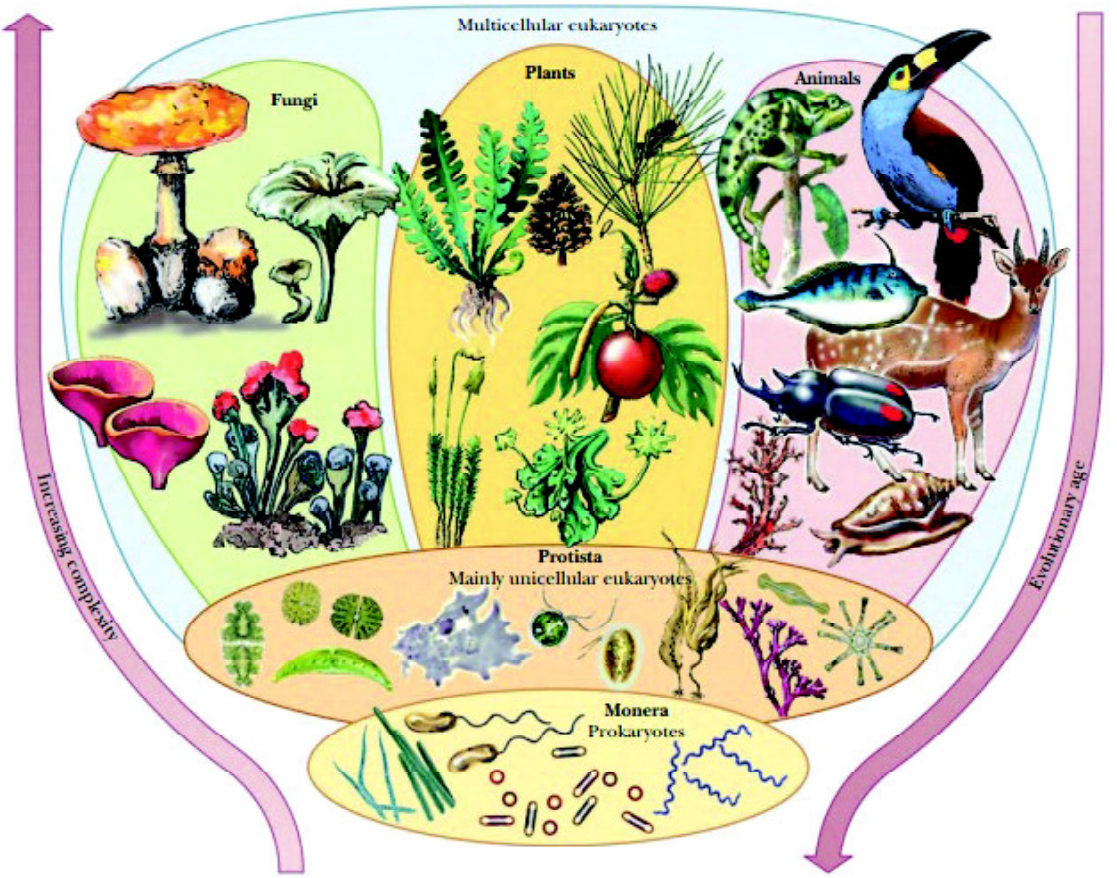


2 BIOLOGICAL CLASSIFICATION

CONTENTS

- *Kingdom Monera*
- *Kingdom Protista*
- *Kingdom Fungi*
- *Kingdom Plantae*
- *Kingdom Animalia*
- *Viruses, Viroids and Lichens*

NEET SYLLABUS

- *Five kingdom classification*
- *salient features and classification of Monera Protista and Fungi into major groups*
- *Viruses and Viroids.*
- *Lichens*

INTRODUCTION

➢ In this chpater we will study the broad classification of living organisms. This system was proposed by Whittaker (1969) where in he suggested that 5 kingdom classification viz **Monera, Protista, Fungi, Plantae and Animalia.**

➢ We must stress here that our understanding of the Plant kingdom and Animal kingdom has changed over time. Fungi, and members of the Monera and Protista having cell walls have now been excluded from Plantae though earlier classifications put them in the same kingdom. So, the cyanobacteria that are also referred to as blue green algae are not 'algae' any more. Unicellular, Eucaryotic organisms have been separated from animalia and they are put in Protista. We will study how the evolution of organisms has taken place from simple to complex forms and how the study of these organisms has been simplified by classification.

* Since the dawn of civilisation, there have been many attempts to classify living organisms. It was done instinctively not using criteria that were scientific but borne out of a need to use organisms for our own use – for food, shelter and clothing.

* Aristotle was the earliest to attempt a more scientific basis for classification. He used simple morphological characters to classify plants into trees, shrubs and herbs. He also divided animals into two groups, those which had red blood (Aeimia) and those that did not (Aneimia).

TWO KINGDOM SYSTEM OF CLASSIFICATION

* In Linnaeus' time, **Two Kingdom** system of classification with **Plantae** and **Animalia** kingdoms was developed that included all plants and animals respectively. This system was used till very recently.

* **DEMERITS** :This system did not distinguish between the eukaryotes and prokaryotes, unicellular and multicellular organisms and photosynthetic (green algae) and non-photosynthetic (fungi) organisms.

* **Merits:**Classification of organisms into plants and animals was easily done and was easy to understand, inspite, a large number of organisms did not fall into either category. Hence the two kingdom classification used for a long time was found inadequate.

* A need was also felt for including, besides gross morphology, other characteristics like cell structure, nature of wall, mode of nutrition, habitat, methods of reproduction, evolutionary relationships, etc.Classification systems for the living organisms have hence, undergone several changes over time.

* Though plant and animal kingdoms have been a constant under all different systems, the understanding of what groups/organisms be included under these kingdoms have been changing; the number and nature of other kingdoms have also been understood differently by different scientists over time.

➢ Three kingdom system of classification

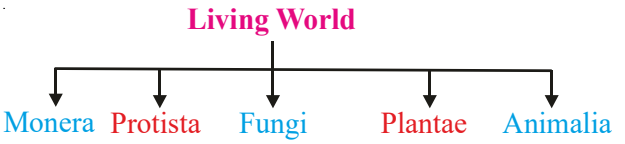
Ernst Haeckel (1866), a German zoologist suggested that a third kingdom, **Protista** should be created to include those unicellular microorganisms that are typically neither plants nor animals. He included bacteria, algae, fungi and protozoa under Protista.

* Three kingdoms according to Haeckel are **Protista, Plantae** and **Animalia**.

➢ FOUR KINGDOM SYSTEM OF CLASSIFICATION

Copeland (1956) suggested that all prokaryotes. *i.e.,* bacteria, cyanobacteria, etc., be placed under kingdom **Monera** (= Mychota). According to Copeland, four kingdoms are Monera (= Mychota), Protista, Plantae and Animalia.

* The main drawback of this system is that fungi are not properly placed.
* R.H. Whittaker (1969) proposed a **Five Kingdom Classification.** The kingdoms defined by him were named **Monera, Protista, Fungi, Plantae** and **Animalia.**
* The main criteria for classification used by him include cell structure, thallus organisation, mode of nutrition, reproduction and phylogenetic relationships.
* The table below gives a comparative account of different characteristics of the five kingdoms.



Characteristics of the Five Kingdome

Chara-cters	Five Kingdoms				
	Monera	**Protista**	**Fungi**	**Plantae**	**Animalia**
Cell type	Prokaryotic	Eukaryotic	Eukaryotic	Eukaryotic	Eukaryotic
Cell wall	Noncellulosic (Polysaccharide + amino acid)	Present in Some	Present (without cellulose)	Present (cellulose)	Absent
Nuclear membrane	Absent	Present	Present	Present	Present
Body organis-ation	Cellular	Cellular	Multiceullar/ loose tissue	Tissue/ organ	Tissue/organ/ organ system
Mode of nutrition	Autotrophic (chemosyn-thetic & photosynthetic) and Heterotr-ophic (saprophytic/ Parasitic	Autotrophic (Photosynth-etic) and Heterotrophic	Heterotrophic (Saprophytic/ Parasitic)	Autotrophic (Photosynthetic)	Heterotrophic (Holozoic/ Saprophytic etc.)

