

BIOLOGY



Important Questions

Multiple Choice questions-

- Five kingdom classification was proposed by
 - Linnaeus
 - Whittaker
 - Lamarck
 - Aristotle
- The Term 'Superparasite' is; meant for
 - Mycoplasma
 - Animal parasites
 - Viruses
 - A parasite living on another parasite
- The biologist, who created the kingdom protista for the unicellular animals and plants, is
 - Haeckel
 - Pasteur
 - Koch
 - Lister
- Organism having characters of both animals and plants is
 - Bacterium
 - Paramoecium
 - Mycoplasma
 - Euglena
- On the basis of nucleus, viruses should be included in
 - Prokaryotes
 - Eukaryotes
 - Both (a) and (b)
 - None of these
- A unicellular organism often considered a connecting link between plants and animals, is
 - Paramoecium
 - Entamoeba
 - Monocystics
 - Euglena
- In Whittaker's classification, the Unicellular organisms having various cell organelles constitute the kingdom
 - Monera

- B. Protista
C. Fungi
D. Plantae
8. In five kingdom classification, the kindom that includes the blue green algae, nitrogen fixing bacteria and methanogenic archaeobacteria is
- A. Plantae
B. Fungi
C. Protista
D. Monero
9. Name the archaeobacteria present in the guts of ruminant animals
- A. Methanogens
B. Anabaena
C. Nostoc
D. Paramoecium
10. An organism without cell-wall and can survive without oxygen
- A. Gonyax
B. Rhizopus
C. Mycoplasma
D. Sacharomyces

Fill in the blanks

1. In Linnaeus' time a _____ system of classification with _____ and _____ kingdom was developed that included all plants and animals respectively.
2. R.H. Whittaker (1969) proposed a _____
3. The kingdoms defined by him were named _____, _____, _____, _____ and _____
4. _____ and _____ were placed together under algae.
5. _____ differ from other bacteria in having a different cell wall structure and this feature is responsible for their survival in extreme conditions.
6. _____ have chlorophyll a similar to green plants and are photosynthetic autotrophs.
7. _____ are the most abundant in nature.
8. All single celled eukaryotes are placed under _____, but the boundaries of this kingdom are not well defined.
9. _____ are the chief 'producers' in the oceans.
10. Slime moulds are _____ protists.

True (T) or False (F)

1. All protozoans are heterotrophs and live as predators or parasites.
2. Most Fungi are heterotrophic and absorb soluble organic matter from dead substrates and hence are called saprophytes.
3. Reproduction in fungi can take place by vegetative means fragmentation, fission and budding.
4. Fusion of protoplasts between two motile or non-motile gametes is called karyogamy.
5. Fusion of two nuclei is called plasmogamy?
6. Meiosis in zygote resulting in haploid spores.
7. The mycelium is aseptate and coenocytic.
8. Some examples are Aspergillus, Claviceps and Neurospora, Neurospora is used extensively in biochemical and genetic work.
9. Some examples are Alternaria, Colletotrichum and Trichoderma.
10. Life cycle of plants has two distinct phases-the diploid sporophytic and haploid gametophytic?

Very Short Questions :

1. What are imperfect fungi?
2. How many basidiospores are formed after Karyogamy and meiosis?
3. What is plasmogamy?
4. What do you mean by mycorrhiza?
5. How does the spore of slime molds disperse?
6. Name the protein-rich layer found in Euglenoids.
7. Give an example of red dinoflagellates?
8. Who is known as 'Producers of the oceans'?
9. Name the organism responsible for algal bloom?
10. Who has discovered viroids?

Short Questions :

1. What are the slime molds?
2. Write a short note on kingdom Plantae.
3. Write a short note on Mycoplasma.
4. Write a short note on Kingdom Animalia.
5. Write a short note on Lichens.

Long Answer Type

1. Describe the kingdom Monera.
2. Write the distinct characters of protozoa.

Assertion Reason Question-

1. In these questions, a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices.

- (a) If both Assertion and Reason are true and Reason is the correct explanation of Assertion.
- (b) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
- (c) If Assertion is true but Reason is false.
- (d) If both Assertion and Reason are false.

Assertion: Bacteria are prokaryotic.

Reason: Bacteria do not possess true nucleus and membrane bound cell organelles.

2. In these questions, a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices.

- (a) If both Assertion and Reason are true and Reason is the correct explanation of Assertion.
- (b) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
- (c) If Assertion is true but Reason is false.
- (d) If both Assertion and Reason are false.

