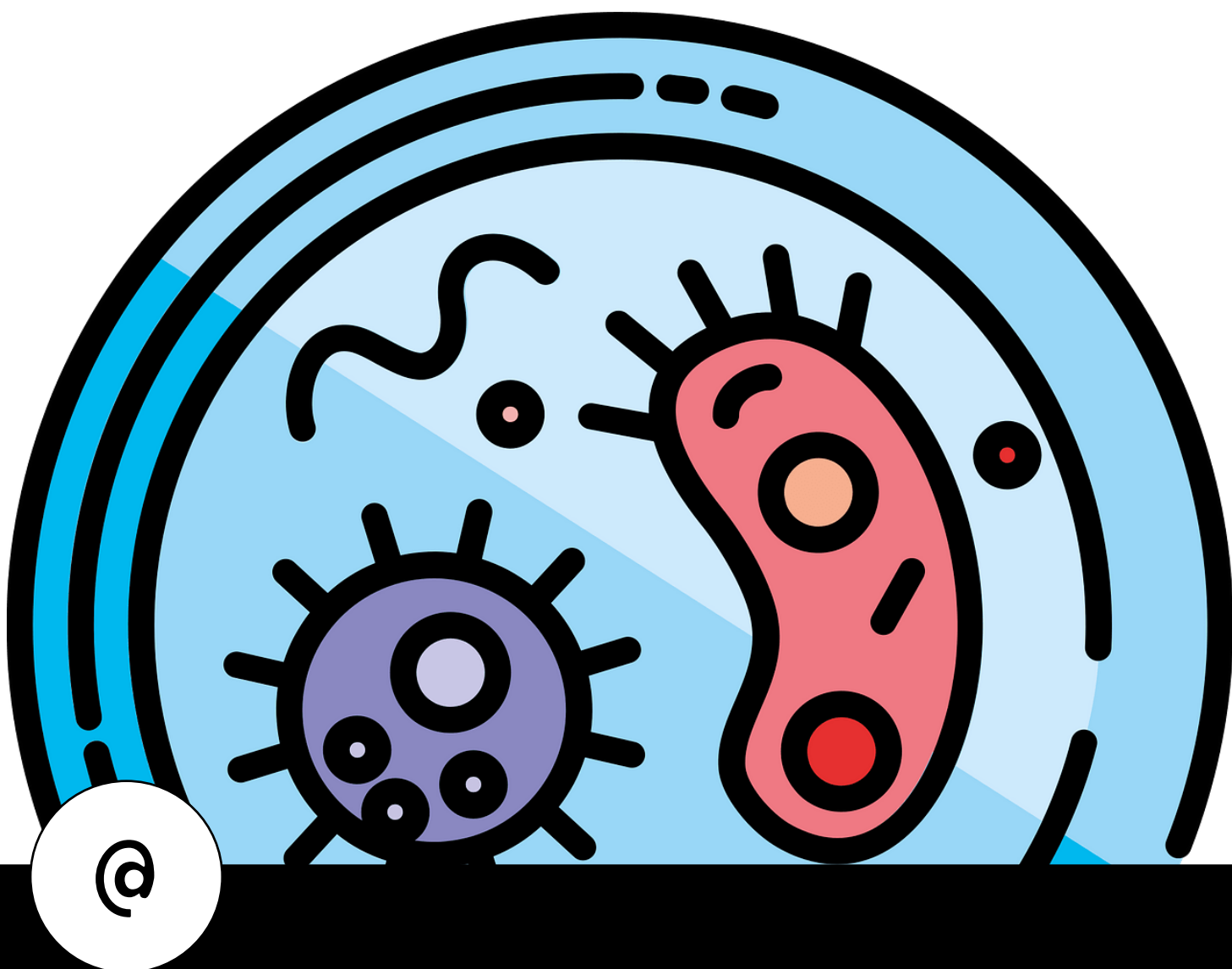


Chapter- 2. Biological Classification



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1. Discuss how classification systems have undergone several changes over a period of time.