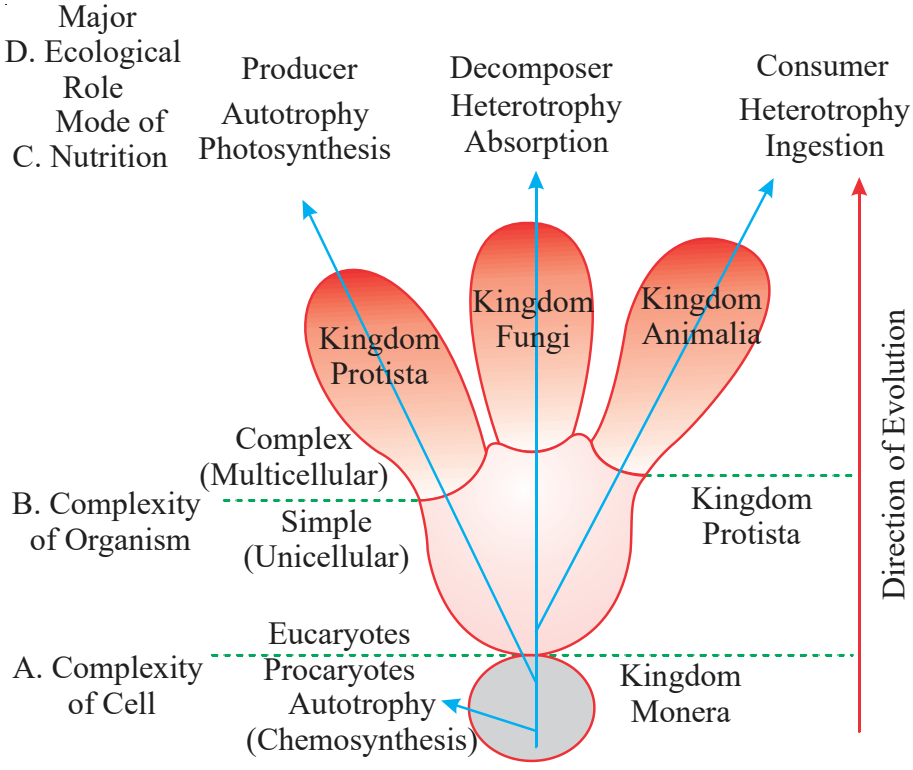
Need for five kingdom classification was felt due to following reasons

* Earlier classification systems included bacteria, blue green algae, fungi, mosses, ferns, gymnosperms and the angiosperms under 'Plants'.
* The character that unified this whole kingdom was that all the organisms included had a cell wall in their cells. This placed together groups which widely differed in other characterstics. It brought together the prokaryotic bacteria and the blue green algae with other groups which were eukaryotic.

* It also grouped together the unicellular organisms and the multicellular ones, say, for example, *Chlamydomonas* and *Spirogyra* were placed together under algae.
* The classification did not differentiate between the heterotrophic group – fungi, and the autotrophic green plants, though they also showed a characteristic difference in their walls composition – the fungi had chitin in their walls while the green plants had a cellulosic cell wall.

Merits of five kindoms classification:-

* Fungi were placed in a separate kingdom – Kingdom Fungi.
* All prokaryotic organisms were grouped together under Kingdom Monera and the unicellular eukaryotic organisms were placed in Kingdom Protista.
* Kingdom Protista has brought together *Chlamydomonas, Chlorella* (earlier placed in Algae within plants and both having cell walls) with *Paramoecium* and *Amoeba* (which were earlier placed in the animal kingdom) which lack it. It has put together organisms which, in earlier classifications, were placed in different kingdoms.
* This happened because the criteria for classification changed. This kind of changes will take place in future too depending on the improvement in our understanding of characteristics and evolutionary relationships.
* Over time, an attempt has been made to evolve a classification system which reflects not only the morphological, physiological and reproductive similarities, but is also phylogenetic, i.e., is based on evolutionary relationships.



➢ SIX KINGDOM SYSTEM OF CLASSIFICATION

➢ **Carl Woese** proposed six kingdom classification.

➢ These are Archebacteria, Eubacteria, Protista, Fungi, Plantae, Animalia.

➢ The seperation of Arechaebacteria and Eubacteria was on the basis of some major differences such

as absence of peptidoglycan cell wall.

- Based on the sequence of 16S ribosomal RNA genes, Woese included the six kingdoms into a natural cluster of three main categories called the Domains.
- The three Domains are Bacteria, Archae and Eukarya, which are believed to be originated from a common ancestor namely '**Progenote**'.
- The domain Archea has more similarities with domain Eukarya

TEST YOUR I.Q. 1

1. Classification of animals based on with and with out blood was first made by

(1) Linnaeus (2) Aristotle
(3) Whittaker (4) Carl Woese

2. The two kingdom classification can differentiate

(1) Autotrophs from heterotrophs
(2) Prokaryotes from eukaryotes
(3) Unicellular organisms from multicellular organisms
(4) Plants from animals

3. Identity the draw backs in two kingdom classification

I) Prokaryotes & Eukaryotes were groupedtogether
II) Unicellular & multicellular organisms were grouped together
III) Heterotrophic fungi are not properly placed

(1) I only (2) I & II only
(3) II & III only (4) I,II,III

4. What are the main criteria used by Whittaker for the classification of organisms into five kingdoms

I) Reproduction and phylogenetic relationships
II) Mode of nutrition
III) Cell structure
IV) Thallus organisation

Correct answer is

(1) II, III, IV only (2) I, II, only
(3) III, IV only (4) I, II, III, IV

5. What is the ratio of kingdoms of whittaker having Eukaryotic organisms and multicellular organisms respectively?

(1) 4:3 (2) 1:2
(3) 3:4 (4) 1:1

6. Unicellular eukaryotic alga - Chlamydomonas was included in this kingdom of Whittaker's classification

(1) Plantae (2) Protista
(3) Monera (4) Fungi

7. Both autotrophs and heterotrophs are included in these kingdoms of Whittaker's classification

(1) Monera, Plantae
2) Monera, Protista
(3) Monera, Fungi
(4) Monera, Animalia

8. In five kingdom classification, the number of kingdoms with Eukaryotes is

(1) 4 (2) 1 (3) 2 (4) 3

9. Which are not included in the five kingdom classification of Whittaker?

(1) Protista without cell walls
(2) Prokaryotes that lack cell wall
(3) Branched filamentous bacteria
(4) Lichens, viruses, viroids and prions

10. In Whittaker's five kingdom classification the bounderies of which kingdom is not well defined

(1) Monera (2) Fungi
(3) Archea (4) Protista

11. Five kingdom system of classification is mainly based on

(1) Mode of nutrition
(2) Complexity of body organisation
(3) Ecological role
(4) Complexity of cell structure

12. **In Whittaker's five kingdom classification, eukaryotes were assigned to**
(1) all the five kingdoms
(2) two of the five kingdoms
(3) four of the five kingdoms
(4) only one of the five kingdoms

13. **Two kingdoms that are common to all biological classifications**
(1) Monera and Plantae
(2) Plantae and Animalia
(3) Protists and Monera
(4) Animalia and Fungi

14. **Earliest attempt to scientific basis for classification is made by**
(1) Linnaeus (2) Whittaker
(3) Aristotle (4) Theophrastus

15. **Two kingdom classification was given by**
(1) Whittaker (2) Linnaeus
(3) Copeland (4) Aristotle

16. **Multicellular decomposers are**
(1) Saprophytic plants
(2) Saprophytic bacteria
(3) Fungi (4) Monerans

17. **In Whittaker's classification Archaebacteria and nitrogen fixing algae are placed under**
(1) Plantae (2) Fungi
(3) Monera (4) Protista

18. **Kingdom of unicellular eukaryotes is**
(1) Monera (2) Protista
(3) Fungi (4) Cyanobacteria

19. **Plant decomposers are under these kingdoms**
(1) Fungi and plantae
(2) Monera and fungi
(3) Protists and Monera
(4) Protista and Plantae

20. **Whittaker's system of classification implies the unicellular eukaryotes are primarily precusors of the**
(1) plants (2) fungi
(3) animals (4) plants fungi and animals

21. **Whittaker's protista excludes**
(1) some unicellular algae and fungi
(2) no unicellular organisms
(3) only unicellular prokaryotes
(4) all the above

ANSWERS

1. (2)	2. (4)	3. (4)	4. (4)	5. (1)
6. (2)	7. (2)	8. (1)	9. (4)	10. (4)
11. (1)	12. (3)	13.(2)	14.(3)	15.(2)
16. (3)	17. (3)	18. (2)	19. (2)	20.(4)
21.(3)				

KINGDOM MONERA

* Bacteria are the sole members of the Kingdom Monera.
* They are the most abundant among the micro-organisms.
* Bacteria occur almost everywhere (Ubiquitous). Billions of bacteria are present in a handful of soil.
* 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.
* 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 do not synthesise their own food but depend on other organisms or on dead organic matter for food.

- The kingdom Monera (*monos*-single; **Dougherty and Allen**, 1960) includes all prokaryotes.
- The kingdom Monera is divided into two major groups, the **Eubacteria** (true bacteria) and the **Archaebacteria** (primitive bacteria). **Eubacteria** include several sub groups, the most distinctive of which is **Cyanobacteria** (blue green algae)
- Other Monera members include *Actinomycetes* (filamentous bacteria), *Mycoplasma*, *Rickettsiae* etc.

Archaebacteria

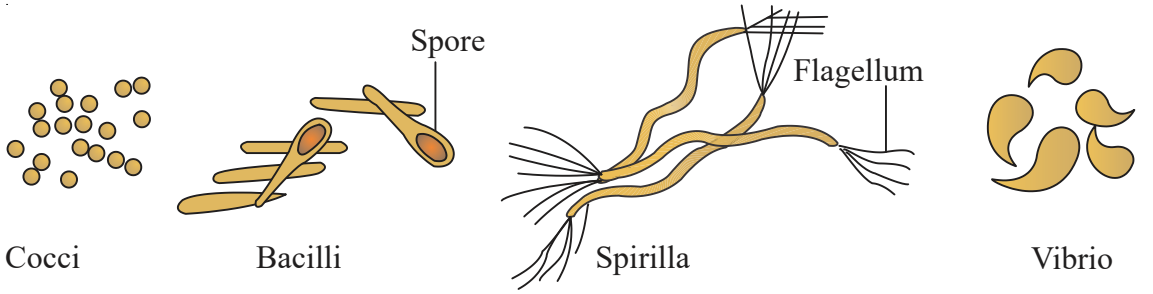
* These bacteria are special since they live in some of the most harsh habitats such as extreme salty areas (halophiles), hot springs (thermoacidophiles) and marshy areas (methanogens).
* Archaebacteria differ from other bacteria in having a different cellwall structure and this feature is responsible for their survival in extreme conditions.
* Methanogens are present in the guts 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.