Assertion: Bacterial photosynthesis occurs by utilizing wavelength longer than 700 nm.

Reason: Here reaction centre is P-890.

Case Study Based Question-

1. Bacteria are the sole members of the Kingdom Monera. They are the most abundant micro-organisms. Bacteria occur almost everywhere. They also live in extreme habitats such as hot springs, deserts, snow and deep oceans where very few other life forms can survive. Many of them live in or on other organisms as parasites. Bacteria are grouped under four categories based on their shape –the spherical Coccus (pl.: cocci), the rod-shaped Bacillus (pl.: bacilli), the comma shaped Vibrium (pl.: vibrio) and the spiral Spirillum (pl.: spirilla).

Though the bacterial structure is very simple, they are very complex in behaviour. Compared to many other organisms, bacteria as a group show the most extensive metabolic diversity. Some of the bacteria are autotrophic, i.e., they synthesise their own food from inorganic substrates. They may be photosynthetic autotrophic or chemosynthetic autotrophic. The vast majority of bacteria are heterotrophs, i.e., they depend on other organisms or on dead organic matter for food.

Archaeobacteria

These bacteria are special since they live in some of the harshest habitats such as extreme salty areas (halophiles), hot springs (thermoacidophiles) and marshy areas (methanogens).

Archaeobacteria differ from other bacteria in having a different cell wall structure and this feature is responsible for their survival in extreme conditions. Methanogens are present in the gut of several ruminant animals such as cows and buffaloes and they are responsible for the production of methane (biogas) from the dung of these animals.

Eubacteria

There are thousands of different eubacteria or 'true bacteria'. They are characterised by the presence of a rigid cell wall, and if motile, a flagellum. The cyanobacteria (also referred to as blue green algae) have chlorophyll a similar to green plants and are photosynthetic autotrophs. The cyanobacteria are unicellular, colonial or filamentous, freshwater/marine or terrestrial algae. Their colonies are generally surrounded by gelatinous sheath. They often form blooms in polluted water bodies. Some of these organisms can fix atmospheric nitrogen in specialised cells called heterocysts, e.g., Nostoc and Anabaena. Chemosynthetic autotrophic bacteria oxidise various inorganic substances such as nitrates, nitrites and ammonia and use the released energy for the ATP production. They play a great role in recycling nutrients like nitrogen, phosphorous, iron and sulphur.

Heterotrophic bacteria are most abundant in nature. The majority are important decomposers. Many of them have a significant impact on human affairs. They are helpful in making curd from milk, production of antibiotics, fixing nitrogen in legume roots, etc. Some are pathogens causing damage to human beings, crops, farm animals and pets. Cholera, typhoid, tetanus, citrus canker are well known diseases caused by different bacteria. Bacteria reproduce mainly by fission. Sometimes, under unfavourable conditions, they produce spores. They also reproduce by a sort of sexual reproduction by adopting a primitive type of DNA transfer from one bacterium to the other. The Mycoplasma are organisms that completely lack a cell wall. They are the smallest living cells known and can survive without oxygen. Many mycoplasma are pathogenic in animals and plants.

- (1) _____ bacteria is responsible for formation of biogas from cow dung / organic waste
- (a) cyanobacteria
 - (b) Halophiles
 - (c) Thermoacidophiles
 - (d) Methanogens
- (2) _____ are the bacteria that can grow and thrive in salty areas.
- (a) Methanogens
 - (b) Halophobic
 - (c) Halophiles
 - (d) Thermoacidophiles
- (3) true bacteria are characterised by _____
- (a) Rigid Cell wall
 - (b) Flagellum present for locomotion

- (c) Both a and b
- (d) None of the above

(4) Name the eubacteria which is also referred as blue green algae.

(5) What is heterocyst?

(6) What are the thermoacidophiles?

2. The fungi constitute a unique kingdom of heterotrophic organisms. They show a great diversity in morphology and habitat. Some unicellular fungi, e.g., yeast are used to make bread and beer. Other fungi cause diseases in plants and animals; wheat rust-causing *Puccinia* is an important example. Some are the source of antibiotics, e.g., *Penicillium*. Fungi are cosmopolitan and occur in air, water, soil and on animals and plants. With the exception of yeasts which are unicellular, fungi are filamentous. Their bodies consist of long, slender thread-like structures called hyphae. The network of hyphae is known as mycelium. Some hyphae are continuous tubes filled with multinucleated cytoplasm – these are called coenocytic hyphae. Others have septae or cross walls in their hyphae. The cell walls of fungi are composed of chitin and polysaccharides. Most fungi are heterotrophic and absorb soluble organic matter from dead substrates and hence are called saprophytes. Those that depend on living plants and animals are called parasites. They can also live as symbionts – in association with algae as lichens and with roots of higher plants as mycorrhiza.

