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Case Report

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Bacteria and Fungi in Medicine

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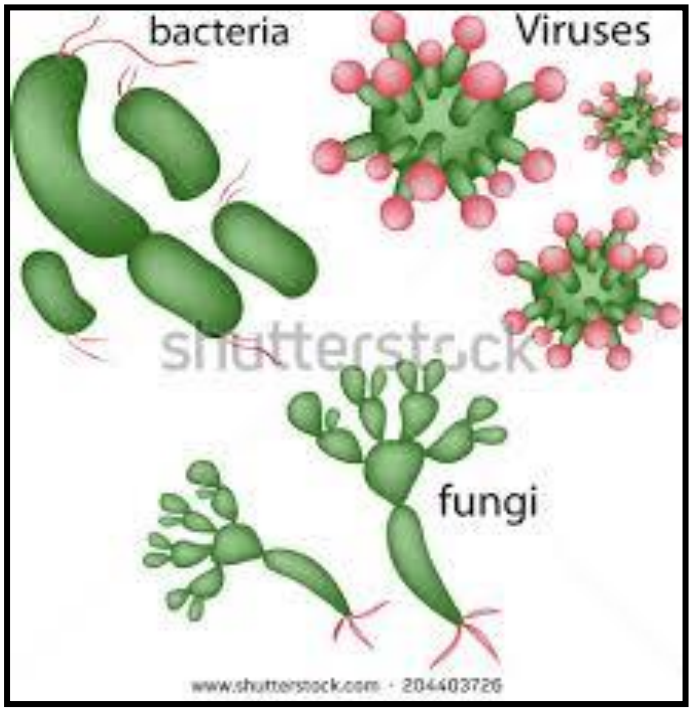
ABSTRACT

Bacteria grow when environmental conditions are favorable. If conditions are not suitable, growth occurs slowly or not at all, and death may even occur. Some factors that affect growth are water, food, oxygen, pH, and temperature. They grow in air, water, foods, and soil, as well as in plant and animal tissue. Any environment that can support life has its bacterial or fungal population.

Introduction:

Fungi and bacteria are essential to many of the most basic ecosystem processes: saprobic fungi break down fallen wood and litter returning nutrients to the soil; nitrogen-fixing bacteria and mycorrhizal fungi assist plants to obtain nutrients from the soil; and many groups of fungi and bacteria cause diseases of plants and animals. Understanding the roles of fungi in ecosystems, the impacts of environmental change and disturbance, and the potential impacts of newly introduced organisms all require accurate identification of species.



Bacteria :

Types of bacteria:

1. Spherical (coccus/cocci)
2. Spiral (spirillium/spirilla)
3. Rod (bacillus/bacilli).

Binary fissionis asexual reproduction in bacteria.

1. DNA replication.
2. Cells size increases.
3. Two¬ identical DNA move to opposite sides of the cell.
4. Cytokinesis (cell division) occurs.

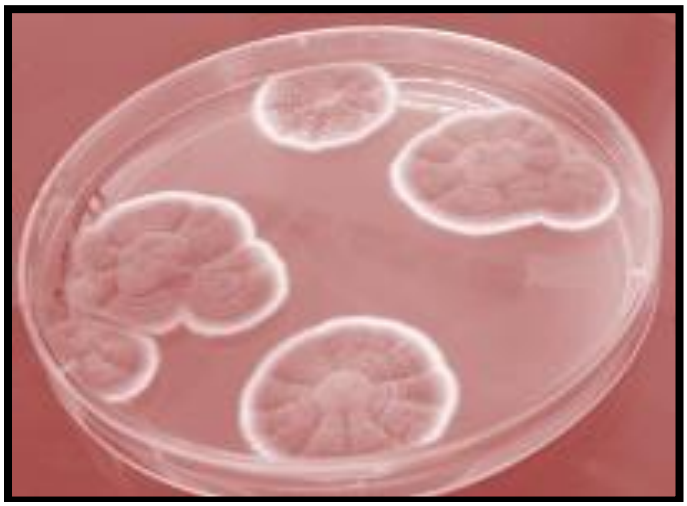
An endo spore is a thick and though-walled, dormant and dehydrated bacterial cell formed during¬ unsuitable conditions.

Pic Information Nahi hai:

1. Conditions become less favourable for bacterium.
2. Polar division occurs (asymmetrical binary fission).
3. The smaller cell is engulfed by the larger cell.
4. A cortex (thick wall) forms around the engulfed cell.
5. An outer coat forms around the cortex as an extra layer of protection,
6. The endospore matures, the larger cell holding it degenerates and it is released.