- **Methanogens** – *Methanobacterium, Methanobacillus, Methanosarcina and Methanococcus.*
- **Halophiles** – *Holobacterium* and *Halococcus*.
- **Thermoacidophiles** *e.g. Sulfobolus, Thermoplasma, Thermoproteins*.

Eubacteria

- **Anton von Leeuwenhoek** (1675), a Dutch naturalist discovered bacteria and interestingly termed those as tiny *animalcules*. Linnaeus (1758) called them **vermes**.
- Bacteria were traditionally believed to be microscopic unicellular plants without chlorophyll that reproduce by fission.
- **Ehrenberg** (1838) first of all coined the word **Bacteria** (**Gk. *Bakteron*** = small rod) for these small organisms.

* Bacteria are grouped under four categories based on their shape:the spherical Coccous (pl.: cocci), the rod-shaped Bacillus(pl.:bacilli),the comma-shaped Vibrium (pl.:vibrio) and the spiral spirillum (pl.:spirilla)

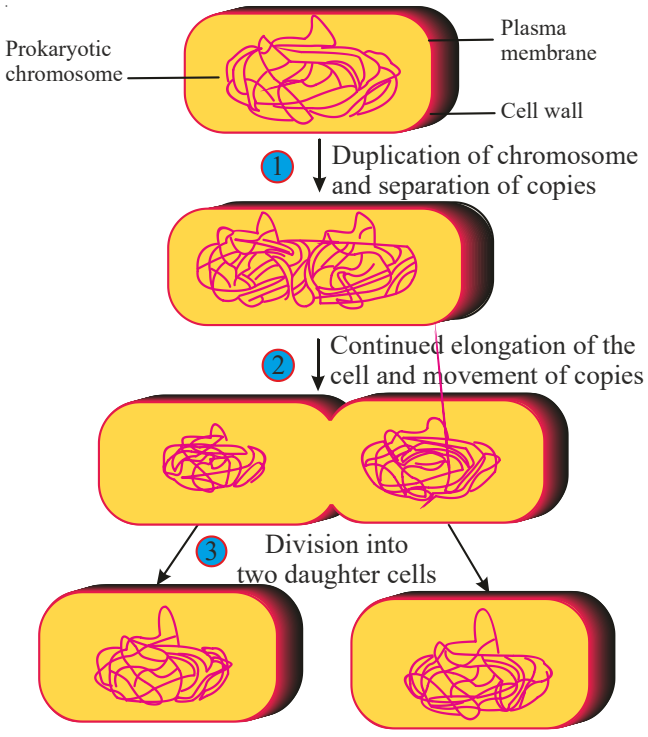


Bacteria of different shapes

* 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 deversity.
* Some of the bacteria are autotrophic. i.e they synthesise their own food from inorganic substrates.

  They may be photosynthetic autotrophic or chemosynthetic autorophic.
* The vast majority of bacteria are heterotrophs, i.e., they do not synthesise their own food but depend on other organisms or on dead organic matter for food.
* **Heterotrophic bacteria** are the most aboundant in nature. The majority are important decomposers.
* Many of them have a significant impact on human affairs. They are helpful in making curd form milk, porduction of antibiotics, fixing nitrogen in legume roots, etc.
* Some are pathogens causing damage to human beings, crops, farms animals and pets,
* Different pathogenic bacteria causes human diseases like cholera, typhoid, tetanus etc and plant dieseases like citrus canker, Blight of paddy, Crown gall of apple etc.
* Bacteria reproduce mainly by binary fission. Sometimes, under unfavourable conditions,they produce endospores(bacillus sps).



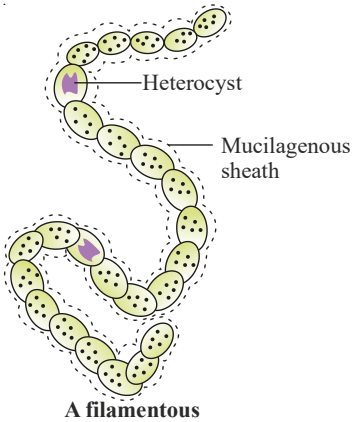
Binary fission in bacteria

* They also reproduce by sort of sexual reproduction by adopting a primitive type of DNA transfer (conjugation, transformation, Transduction)form one bacterium to the other.

CYANOBACTERIA

➢ Cyanobacteria (Gk. *Cyano* = blue, *bact* = rod) or blue green algae are Gram negative photosynthetic prokaryotes, being the most primitive organisms to have oxygenic photosynthesis. They are the most successful and self dependent organisms on the earth and survived successfully for more than three billion years. They added oxygen to the atmosphere, which is indispensible

for the existence of aerobic forms of living organisms



A filamentous blue-green alga-*Nostoc*

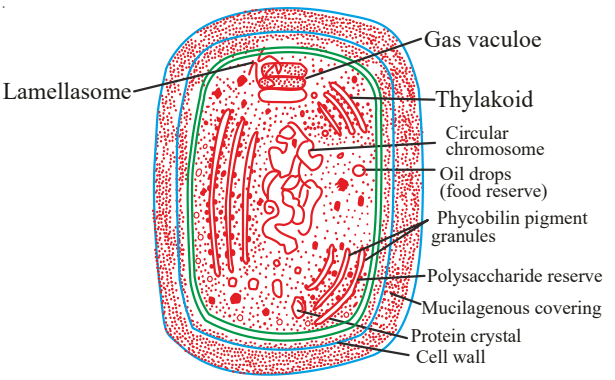
CELL STRUCTURE

* The **cyanobacteria** (also referred to as blue-green algae) have chlorophyll *a* similar to green plants
. and are **photosynthetic autotrophs**.
* They often form blooms in polluted water bodies.
* The cyanobacteria are unicellular, colonial or filamentous, marine or terrestrial algae.
* Flagellated structure or stage is totally absent in the life cycle
* The colonies are generally surrounded by gelatinous sheath.
* Some of these organisms can fix atmospheric nitrogen in specialised cells called **heterocysts,** e.g., *Nostoc* and *Anabaena*.

➢ The cell contains reserve food material in the form of special starch called *cyanophycean starch*. Other granules present in a cyanobacterial cell are volutin granules and polyhedral bodies.

➢ The characteristic feature of a cyanobacterial cell is the presence of a system of photosynthetic lamellae called *thylakoids*, which make the structure more elaborate in comparison to that in bacteria. The characteristic photosynthetic pigments present in the thylakoids are chlorophyll *a* and phycobilins *i.e.,* **phycocyanin** (blue coloured) **allophycocyanin** (blue) and **phycoerythrin** (red coloured).

➢ Sometimes, the same species, when grown under different wavelengths of light, exhibits variations in pigment composition. It is believed that by doing so, the alga is able to absorb maximum available light for photosynthesis. This capacity to change colour with complementary effect towards light is known as **Gaidukov phenomenon** (first given by Gaidukov) or **complementary chromatic adaptation.** e.g,. *Trichodesmium*



Ultrastructure of a cyanophycean cell

* They are most self dependent organisms, because most of these are capable of converting atmospheric nitrogen into ammonium compounds besides utilizing atmospheric CO_2 for synthesis of organic food during photosynthesis. These are **the first oxygenic photosynthetic organisms**.
* Nitrogen fixation under anaerobic conditions mainly occurs in specialized cells called ***heterocysts***. Heterocysts are large sized pale coloured mucilage free, thick walled cells which are impermeable to oxygen.

Reproduction

➢ Cyanobacteria reproduce vegetatively and asexually. Typically sexual reproduction is absent. Gene recombination is, however, reported to occur. Cyanobacteria multiply by

* **Binary fission:** It occurs in unicellular forms. The daughter cells formed by amitotic division, immediately after the division.
* **Fragmentation:** It occurs in filamentous forms. The filament breaks up into short pieces or fragments that grow to form new filaments.
* **Hormogones:** They are small trichome segments which separate from the parent due to death of intervening cells (necridia).
* **Akinetes:** Vegetative cells are transformed into thick walled akinetes due to the deposition of food

followed by the thickening of wall. On the arrival of favourable conditions, they germinate to form new filaments.

MYCOPLASMAS (PPLO's)

* The **Mycoplasmas** are organisms that completely lack a cell wall. They are the smallest living cells known and can survive without oxygen.
* MLO (mycoplasma-like organisms) or PPLO (pleuropneumonia like organisms) were discovered by **Nocard and Roux** (1898) in pleural fluid of cattle having bovine pleuropneumonia.
* The Mycoplasmas are organisms that completely lack a cell wall and are pleomorphic.
* They can survive without oxygen (Obligate anaerobes).
* Many mycoplasmas are pathogenic in animals and plants. They were previously called pleuropneumonia like organisms (PPLO).