Reproduction in fungi can take place by vegetative means – fragmentation, fission and budding. Asexual reproduction is by spores called conidia or sporangiospores or zoospores, and sexual reproduction is by oospores, ascospores and basidiospores. The various spores are produced in distinct structures called fruiting bodies. The sexual cycle involves the following three steps:

- Fusion of protoplasts between two motile or non-motile gametes called plasmogamy.
- Fusion of two nuclei called karyogamy.
- Meiosis in zygote resulting in haploid spores.

When a fungus reproduces sexually, two haploid hyphae of compatible mating types come together and fuse. In some fungi the fusion of two haploid cells immediately results in diploid cells ($2n$). However, in other fungi (ascomycetes and basidiomycetes), an intervening dikaryotic stage ($n + n$, i.e., two nuclei per cell) occurs; such a condition is called a dikaryon and the phase is called dikaryophase of fungus. Later, the parental nuclei fuse and the cells become diploid. The fungi form fruiting bodies in which reduction division occurs, leading to formation of haploid spores.

(1) _____ Hyphae are without septa and filled with multinucleated cytoplasm.

- (a) Septate
- (b) Nucleated
- (c) Coenocytic
- (d) Both a and c

(2) _____ is the only single celled fungi organism.

- (a) Penicillium
- (b) Yeast
- (c) Mycorrhiza
- (d) Both a and b

(3) What is saprophytic fungi?

(4) Give reason – why fungi are referred as cosmopolitan organism?

(5) Name the fungi which is responsible for rusting disease in wheat plant.

ANSWER KEY –

➤ Multiple Choice Answer :

1. Whittaker
2. A parasite living on another parasite
3. Haeckel
4. Euglena
5. None of these
6. Euglena
7. Protista
8. Monero
9. Methanogens
10. Mycoplasma

➤ Fill in the blanks :

1. Two kingdom, Plantae, Animalia
2. Five Kingdom Classification
3. Monera, Protista, Fungi, Plantae, Animalia
4. Chlamydomonas, Spirogyra
5. Archaeobacteria
6. Cyanobacteria
7. Heterotrophic bacteria
8. Protista
9. Diatoms
10. saprophytic

➤ **Write true (T) or false (F) :**

1. True
2. True.
3. True
4. False
5. False
6. True
7. True
8. True
9. True
10. True

➤ **Very Short Answer :**

1. Asexually reproducing fungi belonging to Deuteromycetes are imperfect fungi
2. 4
3. Fusion of protoplasts between two motile or non-motile gametes.
4. Mycorrhiza is a symbiotic association between fungi with roots of higher
5. By air currents
6. Pellicle.
7. Gonyaulax.
8. Diatoms.
9. Blue-green algae.

➤ **Short Answer :**

1. Answer:

1. The slime molds are both plant and animal-like.
2. They are plant-like in the production of spores during reproduction and animal-like in the mode of nutrition and rheumatic organization.
3. Their rheumatic structure consists of an acellular, multinucleate mobile mass of protoplasm which lacks a good wall called plasmodium.
4. The reproductive stage consists of sporangia and spores formed after meiosis. The spores on germination produce either flagellated swarm cells or myxamoebae.
5. These divide mitotically, then behave as gametes and fuse in pairs to form a diploid

zygote. The zygote nucleus divides mitotically but the nuclear division is not followed by cell wall formation so that all nuclei lie free in the cytoplasm.

6. The enlargement of the zygote into plasmodium takes place which moves freely on the substratum and feeds on bacteria, fungal and algal spores, and also absorbs nutrients directly from the substratum. The plasmodium then settles on dry places and develops into sporangia. Therefore asexual stage is plant-like and the sexual stage is animal-like.

