

#424311

Topic: Monera

State two economically important uses of :

- (a) Heterotrophic bacteria
- (b) Archaeobacteria

**Solution**

Heterotrophic bacteria are microorganisms which survive by deriving their energy using organic matter from other sources rather synthesizing their own organic matter. The Heterotrophic bacteria have several economic applications; *Lactobacillus* and *Streptococcus* are widely used for the production of milk products like curd and cheese. *Streptomyces* is a genus of Gram-positive bacteria with the ability to produce bioactive secondary metabolites such as antifungals, antivirals, antitumoral, anti-hypertensives, and mainly antibiotics and immunosuppressives. Many different kinds of heterotrophic bacteria are used for sewage treatment. Some heterotrophic bacteria like *Alcanivorax* or *Methylocella Silvestris* have an important applications in bio-remediation (cleaning the oil spills).

Archaeobacteria are a group of prokaryotes which live under very harsh and hostile conditions. Since the enzymes from these organisms can survive harsh conditions they have many industrial applications in biotechnology; Many of the thermostable enzymes used in the manipulation of DNA are derived from Archaeobacteria, Methanogens of the Archaeobacteria are mainly involved in the biogas production.

#424314

Topic: Virus

How are viroids different from viruses?

**Solution**

Viroids are free RNA molecules of low molecular weight without any protein coat while viruses can have either RNA or DNA molecules encapsulated in a protein coat. Viroids are smaller in size than the viruses. Viroids infect only plants whereas virus infects all types of organisms. In viroids, protein coat is absent whereas in viruses a protein covering or a coat called as capsid is present around the genetic material.

#424316

Topic: Protista

Describe briefly the four major groups of Protozoa?

**Solution**

The Protozoans which are included in the kingdom Protista, are single-celled heterotrophic eukaryotic organisms. Depending on their mode of locomotion they are grouped into four;

The amoeboid protozoans - which use pseudopodia for movement e.g. *Amoeba*, *Entamoeba*

The flagellated protozoans - which have flagella assisting their movement. e.g. *Trypanosoma*

The ciliated protozoans - which have thousands of cilia whose coordinated movement helps the organism to move. e.g. *Paramecium*

The sporozoans - which do not have movement but are carried around by flow of fluids. They are usually parasites with spore-like stage in their life cycle. e.g. *Plasmodium*

#424320

Topic: Fungi

What do the terms phycobiont and mycobiont signify?

**Solution**

Phycobiont refers to the algal component of the lichens and mycobiont refers to the fungal component. Both of these are present in a symbiotic relationship in which algae prepare food for fungi due to the presence of chlorophyll whereas the fungus provides shelter to algae and absorbs water and nutrients from the soil.

#424321

Topic: Fungi

Give a comparative account of the classes of kingdom Fungi under the following:

- (i) Mode of nutrition
- (ii) Mode of reproduction

**Solution**

(A) **Phycomycetes**- This group of fungi includes members such as *Rhizopus*, *Albugo*, etc.

(i) Mode of nutrition:

They are obligate parasites on plants or are found on decaying matter such as wood.

(ii) Mode of reproduction:

Asexual reproduction takes place through motile zoospores or non-motile aplanospores produced endogenously in a sporangium.

Sexual reproduction may be of isogamous, anisogamous, or oogamous type resulting in the formation of thick-walled zygospore.

(B) **Ascomycetes**- This group of fungi includes members such as *Penicillium*, *Aspergillus*, *Claviceps* and *Neurospora*.

(i) Mode of nutrition:

They are sporophytic, decomposers, parasitic or coprophilous (growing on dung).

(ii) Mode of reproduction:

Asexual reproduction occurs through asexual spores produced exogenously, such as conidia produced on conidiophores.

Sexual reproduction takes place through ascospores produced endogenously in sac-like asci and arranged inside ascocarps.

(C) **Basidiomycetes**- This group of fungi includes members such as *Ustilago*, *Agaricus* and *Puccinia*.

(i) Mode of nutrition:

They grow as decomposers in soil or on logs and tree stumps. They also occur as parasites in plants causing diseases such as rusts and smuts.

(ii) Mode of reproduction:

Asexual reproduction takes place commonly through fragmentation. Asexual spores are absent.

Sex organs are absent but sexual reproduction takes place through plasmogamy. It involves fusion of two different strains of hyphae. The resulting dikaryon gives rise to a basidium. Four basidiospores are produced inside a basidium.

(D) **Deuteromycetes**- This group of fungi includes members such as *Alternaria*, *Trichoderma* and *Colletotrichum*.

(i) Mode of nutrition:

Some members are saprophytes while others are parasites. However, a large number act as decomposers of leaf litter.