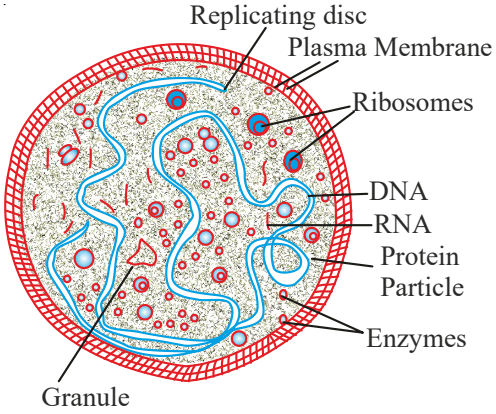


Fig : Ultrastructure of PPLO

Mycoplasma cause various diseases in plants, animals and human beings. Some are given below:

- **Plant diseases :** The mycoplasma diseases are generally transmitted through insects such as leaf hopper, mites and flies.

  (i) Witches' broom (ii) Aster yellow (iii) Brinjal little leaf

  (iv) Bunchy top of Papaya (v) Sesame phyllody (vi) Sandal spike

- **Diseases in animals :**

  (i) Pleuropneumonia in cattle

  (ii) Inflammation of genitals

  (iii) Agalactia of sheep and goat

- **Diseases in human beings**

  (i) Infertility in man

  (ii) Primary atypical pneumonia

Actinomycetes

- Actinomycetes are mycelial (aseptate branched filaments) bacteria which form radiating colonies in culture.Because of this, actinomycetes were formerly called **ray fungi**.
- Mycelial form is reduced in *Mycobacterium* and *Corynebacterium*. Mycelia have a diameter of 1 µm or less.
- Wall contains **mycolic acid**. The bacteria frm conidia and conidial chains, analogous to some fungi. However, they are procaryotic. Fragmentation is quite common. Other modes of reproduction are conidia, sporangiospores an arthrospores or oidia.

Economic importance of Actinomycetes

- *Actinomycetes* **have been used extensively in preparation of antibiotics**.

Table : Antibiotics obtained from Actinomycetes and Bacteria

Antibiotic	Source
Streptomycin	*Streptomyces griseus*
Terramycin or oxytetracycline	*S. ramosus*
Erythromycin	*S. erythreus*
Chloromycetin or chloramphenicol	*S. venezualae* and *S. lavendulae*
Neomycin	*S. fradiae*

Frankia is the only Actinomycetes that fixes atmospheric nitrogen forming root nodule by symbiotic association in non-leguminous plants like *Alnus*, *Casuarina*, *Myristica*, etc.

TEST YOUR I.Q. 2

22. **Biogas is produced by the members which belong to**
(1) Eubacteria (2) Archaebacteria
(3) Mycoplasmas (4) Cyanobacteria

23. **Cell organelle found in all prokaryotes**
(1) Mesosomes (2) Chromatophores
(3) Ribosomes (4) Dictyosomes

24. **Peptidoglycan is a combination of**
(1) Glycolipid (2) Amino acid
(3) Polysaccharides (4) 2 & 3

25. **Which of the following is not the characteristic of Archaebacteria**
(1) They are most primitive monerans
(2) Cell wall contains pseudomurein
(3) Can toletate adverse conditions
(4) Presence of peptidoglycan

26. **The most wide spread group of microorganisms on earth belong to kingdom**
(1) Monera (2) Protista
(3) Fungi (4) Plantae

27. **Eubacteria which oxidise inorganic chemicals such as Ammonia,nitrate nitrites are**
(1) Chemosyntheticautotrophic
(2) Chemosynthetic heterotrophic
(3) Photosynthetic autotrophic
(4) Photosynthetic heterotrophic

28. **The most primitive organisms showing oxygenic photosynthesis are**
(1) Green algae
(2) Chrysophytes
(3) Green and purple sulphur bacteria
(4) Cyanobacteria

29. **Organisms which obtain energy by the oxidation of reduced inorganic compounds are**
(1) Photo autotrophs
(2) Photo heterotrophs
(3) Chemo heterotrophs
(4) Chemo autotrophs

30. **The thickwalled spores formed during asexual reproduction in heterocystous cyanobacteria** are
(1) Hormogonia (2) Endospores
(3) Akinetes (4) Sporangiospores

31. **Monera are**
(1) unicellular eukaryotes
(2) Saprophytic eukaryotes
(3) Prokaryotes (4) All of these

32. **Which kingdom incorporates photoautotrophs, chaemoautotrophs and heterotrophs?**
(1) Protista (2) Archaebacteria
(3) Monera (4) Plantae

33. **Archaebacteria that live in marshy areas are**
(1) Halophiles (2) Methanogens
(3) Acidophiles (4) Cryophiles

34. **Organisms found in extreme temperatures are**
(1) Eubacteria (2) Archaebacteria
(3) Fungi (4) Cyanobacteria

35.. **Primitive type of DNA transfer occurs during sexual reproduction in**
(1) Bacteria (2) Fungi
(3) Slime moulds (4) Cyanobacteria

36. **Most common method of reproduction in bacteria is**
(1) Endosproes (2) Fragmentation
(3) Binary fission (4) Conjugation

37. **Bacterial cell membrane has**
(1) Chitin (2) Cellulose
(3) Proteins and phospholipids
(4) Acetyl glucosamine and muramic acid

38. Bacteria lack
(1) Cell wall (2) Cell membrane
(3) Ribosomes (4) Mitochondria

39. Nitrogen fixing Cyanobacterium is
(1) Rhizobium (2) Nostoc
(3) Chlorella (4) Methanogens

40. Heterocysts are Specialised in
(1) Nitrogen fixation under aerobic conditions
(2) Nitrogen fixation under anaerobic conditions
(3) Formation of internal hormogones
(4) Saprotrophism

41. One of the reasons to include cyanophyceae (cyanobacteria) in prokaryote is
(1) presence of mucilage sheath
(2) absence of nuclear membrane
(3) presence of sexuality
(4) absence of flagellation

42. Monerans that do not have cell wall and smaller known organisms are
(1) Methanogens (2) Archaebaceteria
(3) Mycoplasma (4) Cyanobacteria

43. Monera are evolved from
(1) Progenote (2) Protista
(3) Viruses (4) All the above

44. Halophiles are
(1) Chemoautotrophs
(2) Photoautotrophs
(3) Chemo heterotrophs
(4) Photo heterotrophs

45. Identify a bacterial disease from the following
(1) Polio (2) Mumps
(3) Cholera (4) Small pox

46. Citrus canker disease is caused by
(1) Virus (2) Fungus
(3) Bacteria (4) Mycoplasma

47. Cyanobacteria are
(1) Producers (2) Decomposers
(3) Consumers (4) All the above

48. Organisms that often bloom in polluted water bodies
(1) Archaebacteria (2) Eubacteria
(3) Mycoplasma (4) Cyanobacteria

49. Function of heterocysts in cyanobacterium
(1) Perennation (2) Assimilation
(3) Spore production (4) Nitrogen fixation

50. Unicellular organisms that divide by binary fission are
(1) Viruses
(2) An independent group between viruses and bacteria
(3) Fungi (4) Bacteria

51. During Gram's stain
(1) all bacteria, Gram +ve or -ve, take crystal violet stain.
(2) only gram +ve bacteria take crystal violet stain.
(3) only Gram -ve bacteria take crystal violet stain
(4) Gram(+)ve bacteria lose this stain after alcohol treatment and take red stain of safranin.

52. When a spiral bacterium has only one curve and is comma like, it is called
(1) spirillum (2) vibrio
(3) bacillus (4) spirochaete

53. The major part of cell wall of monerans (Bacteria and Cyanobacteria) is made up of a polymer called
(1) Peptidoglycan (2) Mucopeptide
(3) Glycopeptide or murein
(4) All the above

54. On the basis of shape and staining Eschereichia coli is
(1) Bacillus, Gram -ve
(2) Coccus, Gram -ve
(3) Spirillum, Gram +ve
(4) Vibrio, Gram +ve

55. Mesosomes in bacteria are considered equivalent to mitochondria. What is correct for mesosomes?

(1) They contain respiratory enzymes like cytochrome oxidase and dehydrogenase

(2) They are infoldings of cell membrane to increase surface area.

(3) They are attached to nucleoid to provide energy during binary fission, and help in nucleoid separation and septa formation.