2. Answer:

1. Kingdom Plantae includes all autotrophic plants which are photosynthetic forms called green plants starting from simple algae, bryophytes, pteridophytes to gymnosperm and angiosperms.
2. The plant cell has a cell wall mainly made of cellulose and, eukaryotic structure with prominent chloroplasts. Some plants are heterophilic like insectivorous plants which feed on insects and flies e.g. Bladderwort and Venus flytrap.
3. The life cycle has two phases-sporophytic and gametophytic which are diploid ($2n$) and haploid (n) respectively. That means zygote ($2n$) undergoes meiosis to form haploid (n) spores these spores germinate into a gametophyte, then these gametes (male and female) fuse to form a zygote ($2n$) again which gives rise to the sporophyte. This phenomenon is called the alternation of generation.

3. Answer:

1. Discovered by E.Nocard and E.R. Roux (1898) mycoplasma is the smallest known aerobic prokaryotes without a cell wall.
2. They were isolated from cattle suffering from bovine pleuropneumonia and hence they were designated as PPLO (pleuropneumonia-like organisms)
3. They are found in different forms as a spheroid, thin, stellate called pleomorphic.
4. They occur in soil, sewage, human, and plants.

4. Answer:

1. Kingdom Animalia includes all animals except the protozoan. The members are multicellular eukaryotes. The cell wall is absent cells, organized into tissue. They directly or indirectly depend on plants for food.
2. They digest their food in an internal cavity and store food reserves as glycogen or fat. They are heterotrophic and the mode of nutrition is holozoic nutrition. They act as decomposers and help in the recycling of minerals.
3. Kingdom Plantae includes the multicellular, photosynthetic eukaryotic forms.
4. They have well-established mechanisms for absorption and Kingdom Animalia includes all animals except the protozoans. They are multicellular eukaryotes and are holozoic. The cells lack walls.

5. Answer:

Lichens are a symbiotic association between algae and fungi. The algae component is known as phycobiont and the fungal component as mycobiont which are autotrophic and heterotrophic respectively. Algae prepare food for fungi and fungi provides shelter and absorbs mineral nutrient and water for its partner.

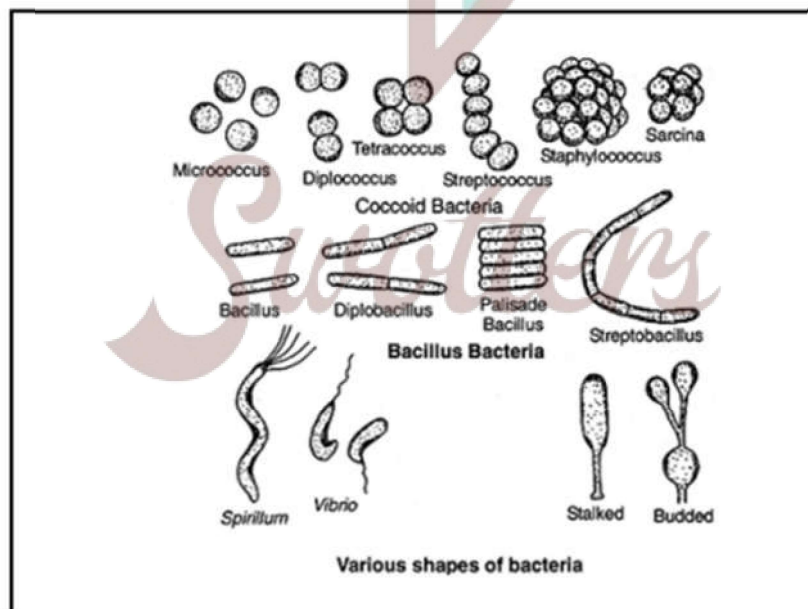
On the basis of the structure of thallus, lichens can be classified into three types

1. **Crustose:** forms a crust on the substrate which is not easily separated from the substrate e.g. Graphis
2. **Foliose:** forms the leafy lobed structure attached to the substrate with the help of rhizines easily separated from substrate eg. Parmelia.
3. **Fruticose:** forms shrubby, cylindrical, and branched thallus. They grow erect or hang from the substrate e.g. Usnea. Lichens are the pioneer colonizers of bare rocks. They also colonize tree trunks in temperate climatic regions.

➤ Long Answer :

1. This kingdom comprises single-celled prokaryotic organisms like bacteria, filamentous actinomycetes, and photosynthetic blue-green algae of Cyanobacteria. The salient features are already given in Table 2.1 we will further discuss the following organisms briefly.

Bacteria: Bacteria are single-celled microscope true prokaryotic organisms which are almost omnipresent. They colonize soil, water, and air. These can survive



in extreme environmental conditions like high temperature, high salt concentration, in absence of oxygen (anaerobic) or in presence of oxygen (aerobic) in high acidic or alkaline pH, etc. (sometimes these are called Archaeobacteria).