Fungi:

Fungi are a diverse group of heterotrophic living organisms, can be found in most areas of theϖ biosphere and are all eukaryotic in nature. The study of fungi is called mycology and scientists who study fungi are mycologists.ϖ Their cell walls are made from a polysaccharide called chitin (as opposed to cellulose in plants) andϖ they don't produce their own food (no chlorophyll) An example of saprophytic fungi is mushrooms. Athlete's foot is a parasitic fungus.ϖ Yeast is a single-celled (unicellular) fungus. They reproduce asexually by a process known asϖ budding. The new cell may remain attached to the parent cell and form a string of yeast cells or break off giving single-celled yeast.



Fungi are recognized by the following characteristics:

- Similarly to plants and animal cells, fungal cells contain nuclei with chromosomes.
- They have no chlorophyl, and hence they cannot photosynthesize (they are heterotrophic, like animals)
- Fungi absorb their food (they are osmotrophic) The body of a majority of fungi is comprised of a spreading network of very narrow, tubular, branching filaments called hyphae. These filaments exude enzymes, and absorb food, at their growing tips. Although these filaments are very narrow, they are collectively very long, and can explore and exploit food substrates very efficiently. This group is commonly referred to as mold. A small group of fungi, the yeasts, exists as single cells.
- Fungi generally reproduce by means of spores, which develop on, and are released by, a range of unique structures (such as mushrooms, cup fungi, and many other kinds of microscopically small fruiting bodies).

Bacteria and Fungi :

Bacteria and fungi can form a range of physical associations that depend on various modes of molecular communication for their development and functioning. These bacterial-fungal interactions often result in changes to the pathogenicity or the nutritional influence of one or both partners toward plants or animals (including humans). They can also result in unique contributions to biogeochemical cycles and biotechnological processes. Thus, the interactions between bacteria and fungi are of central importance to numerous biological questions in agriculture, forestry, environmental science, food production, and medicine.

Microbes such as bacteria and fungi, are very tiny organisms found in just about every ecosystem or elsewhere in the world and can associate with other diverse types of living things. They may be harmless passengers in humans and can even participate in biological processes. However, they can also cause injury and interfere with your body functions to the point of causing disease. Here are some significant differences between bacteria and fungi as they play a vital role in the ecology.

The major difference is that they have completely different cellular makeup.. Bacteria are said to be prokaryotic organisms, meaning they do not possess nucleus while fungi are eukaryotic organisms in which they have well-defined nucleus. Additionally, bacteria are considered unicellular microorganisms which can only be seen under a microscope whereas fungi are more complex microorganisms except for yeast. Both organisms have cell walls but the components within the cell walls are different. Most fungi are composed of networks of long hollow

tubes called hyphae. Each hypha is bordered by a rigid wall usually made of chitin—the same material that forms the exoskeletons of insects. Hyphae grow by elongation at the tips and by branching to form a dense network called mycelium. As the mycelium grows, it produces huge fruiting bodies and other structures which contain reproductive spores. In contrast, the key component of the bacterial cell wall is called peptidoglycan. The bacterial cell also has a cell membrane containing cytoplasm.Bacteria have three basic shapes where the cell wall influences the shape of the bacterium. Coccus bacteria are typically rounded, bacilli are rod-shaped and spirillum is spiral-shaped. But there are few bacteria that do not have cell wall and have no definite shape and they are referred as mycoplasma. Fungi appear to have various shapes and forms from mushrooms and shelf fungus to microscopic yeast and mold.

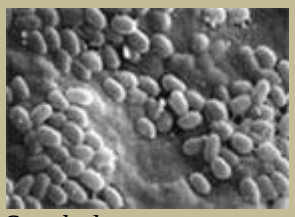
Growth and Nutrition:

Bacteria multiply via binary fission, a process whereby each parent bacterium divides into two daughter cells of similar sizes. Filamentous fungi, on the other hand, grow by branching and elongation, while yeasts reproduce by budding. Regarding their nutrition, fungi are saprophytes, that is, they feed on dead matter. That is why you usually find fungi in soil or water containing organic waste. They are referred to as heterotrophs, meaning they cannot synthesize their own food. In contrast, bacteria can be heterotrophic or autotrophic. Autotrophic bacteria produce their own food from light or chemical energy.

Bacteria can occur in three basic shapes:

- Coccus (spheres)
- Bacillus (rods)
- Spirillum(spirals)

Bacterial Shapes

Name	**Basic Shape**	**Example (electron micrograph)**
Coccus (sphere)		 *Staphylococcus aureus*
Bacillus (rod)	 (starting to divide)	 *Salmonella typhi*
Spirillum (spiral)		 *Campylobacter jejuni*

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