(4) All of the above

56. Peptidoglycan (Murein) and amino acids in cell wall are found in

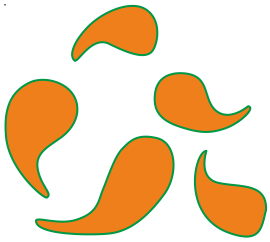
(1) Archaebacteria and Eukaryotes

(2) Eubacteria and Protista

(3) Monera and Protista

(4) Bacteria and Cyanobacteria

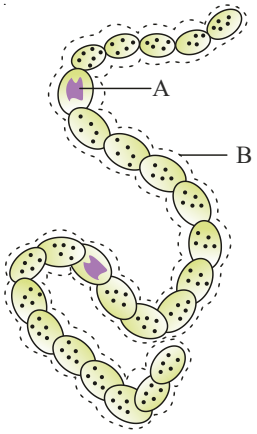
57. Identify the type of bacteria from the following diagram



(1) Bacilli (2) Cocci

(3) Vibrio (4) Spirilla

58. Given is the structure of a blue gree alga. Identify the function of the marked region A and B.



	A	B
(1)	Oxygenation	Protection
(2)	Nitrogen fixation	Respiration
(3)	Nitrogen	Retentionof moisture
(4)	Protection	Nitrogen fixation

ANSWERS

22) 2	23) 3	24) 4	25) 4	26) 1	27) 1
28) 4	29) 4	30) 3	31) 3	32) 3	33) 2
34) 2	35) 1	36) 3	37) 3	38) 4	39) 2
40) 2	41) 2	42) 3	43) 1	44) 3	45) 3
46) 3	47) 1	48) 4	49) 4	50) 4	51) 1
52) 2	53) 4	54) 1	55) 4	56) 4	57) 3
58) 3					

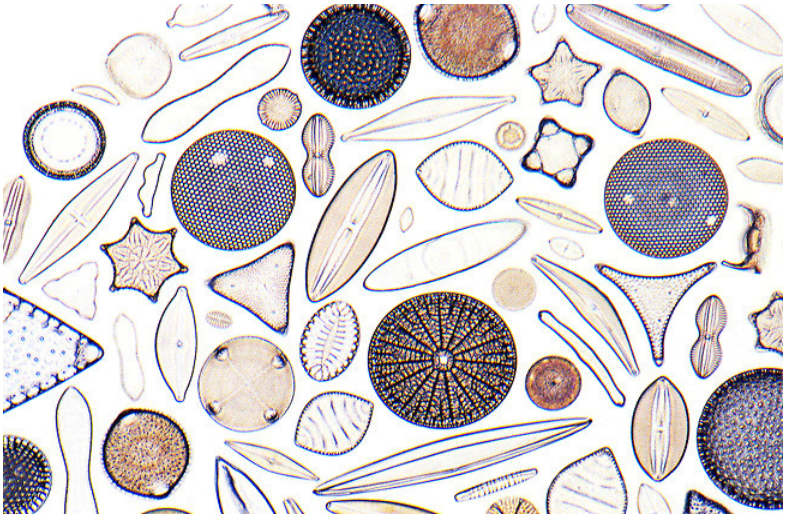
KINGDOM PROTISTA

* All single-celled eukaryotes are placed under **Protista**,
* The boundaries of this kingdom are not well defined. What may be 'a photosynthetic protistan' to one biologist may be 'a plant' to another.
* Members of Protista are primarily aquatic.
* This kingdom forms a link with the others dealing with plants, animals and fungi.
* Being eukaryotes, the protistan cell body contains a well defined nucleus and other membrane-bound organelles.
* Some have flagella or cilia.
* Protists reproduce asexually and sexually by a process involving cell fusion and zygote formation.
* Chrysophytes, Dianoflagellates, Euglenoids, Slime moulds and Protozoans are included in Protista.

Chrysophytes

Diatoms (Gk. dia - through, temnein - to cut)

* This group includes **diatoms** and **desmids** (golden algae).
* They are found in fresh water as well as in marine environments.
* They are microscopic and float passively in water currents (plankton).
* In diatoms the cell walls form two thin overlapping shells, which fit together as in a soap box.
➢ The body is covered by a transparent siliceous shell known as *frustule*. The frustule is made of two valves, **epitheca** and **hypotheca**.
* The walls are embedded with silica and thus the walls are indestructible.
* Most of them are photosynthetic. Photosynthetic pigments chlorophyll-a, chlorophyll-c, β-carotene, fucoxanthin etc..
➢ The food reserve is in the form of oils and *leucosin* or chrysolaminarin **(polysaccharide, β-1, 3 glucan)**,
Volutin globules (proteinaceous in nature) are also present.
➢ The common mode of multiplication is by binary fission. Each daughter retains one valve of the parent as **epitheca** and secretes a new **hypotheca**. As a result, one of the two daughter is slightly smaller than the parent. Over the generations there would be considerable reduction in size. The normal size is restored by the formation of **rejuvenescent zygote called auxospore**.



➢ **TYPES OF DIATOMS**

a) Pennales type having bilateral symmetry *e.g. Navicula*
b) Centrales type having radial symmetry e.g. *Melosira.*

Importance of diatoms

* Thus, diatoms have left behind large amount of cell wall deposits in their habitat; this accumulation over billions of years is referred to as 'diatomaceous earth' (keiselghur)
* Being gritty this soil is used in polishing, filtration of oils and syrups.
* Diatoms are the chief 'producers' in the oceans.

Dianoflagellates

➢ They are golden brown photosynthetic protists.

* These are mostly marine and photosynthetic forms.

* They appear yellow, green, brown, blue or red depending on the main pigments present in their cells.

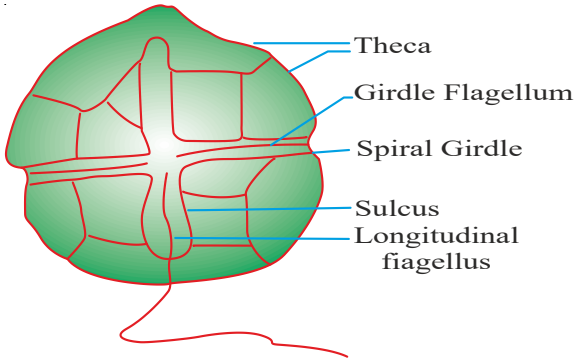
* The cell wall has stiff cellulose plates on the outer surface called **theca or lorica**. The theca contains two groves-the longitudinal groove called the **sulcus** and the transverse groove known as the **cingulum** or **annulus or girdle**.

➢ Reserve food is stored in the form of starch in fresh water forms and oils in marine forms.

* Most of them have two unequal flagella (**hetrokont**). One long flagellum lies vertically in sulcus the other short flagellum arranged perpendicular to long flagellum in transverse groove. Due to presence of two flagella at right angles to each other, the dinoflagellates show peculiar spinning movement. Hencce they are called **whirling whips**.

* Very often, red dianoflagellates (**Example:** ***Gonyaulax***) undergo such rapid multiplication that they make the tides appear red (**red tides**).

* The toxins called 'Saxi toxins' are produced by dinoflagellates. Consumption of dinoflagellates with these toxins may even kill small marine animals including fishes.



A Dinoflagellate

* Some marine dinoflgellates show bioluminescence, e.g., *Gonyaulax*, *Noctiluca*, *Pyrocystis*, *Pyrodinium*, etc.

* Dinoflagellates reproduce either asexually or sexually.

* Asexual reproduction occurs by cell division, spores and cysts.

* Sexual reproduction is isogamous or anisogamous.

* The life cycle involves zygotic meiosis. Gametic meiosis occurs in *Noctiluca*.

EUGLENOIDS

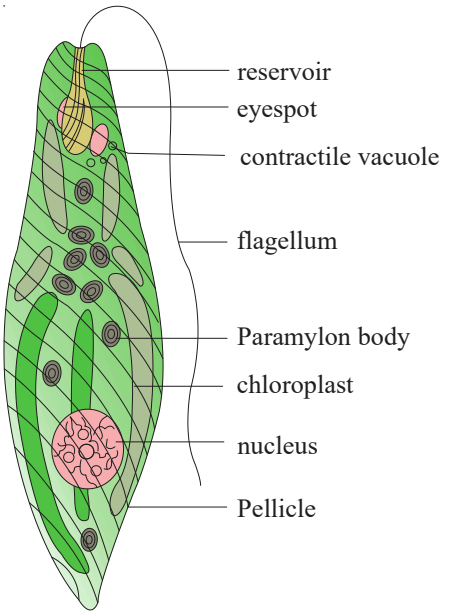
* Majority of them are fresh water organisms found in stagnant water.

* Instead of a cell wall, they have a protein rich layer called pellicle which makes their body flexible.

* The anterior end bears an invagination having three parts-cytostome, cytopharynx and reservoir.

* Two flagella, a short and a long one are loacted in the anterior groove.

* An orange-red **eye spot** or **stigma** contains red pigment **astaxanthin present** adjascent to reservoir.
* The pigments of euglenoids are chlorophyll- a, chlorophyll-b, β - carotene and xanthophylls which are identical to those present in higher plants.
➢ They can also perform creeping movements by expansion and contraction of their body. The phenomenon is called *metaboly*.
* Though they are photosynthetic in the presence of sunlight, when deprived of sunlight they behave like heterotrophs by predating on other smaller organisms.(**Mixotrophic nutrition**)
* They store their carbohydrates as *paramylum bodies*.
* Under favourable conditions, they multiply by longitudinal binary fission.
* During unfavourable conditions they reproduce by formation of resting stage called **palmella stage**.
* Sexual reproduction has not yet been definitely proven.



Euglena

SLIME MOULDS (Consumer Decomposer Protistans)

* Slime moulds are saprophytic protists. (protistan fungi)
* The body moves along decaying twigs and leaves engulfing organic material.
* Under suitable conditions, they form an aggregation called plasmodium which may grow and spread over several feet.
* During unfavourable conditions, the plasmodium differentiates and forms fruiting bodies bearing spores at their tips.
* The spores possess true walls. They are extremely resistant and survive for many years, even under adverse conditions.
* The spores are dispersed by air currents.
➢ Slime moulds are two types

Acellular slime moulds - *Physaram, Physarella, Fuligo*

Cellular slime moulds - *Dictyostelium, Polysphondhlium*

PROTOZOANS

* All protozoans are heterotrophs and live as predators or parasites.
* They are believed to be **primitive relatives of animals**. There are four major groups of protozoans. They are
* **a) *Amoeboid protozoans:*** These organisms live in fresh water, sea water or moist soil. They moveand capture their prey by putting out pseudopodia.