Answer:

1. Two-Kingdom System (Linnaeus):

- Classified all organisms into two kingdoms: **Plantae** and **Animalia**.
- Plants were categorized based on their structure, while animals were classified based on the presence or absence of red blood cells.
- This approach failed to accommodate unicellular organisms and did not differentiate between prokaryotes and eukaryotes, leaving many organisms unclassified.

2. Three-Kingdom System (Haeckel):

- To address the limitations of the two-kingdom system, a third kingdom called **Protista** was introduced.
- This kingdom included unicellular eukaryotic organisms, allowing for a broader classification and recognition of diverse life forms.

3. Four-Kingdom System (Copeland):

- The classification was further refined by establishing a fourth kingdom, **Monera**, which comprised all prokaryotic organisms.
- This system provided a clearer distinction between unicellular and multicellular organisms, as well as between different cellular organizations.

4. Five-Kingdom System (Whittaker):

- Proposed in 1969, this comprehensive classification system added a fifth kingdom, **Fungi**, for achlorophyllous, decomposer organisms.
- The five kingdoms are:
 - **Monera**: Prokaryotic organisms (e.g., bacteria)
 - **Protista**: Unicellular eukaryotic organisms (e.g., protozoa)
 - **Fungi**: Decomposers, including molds and yeasts
 - **Plantae**: Multicellular, photosynthetic organisms (e.g., plants)
 - **Animalia**: Multicellular, heterotrophic organisms (e.g., animals)

2. State two economically important uses of:

(a) Heterotrophic bacteria (b) Archaeobacteria

Answer:

(a) Heterotrophic bacteria:

- They assist in the production of curd from milk.
- They are a source of many antibiotics, which are derived from various bacterial species.

(b) Archaeobacteria:

- Methanogens produce methane gas from the dung of ruminants.
- They play a crucial role in biogas production and are involved in sewage treatment processes.

3. What is the nature of cell walls in diatoms?

Answer:

The cell walls of diatoms are composed of silica, making them indestructible. This unique structure is referred to as a frustule, which consists of two thin, overlapping shells that fit together like a soap box. When diatoms die, their silica cell wall deposits accumulate in their habitats, forming diatomaceous earth. This material is soft and inert, making it useful for various industrial applications, such as filtration in oils and sugars.

4. Find out what do the terms 'algal bloom' and 'red tides' signify.

Answer:

Algal Bloom: Algal bloom refers to a rapid increase in the population of algae, particularly blue-green algae (cyanobacteria), in water bodies. This overgrowth leads to discoloration of the water and causes a rise in biological oxygen demand (BOD), which can result in the death of fish and other aquatic life.

Red Tides: Red tides are a phenomenon caused by the rapid multiplication of red dinoflagellates, such as *Gonyaulax*. Their large numbers can turn the water red, and they release toxins that are harmful to marine organisms, leading to significant fish kills and negatively impacting marine ecosystems.

5. How are viroids different from viruses?

Answer:

1. **Structure:** Viroids are small infectious agents consisting solely of single-stranded RNA and lack a protein coat, whereas viruses have genetic material (either single-stranded or double-stranded RNA or DNA) encased in a protective protein coat.
2. **Size:** Viroids are significantly smaller than viruses.
3. **Host Range:** Viroids exclusively infect plants, while viruses can infect a wide range of hosts, including plants, animals, and microorganisms.

6. Describe briefly the four major groups of Protozoa.

Answer:

The four major groups of Protozoa are:

1. **Amoeboid Protozoans:** These organisms inhabit fresh water, seawater, or moist soil. They move and capture their prey using pseudopodia (false feet), as seen in *Amoeba*. Some species, like *Entamoeba*, are parasitic.
2. **Flagellated Protozoans:** Members of this group can be either free-living or parasitic and possess flagella for locomotion. Parasitic forms can cause diseases, such as sleeping sickness, with *Trypanosoma* being a notable example.
3. **Ciliated Protozoans:** Commonly found in aquatic environments, these protozoans are characterized by the presence of numerous cilia covering their body. All cilia beat in unison to create a current that directs food into a cavity called the gullet. Examples include *Paramecium* and *Vorticella*.
4. **Sporozoans:** This group consists of endoparasitic organisms that do not have cilia or flagella. They are unicellular and their bodies are covered by a protective pellicle. A well-known member of this group is *Plasmodium*, the parasite that causes malaria.