Some bacteria can be chemotrophs that derive energy from inorganic compounds in absence

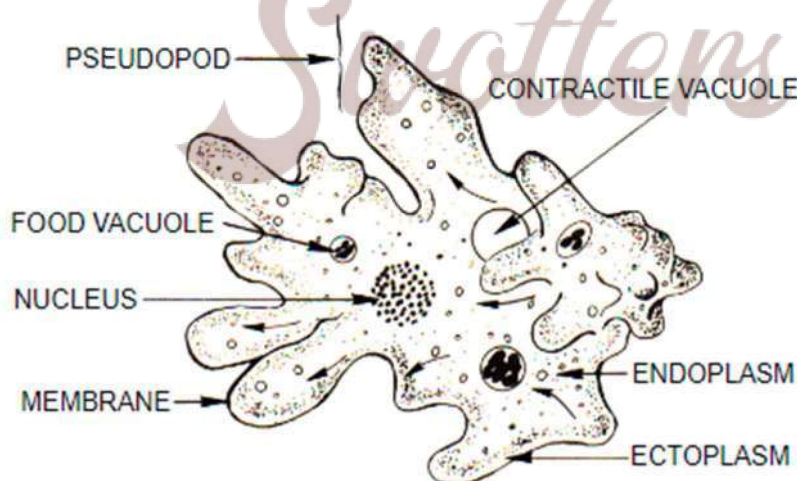
of oxygen e.g. methanogenic bacteria produce methane gas (CH_4) from CO_2 and H_2 , some live by oxidizing hydrogen supplied eg. Thiobacillus.

Some are parasites on plants and animals e.g. Xanthomonas citri and Vibrio Cholera; another form symbiotic association with plant roots e.g. Rhizobium.

The bacteria can be of various sizes and shape i.e. spherical or round, coccus (pi. cocci), rod-shaped and bacillus (pi. Bacilli), spiral-shaped spirillum (pi. Priscilla). Long and helical shaped called spirochetes. Many bacteria have one or more slender, long flagellum (pi. flagella) which helps them to move in the liquid substrate. Some bacteria form endospores under poor nutrient conditions.

2. Answer

1. Protozoa are single-celled heterotrophs or 'first animal'. They can be free-living and parasitic members, mobile with flagellar movement, by pseudopodia, or by ciliary movements e.g. Euglena and Amoeba.
2. Cell wall is absent in some like Amoeba so they can change their shape. The Euglena is autotrophic because of the presence of chlorophyll it performs photosynthesis but in the absence of light, it becomes heterotrophic and ingests other protists or food particles.
3. They reproduce asexually by binary fission but some reproduce sexually by fusion of gametes followed by meiosis. Another important member of protists is the malarial parasite, Plasmodium, causing the notorious disease malaria in man, carried by mosquitoes, it multiplies rapidly in the liver of humans and brings about the cyclic fever releasing toxins into the bloodstream of its host.



Photograph of Amoeba and Euglenas

Assertion Reason Answer-

1. (a) If both Assertion and Reason are true and Reason is the correct explanation of Assertion.

Explanation: Bacterial cell is prokaryotic. It lacks true nucleus and membrane bound organelles

2. (b) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion

Explanation: Bacteria utilize the wavelengths longer than 700 nm for photosynthesis and the reaction centre is P-890 the reductant is NADH + H⁺. In bacteria, donor may be H₂S or malate or succinate.

Case Study Answer-

1. Answer:

(1) d

(2) c

(3) c

(4) The cyanobacteria is also referred to as blue-green algae, they have chlorophyll a similar to green plants and are photosynthetic autotrophs.

(5) Heterocyst is the specialised cells which facilitate the nitrogen fixation. It is found in cyanobacteria e.g., Nostoc and Anabaena.

(6) Thermoacidophiles are the bacteria that can survive, grow and thrive in extreme hot temperature condition and acidic environments

2. Answer:

(1) c

(2) b

(3) Saprophytic is the mode of obtaining food by absorption of dissolved organic material which is produced by decaying of organic matters. Those fungi obtain their food by this mode are termed as saprophytic fungi.

(4) Fungi shows a great diversity in morphology and habitat. Fungi are widespread. They can be found in air, water, soil, on the body of other living animal, inside the body. They can be found almost every, because of this fungi are referred as cosmopolitan organism.

(5) Puccinia is the fungi, which cause rusting disease in wheat plant.