(ii) Mode of reproduction:

Asexual reproduction is the only way of reproduction in Deuteromycetes, which occurs through asexual spores called as conidia.

Sexual reproduction is absent in Deuteromycetes.

---

#### #424322

**Topic:** Protista

What are the characteristic features of Euglenoids?

#### Solution

Some characteristic features of Euglenoids are as follows.

- Euglenoids (such as *Euglena*) are unicellular protists commonly found in fresh water.
- Instead of the cell wall, a protein-rich cell membrane known as pellicle is present.
- They bear two flagella on the anterior end of the body.
- A small light sensitive eye spot is present.
- They contain photosynthetic pigments such as chlorophyll and can thus prepare their own food. However, in the absence of light, they behave similarly to heterotrophs by capturing other small aquatic organisms.
- They have both plant and animal-like features, which makes them difficult to classify and hence they are called as connecting link between plants and animals.

---

#### #424324

**Topic:** Virus

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

#### Solution

Viruses are sub-microscopic, infectious, nucleoprotein particles that can infect all living organisms. A virus consists of genetic material either in the form of RNA or DNA surrounded by a protein coat.

Most of the viruses, infecting plants, have single-stranded RNA as genetic material. On the other hand, the viruses infecting animals have single or double-stranded RNA or double-stranded DNA.

Bacteriophages or viruses infecting bacteria mostly have double-stranded DNA. Their protein coat called as capsid is made up of capsomere subunits. These capsomeres are arranged in helical or polyhedral geometric forms.

AIDS, smallpox, mumps, and influenza are some common examples of viral diseases.

---

**#424325**

**Topic:** Virus

---

Organise a discussion in your class on the topic, are viruses living or nonliving?

---

**Solution**

Viruses are microscopic organisms that have characteristics of both living and non-living. A virus consists of a strand of DNA or RNA covered by a protein coat. This presence of nucleic acid (DNA or RNA) and protein suggests that viruses are alive. In addition, they can also respond to their environment in a limited manner inside the host cell.

However, some other characters, such as their inability to reproduce without using the host cell machinery and their acellular nature indicate that viruses are non-living.

Therefore, classifying viruses has remained a mystery for modern systematics.

---

**#462996**

**Topic:** Monera

---

What are the major group of microorganisms?

---

**Solution**

Microorganisms are the small organisms that cannot be seen with naked eyes. Major groups of microorganisms are bacteria, virus, protozoa and algae. Bacteria are the prokaryotic, unicellular organisms while viruses are acellular. Protozoans are single celled eukaryotic mostly aquatic organisms. Algae are chlorophyll containing photosynthetic eukaryotic single to multiple celled organisms.

---

**#464548**

**Topic:** Classification of organisms

---

Explain the basis for grouping organisms into five kingdoms.

---

**Solution**

The basis of grouping organisms into five kingdoms was given by Whittaker. They are as follows:

1. Whether the cell is prokaryotic or eukaryotic.
2. Whether the cell is unicellular or multicellular.
3. Whether the cell wall is present or absent.
4. Whether the cell prepares its own food or obtains its food from outside.

---

**#464549**

**Topic:** Algae

---

What are the major divisions in the Plantae? What is the basis for these divisions?

---

**Solution**

Kingdom Plantae are divided into 5 major divisions: Thallophyta, Bryophyta, Pteridophyta, Gymnosperms and Angiosperms.

The kingdom Plantae is classified on the basis of:

1. Whether the plant body is differentiated or undifferentiated.
2. Whether the plant produces seeds or not.
3. Whether the seeds produced are naked or enclosed within the fruits.
4. Whether the differentiated plant body possesses specialized tissue for water and food transportation.

---

**#464550**

**Topic:** Algae

---

How are the criteria for deciding divisions in plants different from the criteria for deciding the subgroups among animals?

---

**Solution**

Classification of plant is different than the classification of animals. In plants, classification is based on the morphology of the plants (i.e., differentiated or undifferentiated plant body, with or without seeds, naked seeds or seeds inside fruits, etc) whereas in animals, classification is mainly on the basis body design of an animal (i.e., presence or absence of a notochord).

---

**#526095**

**Topic:** Monera

---

Bacteria cannot be seen with the naked eyes, but these can be seen with the help of a microscope. If you have to carry a sample from your home to your biology laboratory to demonstrate the presence of microbes under a microscope, which sample would you carry and why?

---

**Solution**

As a sample tap water or curd can be used for the study of microbes. Tap water contains many kinds of bacteria (close to 80,000 bacteria in 1 ml of water) which can be observed under the microscope by simple staining procedures. Alternately, curd which is made by the action of *Lactobacillus* bacteria on milk can also be easily observed under a microscope.