  Marine forms have silica shells on their surface.

  Ex : *Amoeba, Entamoeba*.
* **b) *Flagellated protozoans:*** The members of this group are either free-living or parasitic. They have flagella.

  The parasitic forms cause diaseases such as sleeping sickness.

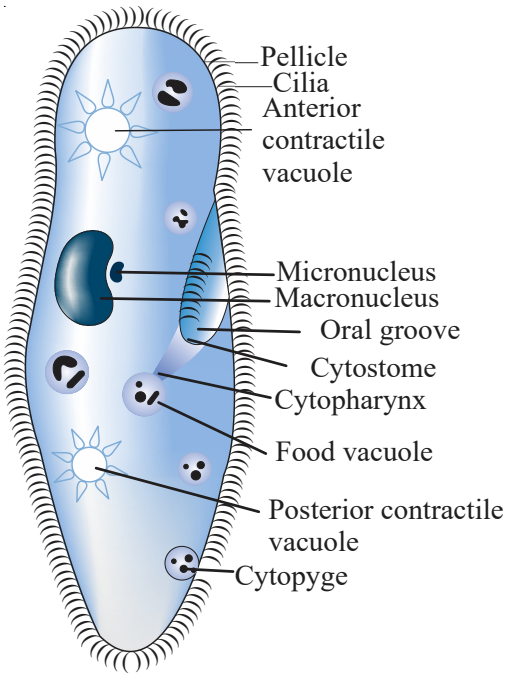
  Ex: *Trypanosoma*.
* **c) *Ciliated protozoans:*** These are aquatic, actively moving organisms because of the presence of thousands of cilia.

  They have a cavity (gullet) that opens to the outside of the cell surface.

  The coordinated movement of rows of cilia causes the water laden with food to be steered into the gullet.

  Ex: *Paramoecium.*
* **d) *Sporozoans:*** This includes diverse organisms that have an infectious spore-like stage in their life cycle.

  The most notorious is *Plasmodium* (malarial parasite) which causes malaria which has a staggering effect on human population.



TEST YOUR I.Q. 3

59. All eukaryotic unicellular organisms belong to
(1) Monera (2) Protista
(3) Fungi (4) Bacteria

60. The first Eukaryotes to evolve are
(1) Bryophytes
(2) Green Algae
(3) Blue - green Algae (4) Protistans

61. Find the correct statement
(1) Centrale diatoms are bilaterally symmetrical
(2) Pennale diatoms are radially symmetrices
(3) Auxospores are rejuvenatory spores
(4) Dinoflagellates are mostly fresh water organisms

62. Auxospores and heterocysts are formed respectively by
(1) Some diatoms and several cyanobacteria
(2) All cyanobacteria and diatoms
(3) Several cyanobacteria and several diatoms
(4) Several diatoms and some cyanobacteria

63. Chief producers of the ocean are
(1) Chrysophytes (2) Dinoflagellates
(3) Euglenoids (4) Eubacteria

64. Diatomaceous earth is used in
1) Polishing
2) Filtration of oils and syrups
3) Production of Antibiotics
4) 1 and 2

65. Photosythetic protists (or) protistan algae include.
(1) Flagellated protozoans, Slime moulds, Chrysophytes
(2) Amoeboid protozoans, Diatoms, Euglenoids
(3) Euglenoids, Slime moulds, Protozoans
(4) Diatoms,Dinoflagellates,Euglenoids

66. Characteristic spores of diatoms are
(1) Zoospores (2) Ascospores
(3) Auxospores (4) Basidiospores

67. Red tides in Medeterranian sea are caused by
(1) Chrysophytes (2) Monerans
(3) Dinoflagellates (4) Mycoplasmas

68. Mesokaryon is
(1) A dikaryon
(2) Centroplasm of bluegreen algae
(3) Intermediate stage between a dikaryon and synkaryon
(4) The nucleus of dinoflagellates which has condensed chromosomes even in interphase and donot have histones.

69. Protistans are connecting link between
(1) Fungi and animals
(2) Plants and animals
(3) Monerans and kingdoms of multicellular organisms
(3) Bacteria and plants

70. Kingdom Protista does not include
(1) Photosynthetic algae
(2) Blue green algae
(3) Slime moulds (4) Chrysophytes

71. Chief producers in the ocean are
(1) Slime moulds (2) Bacteria
(3) Green algae (4) Diatoms

72. Soap box like overlapping shells are found in the cell walls of
(1) Dinoflagellates (2) Protozoan protists
(3) Diatoms (4) Euglenoids

73. Auxospores or rejuvenescent cells are characteristic of which of the followings?
(1) Dinoflagellates (2) Diatoms
(3) Zooflagellates (4) Sporotozoans

74. The outer covering of which organism is used as abrasive for metal polishing?
(1) Dinoflagellates (2) Radiolarinas
(3) Sponge (4) Diatoms

75. In Noctiluca, mesokaryotic stage appears in
(1) somatic stage
(2) at the time of first binary fission
(3) after a few binary fissions
(4) midway during gametogenesis

76. Major photosynthetic planktons are
(1) Chrysophytes (2) Dinoflagellates
(3) Green algae (4) 1 and 2

77. Cell wall has stiff cellulose plates on the surface of cells in
(1) *Gonyaulax* (2) Euglena
(3) Diatoms (4) Slime moulds

78. Which species of protists are known as the whirling whips ?
(1) Diatoms (2) Chrysophytes
(3) Dinoflagellates (4) Euglenoids

79. Which colourless protistan shows bioluminescence?
(1) *Navicula* (2) *Noctiluca*
(3) *Dictyostelium* (4) *Physarum*

80. Difference between a Red colour to the red sea and Red tides in the sea is
(1) Red tide takes place in Red sea
(2) Associated with a cyanobacteria and protist respectively
(3) One is by virus and other by bacteria
(4) Associated with Rhodophyceae and diatoms respectively

81. Euglenoids have ..... instead of cell wall.
(1) Siliceous frustule (2) Pellicle
(3) Capsule (4) Cell membrane

82. Mixotrophic nutrition is found in
(1) *Amoeba* (2) *Navicula*
(3) *Plasmodium* (4) *Euglena*

83. Longitudinal binary fission is found in
(1) Amoeba (2) Paramecium
(3) Euglena (4) None

84. Saprophytic protists that form plasmodium are
(1) Fungi (2) Slime moulds
(3) Sporozoans (4) Ciliates

85. Sleeping sickness is caused by
(1) Entamoeba (2) Paramoecium
(3) Trypanosoma (4) Plasmodium

86. Amoeba moves with the help of
(1) Flagella (2) Pseudoplasmodia
(3) Cilia (4) Pseudopodia

87. ..... protozoan caused malaria possess true walls in slime moulds
(1) Plasmodium (2) Virus
(3) Bacteria (4) Fungus

88. The non-photosynthetic protists are
(1) Ciliates, sporozoans, slime moulds
(2) Euglenoids, diatoms and dinoflagellates
(3) Sarcodines, dinoflagellates and slime moulds
(4) Sarcodines, dinoflagellates and euglenoids

89. Decomposer protists are
(1) Dinoflagellates (2) Protozoans
(3) Chrysophrytes (4) Slime moulds

90. Diatomaccous earth is indestructible due to cell walls embedded by
(1) Calcium (2) Silica
(3) Zinc (4) Phosphorus

91. Holophytic nutrition occurs in
(1) Slime moulds (2) Paramoecium
(3) Diatoms (4) Amoeba

92. Characters of both animals and plants are found in
(1) Viruses (2) Bacteria
(3) Euglena (4) Mycoplasma

93. Slime moulds are ecologically
(1) Producers
(2) Consumer decomposers
(3) Decomposers (4) Carnivores

94. Plasmodium is
(1) Captures the prey by pseudopodia
(2) Free living protozoan
(3) Parasitic protozoan
(4) Ciliated protozoan

95. Protists that form plasmodium are
(1) Euglenoids (2) Slime moulds
(3) Protozoans (4) Diatoms

96. Malarial parasite plasmodium is included in this kingdom
(1) Fungi (2) Monera
(3) Protista (4) Animalia

97. Autotrophs belongs to
(1) Protista (2) Monera
(3) Plantae (4) All of these

98. The kingdom Protista includes
(1) Photosynthetic forms
(2) Decomposers
(3) Porotozoans (4) All of these

99. Locomotory organelles in the protista are
(1) Flagella (2) Cilia
(3) Pseudopodia (4) All of these

100. Kingdom protista includes
(1) life cycle showing zygotic meiosis
(2) life cycle showing gametic meiosis
(3) life cycle showing sporic meiosis
(4) both 1 and 2

101. Protists which are diploid reproduce sexually by the process of
(1) zygotic meiosis (2) cyst formation
(3) binary fission (4) gametic meiosis

102. The alga or protist used for the construction of sound proof room is
(1) *Diatoms* (2) *Chara*
(3) *Volvox* (4) *Fucus*

103. Diatomaceous earth is often accompanied by
(1) reserved carbohydrates
(2) deposits of stones
(3) petroleum fields
(4) deposits of coal

