

Types of microorganisms and their important features

Microorganism or microbes are microscopic organisms that exist as unicellular, multicellular, or cell clusters. Microorganisms are widespread in nature and are beneficial to life, but some can cause serious harm.

They can be divided into six major types: Bacteria, Archaea, Fungi, Protozoa, Algae, and Viruses.

Bacteria

- Bacteria are unicellular organisms.
- The cells are described as prokaryotic because they lack a nucleus.
- They exist in four major shapes: bacillus (rod shape), coccus (spherical shape), spirilla (spiral shape), and vibrio (curved shape).
- Most bacteria have a peptidoglycan cell wall.
- Bacteria divide by binary fission; and they may possess flagella for motility.
- The difference in their cell wall structure is a major feature used in classifying these organisms. According to the way their cell wall structure stains, bacteria can be classified as either Gram-positive or Gram-negative when using the Gram staining .
- Bacteria can be further divided based on their response to gaseous oxygen into the following groups: aerobic (living in the presence of oxygen), anaerobic (living without oxygen), and facultative anaerobes (can live in both environments).
- According to the way they obtain energy, bacteria are classified as heterotrophs or autotrophs. Autotrophs make their own food by using the energy of sunlight or chemical reactions, in which case they are called chemoautotrophs. Heterotrophs obtain their energy by consuming other organisms. Bacteria that use decaying life forms as a source of energy are called saprophytes.

Archaea

- Archaea or Archaeobacteria differ from true bacteria in their cell wall structure and lack peptidoglycans.
- They are prokaryotic cells with avidity to extreme environmental conditions.
- Based on their habitat, all Archaeans can be divided into the following groups: methanogens (methane-producing organisms), halophiles (archaeans that live in salty

environments), thermophiles (archaeans that live at extremely hot temperatures), and psychrophiles (cold-temperature Archaeans).

- Archaeans use different energy sources like hydrogen gas, carbon dioxide, and sulphur. Some of them use sunlight to make energy, but not the same way plants do.
- They absorb sunlight using their membrane pigment, bacteriorhodopsin. This reacts with light, leading to the formation of the energy molecule adenosine triphosphate (ATP).

Fungi

- Fungi (mushroom, molds, and yeasts) are eukaryotic cells (with a true nucleus).
- Most fungi are multicellular and their cell wall is composed of chitin.
- They obtain nutrients by absorbing organic material from their environment (decomposers), through symbiotic relationships with plants (symbionts), or harmful relationships with a host(parasites).
- They form characteristic filamentous tubes called hyphae that help absorb material. The collection of hyphae is called mycelium.
- Fungi reproduce by releasing spores.

Protozoa

- Protozoa are unicellular aerobic eukaryotes.
- They have a nucleus, complex organelles, and obtain nourishment by absorption or ingestion through specialized structures.
- They make up the largest group of organisms in the world in terms of numbers, biomass, and diversity.
- Their cell walls are made up of cellulose.
- Protozoa have been traditionally divided based on their mode of locomotion:
 - i. flagellates produce their own food and use their whip-like structure to propel forward,
 - ii. ciliates have tiny hair that beat to produce movement,
 - iii. amoeboids have false feet or pseudopodia used for feeding and locomotion,
 - iv. sporozoans are non-motile.

- They also have different means of nutrition, which groups them as autotrophs or heterotrophs.

Algae

- Algae, also called cyanobacteria or blue-green algae, are unicellular or multicellular eukaryotes.
- They obtain nourishment by photosynthesis.
- They live in water, damp soil, and rocks and produce oxygen and carbohydrates used by other organisms.
- It is believed that cyanobacteria are the origins of green land plants.

Viruses

- Viruses are noncellular entities that consist of a nucleic acid core (DNA or RNA) surrounded by a protein coat.
- Although viruses are classified as microorganisms, they are not considered living organisms.
- Viruses cannot reproduce outside a host cell and cannot metabolize on their own.
- Viruses often infest prokaryotic and eukaryotic cells causing diseases.

Multicellular Animal Parasites

A group of eukaryotic organisms consisting of the flatworms and roundworms, which are collectively referred to as the helminths. Although they are not microorganisms by definition, since they are large enough to be easily seen with the naked eye, they live a part of their life cycle in microscopic form. Since the parasitic helminths are of clinical importance, they are often discussed along with the other groups of microbes.