7. Plants are autotrophic. Can you think of some plants that are partially heterotrophic?

Answer:

Some plants that are partially heterotrophic include:

- **Insectivorous Plants:** Examples like *Drosera* (Sundew), *Nepenthes* (Pitcher Plant), and *Utricularia* (Bladderwort) are green and primarily autotrophic but also digest small organisms to supplement their nitrogen intake. They are adapted to thrive in nutrient-poor environments and trap insects to obtain essential nutrients.
- **Others:** *Venus Flytrap* is another example of a partially heterotrophic plant that captures and digests insects for added nutrients while still performing photosynthesis.

8. What do the terms photobiont and mycobiont signify?

Answer:

The terms refer to the components of lichens, which are symbiotic associations between algae and fungi:

- **Phycobiont:** This is the algal part of the lichen. It contains chlorophyll and is responsible for photosynthesis, producing food that sustains both the algae and the fungi.

- **Mycobiont:** This is the fungal part of the lichen. It provides structural support and minerals to the algae while also helping retain moisture and absorb nutrients from the environment.

Together, they form a mutually beneficial relationship, showcasing the cooperation between two different organisms.

9. Give a comparative account of the classes of Kingdom Fungi under the following: (i) Mode of nutrition (ii) Mode of reproduction.

Answer

Class	Mode of Nutrition	Mode of Reproduction
Phycomycetes	- Saprophytic or parasitic	- Asexual reproduction by zoospores (motile) and aplanospores (non-motile). - Sexual reproduction through zygospores.
Ascomycetes	- Decomposers, saprophytic, or parasitic, including coprophilous forms	- Asexual reproduction by conidia (asexual spores) and sexual reproduction through ascospores.
Basidiomycetes	- Saprophytic	- Asexual reproduction through budding; sexual reproduction by forming basidiospores through plasmogamy.
Deuteromycetes	- Decomposers, saprophytic, or parasitic	- Primarily reproduce asexually through conidia; sexual reproduction is not observed or is rare.

10. What are the characteristic features of Euglenoids?

Answer:

- Euglenoids are mostly found in fresh or stagnant water.
- They lack a cell wall but have a flexible, protein-rich layer called the pellicle.
- They have two flagella of different lengths.
- In sunlight, they are autotrophic (make their own food), but in its absence, they act as heterotrophs (consume other organisms).
- A small light-sensitive eyespot is present to help them detect light.

11. Give a brief account of viruses with respect to their structure and nature of genetic material. Also, name four common viral diseases.

Answer:

Viruses are microscopic infectious agents consisting of genetic material (either DNA or RNA, but never both) enclosed in a protein coat called a capsid, which is made of smaller subunits called capsomers. Plant viruses usually have single-stranded RNA, while animal viruses may have either single- or double-stranded RNA or DNA. Bacteriophages, which infect bacteria, typically have double-stranded DNA.

Four common viral diseases are Influenza, AIDS, Rabies, and Herpes.

Please input another question from the 1st source.

12. Organise a discussion in your class on the topic - Are viruses living or non-living?

Answer:

Viruses occupy a unique position in biology, showing characteristics of both living and non-living entities.

Non-living characteristics:

- Viruses lack a cellular structure, meaning they don't have cells like living organisms.
- They can exist in a dormant state, often compared to crystals, and can be stored in bottles.
- Viruses cannot carry out metabolic processes on their own; they have no energy storage or energy liberation systems.
- They cannot grow or reproduce outside of a host cell.

Living characteristics:

- They contain genetic material (either DNA or RNA), which is a hallmark of living organisms.
- Viruses are host-specific, meaning they infect particular types of cells.
- They can replicate, but only within the host's cellular machinery, showcasing their ability to reproduce.
- They exhibit antigenic properties, meaning they can trigger immune responses.
- Viruses are obligate parasites, relying entirely on host organisms for survival.
- They can undergo mutations, which is a characteristic of living systems.

In conclusion, while viruses possess some qualities of living organisms, their reliance on host cells for reproduction and their acellular structure challenge the classification as purely living entities. This duality has made viruses a fascinating topic in modern biology and systematics.