104. The average size of diatoms go on decreasing as divisions progress. The original size is restored by
(1) statospores
(2) auxospores
(3) zoospores
(4) microspores

105. Diatomaccous earth is used in
(1) Purification of uranium
(2) Filtration and purification of liquids
(3) Insulation and sound proofing
(4) Both 2 and 3

106. Protist with true cell wall
(1) Diatoms (2)Dinoflagellates
(3) 1 and 2 (4) Euglena

107. Which one of the following organisms act as connecting link in possessing characters of plants and animals?
(1) Euglena (2) Bacteria
(3) Mycoplasma (4) Paramecium

108. The cell wall is absent in
(1) dinoflagellates (2) diatoms
(3) euglenoids (4) none of these

109. Flagellation in Euglena is
(1) Uniflagellate and stichonematic
(2) Isokont and whiplash type
(3) Heterokont and whiplash type
(4) Heterokont and stichonematic

110. Slime moulds are included in protista, otherwise these are close to
(1) plants (2) fungi
(3) algae (4) bacteria

111. During binary fission nucleus divides
(1) mitotically (2) meiotically
(3) amitotically (4) none of these

ANSWERS

59) 2	60) 4	61) 3	62) 4	63) 1
64) 4	65) 4	66) 3	67) 3	68) 4
69) 3	70) 2	71) 4	72) 3	73) 2
74) 4	75) 1	76) 4	77) 1	78) 3
79) 2	80) 2	81) 2	82) 4	83) 3
84) 2	85) 3	86) 4	87) 1	88) 1
89) 4	90) 2	91) 3	92) 3	93) 2
94) 3	95) 2	96) 3	97) 4	98) 4
99) 4	100) 4	101) 4	102) 1	103) 3
104) 2	105) 4	106) 3	107) 1	108) 3
109) 3	110) 2	111) 3		

KINGDOM FUNGI

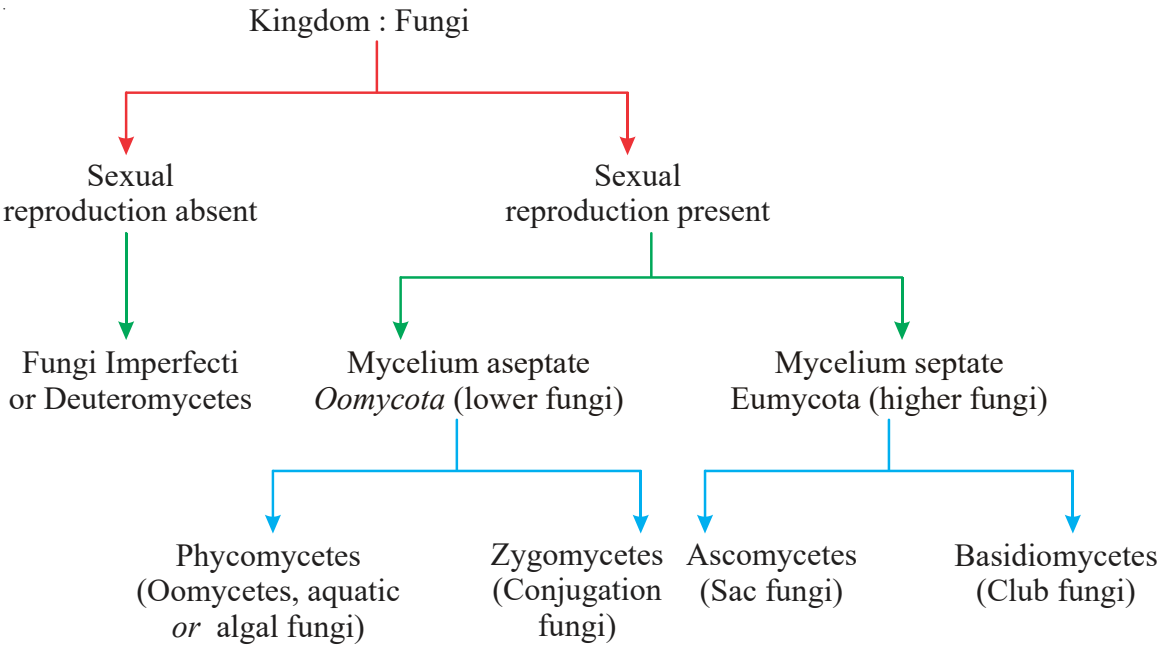
- The term *fungus* (plural : *fungi*) is a Latin word meaning mushroom, and this term was coined by Gaspard Bauhin (1560-1624). The science of study of fungi is known as *mycology* (Greek, *mykes* : mushroom; *logos*: study) or *mycetology*.
- **Father of Mycology:** Pier' Antonio Micheli.
  Father of Systematic Mycology : E. M. Fries.
- **Father of Modern Mycology and Plant pathology:** H. A. de Bary.
- **Father of Indian Mycology and Plant Pathology:** E. J. Butler.

* The fungi constitute a unique kingdom of heterotrophic organisms.
* They show a great diversity in morphology and habitat.
* When your bread develops a mould or your orange rots it is because of fungi.
* The common mushroom you eat and toadstools are also fungi.
* White spots seen on mustard leaves are due to a parasitic fungus.
* 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. They prefer togrow in warm and humid places.
* Food is kept in refrigerator to prevent food from going bad due to bacterial or fungal infections.
* 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 coenocytichyphae. 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.
* Sexual reproduction is by oospores, ascospores and basidiospores.
* The sexual cycle involves the following three steps:
  (i) Fusion of protoplasms between two motile or non-motile gametes called **plasmogamy.**

(ii) Fusion of two nuclei called **karyogamy.**

(iii) 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).
* In other fungi (ascomycetes and basidiomycetes), an intervening dikaryotic stage (+st, -st) with two nuclei per cell. Such condition is called a **dikaryotic stage** . Later, the parental nuclei fuse **(Karyogamy)** and the cells become diploid.
* Fruiting bodies called ascocarps and besidiocarps are formed, in which reduction division occurs, leading to formation of haploid sexual spores.
* The kingdom Fungi is classified into different classes based on the morphology of the mycelium, mode of spore formation and fruiting bodies



PHYCOMYCETES (ALGAL FUNGI)

* Members of Phycomycetes are found in aquatic habitats and on decaying wood in moist and damp places or as obligate parasites on plants.
* The mycelium is aseptate and coenocytic.
* Asexual reproduction takes place by zoospores (motile) or by aplanospores (non-motile) or resting spores chlamydospores and akinites
* Aplanospores are endogeneously produced inside the sporangium.
* Zygospores or oospores are formed in sexual reproduction- Gametangial copulation or Gametangial contact.

Economic Importance

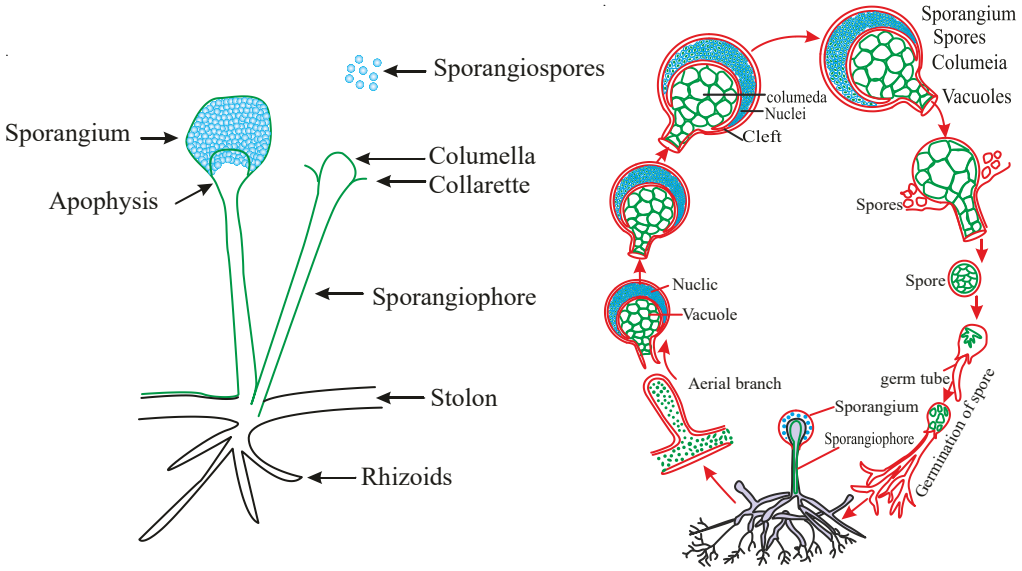
(1) ***Phytophthora*** - Causes the "late blight of potato". This disease is known as "Famine of Ireland" - 1845.

(2) ***Pythium spp.*** - Causes "Damping off" disease in tobacoo and "vegetable crops".

(3) ***Albugo candida or Cystopus candidus*** - It causes "White rust disease" in the members of Cruciferae.

(4) ***Rhizopus*** - It is known as **bread mould** - ***Mucor-*** It is know as pickel mould. The tip of mycelium of *Rhizopus* is also known as black mould, pin mould and weed of the laboratory.

LIFE CYCLE OF *RHIZOPUS:*



ASCOMYCETES (SAC FUNGI)

* The Ascomycetes fungi are unicellular (yeasts- *Sacharomyces*) or multicellular filamentous (*Penicillium*).

➢ The Ascomycetes include pigmented moulds (brown, green, blue, pink), powdery mildews (Erysiphe), yeasts, cup fungi (Peziza), Ergot pathogen (Claviceps) morels and truffles (Morchella).

* They are saprophytic or decomposers or parasitic or coprophilous (growing on dung).

* Mycelium is branched and septate.

* They produce asexual spores called conidia exogenously on the special hyphae called conidiophores.

* Conidium on germination produces mycelium.

* Sexual spores are called ascospores which are produced endogenously in sac like asci.

* The asci may occur freely or get aggregated into specific fructifications called **ascocarps**.

➢ Ascocarps are - **apothecium** (cup like, e.g., *Peziza*), **perithecium** (flask shaped *e.g.,Neurospora*) or **cleistothecium** (closed *e.g., Penicillium*).

* The fructifications of some Ascomycetes are **edible** in morels and truffles

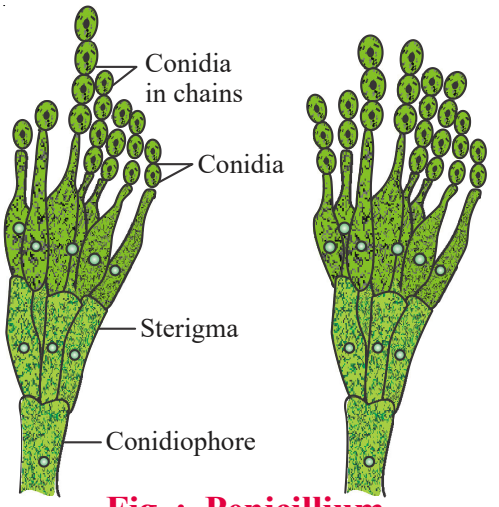
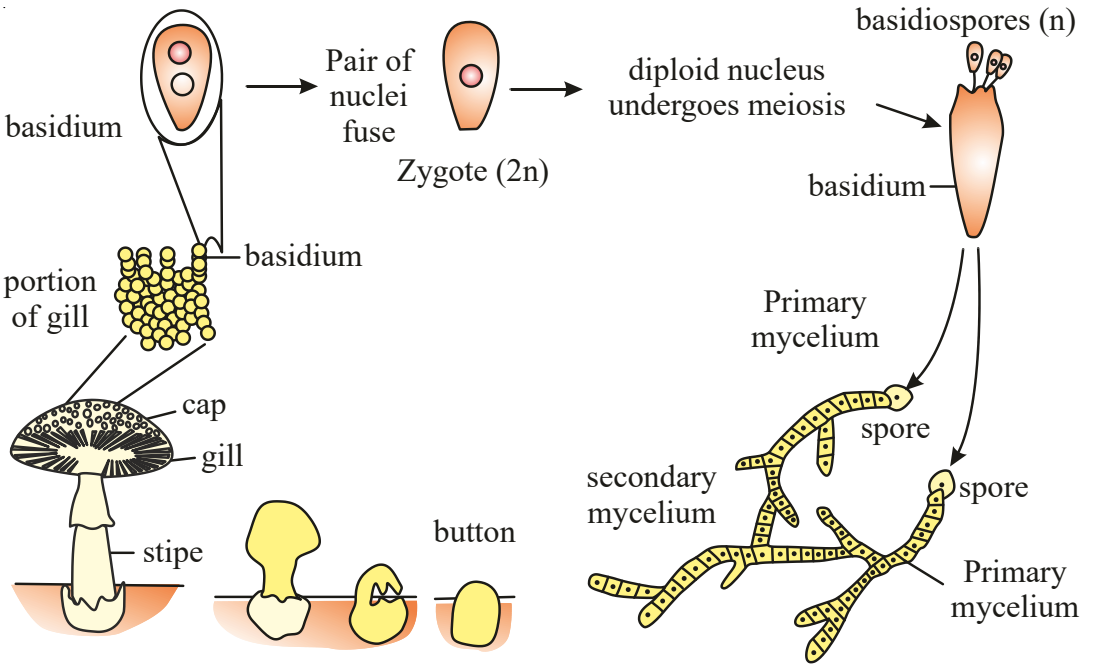


Fig : Penicillium

BASIDIOMYCETES (Club Fungi)

* Basidiomycetes includes mushrooms, bracket fungi, puffballs, rusts, smuts, etc.
* They grow in soil, on decaying wood logs and tree stumps and in living plant bodies as parasites, e.g., rusts and smuts.

Life Cycle of Agaricus (Mushroom)



Agaricus : Topographical representation of life cycle

* The mycelium is multicellular, branched, septate and primary or secondary mycelium.
* The asexual spores are generally not found, but vegetative reproduction by fragmentation.
* The sex organs are absent. Sexual reproduction takes place by fusion of two vegetative or somatic hyphae of different strains or genotypes (+st, -st) called somatogamy and dikaryotization.
* The resultant structure is dikaryotic or secondary mycelium which ultimately gives rise to sexual fruit body called basidiocarp with fertile club shaped structures basidia.

* Karyogamy and meiosis take place in the basidium which results in the production of four basidiospores at the tip
* The basidiospores are exogenous, haploid sexual meiospores produced on the basidium (pl.: basidia).

DEUTEROMYCETES (FUNGI IMPERFECTI)

* Members of Deuteromycetes are commonly known as imperfect fungi because only the asexual or vegetative phases of these fungi are known.
* When the sexual forms of these fungi were discovered, they were moved into the classes either Ascomycets or Basidiomycetes.
* It is also possible that the asexual and vegetative stage have been given one name (and placed under deuteromycetes) and the sexual stage another (and placed under another class).
* Later when the linkages were established, the fungi were correctly identified and moved out of deuteromycetes.
* Once perfect (sexual) stages of members of dueteromycetes were discovered they were often moved to ascomycetes and basidiomycetes.
* The deuteromycetes reproduce only by asexual spores known as conidia.
* The mycelium is septate and branched. Some members are saprophytes or parasites while a large number of them are decomposers of litter and help in mineral cycling.
* Some examples are *Alternaria, Colletotrichum* and *Trichoderma*.

S.No.	Fungi	Disease
1	Alternaria solani	Early blight of Potato
2	Cercospora personata	Tikka disease of groundnut
3	Colletotrichum falcatum	Red rot of sugarcane
4	Helminthosporium	Leaf spot of Rice
5	Fusarium udum	Wilt of pigeon pea

TEST YOUR I.Q. 4

112. Glycogen is the stored food in which the following kingdoms ?

(1) Monera and protista

(2) Protista and Fungi

(3) Fungi and Animalia

(4) Animalia and plantae

113. The cell walls of fungi are composed of

(1) Chitin and Proteins

(2) Chitin only

(3) Chitin and Polysaccharides

(4) Chitin and Sucrose

114. White spots on mustard leaves infection is caused by

(1) Toad stools (2) Albugo

(3) Puccinia (4) Ustilago

115. Mucor, Rhizopus and Albugo are placed in

(1) Phycomycetes (2) Ascomycetes

(3) Basidiomycetes (4) Deuteromycetes

116. Oospores are formed in the members of
(1) Ascomycetes
(2) Basidiomycetes
(3) Phycomycetes
(4) Deuteromy cetes

117. Incorrect about fruit bodies of sac fungi
(1) Flask shaped with an apical opening - perithecium
(2) Globose without opening - cleistothecium
(3) Umbrella shaped with stalk called stipe - basidiocarp
(4) Saucer shaped - apothecium

118. Perithecium refers to
(1) Flask shaped ascocarp with apical opening.
(2) Cup shaped ascocarp
(3) Fruiting body of basidiomycetes
(4) Eye spot of euglenoids

119. The production of asexual spores in Phycomycetes and Ascomycetes respectively
(1) Endogenously and exogenously
(2) Exogenously and endogenously
(3) Exogenously and exogenously
(4) Endogenously and endogenously

120. Sexual spores are exogenously produced in
(1) Albugo (2) Penicillium
(3) Colletotrichum (4) Agaricus

121. Plant body is mycelium in this kingdom
(1) Protista (2) Fungi
(3) Monera (4) Plantae

122. In fungi, the cell wall is mainly composed of
(1) Pectin (2) Cellulose
(3) Hemicellulose (4) Chitin

123. Absorptive nutrition/heterotrophic nutrition/extra cellular digestion is exhibited by
(1) Algae (2) Fungi
(3) Bryophytes (4) Pteridophytes

124. As regards the mode of nutrition is concerned Bread mould is considered to be a
(1) parasite (2) saprophyte
(3) shows mutualism (4) epiphyte

125. Mycelium is coenocytic in
(1) Phycomycetes (2) Deuteromycetes
(3) Ascomycetes (4) Basidiomycetes

126. Brown rust of wheat is caused by
(1) Puccinia (2) Sclerospora
(3) Phytophthora (4) Pythium

127. Fungus that is extensively used in biochemical and genetic work
(1) Neurospora (2) Ustilago
(3) Colletotrichum (4) Saccharomyces

128. Morels and truffles belong to
(1) Deuteromycetes (2) Phycomycetes
(3) Basidiomycetes (4) Ascomycetes

129. Ascomycetes members are known as
(1) Club fungi (2) Sac fungi
(3) Fungi imperfecti (4) Fission fungi

130. Yeasts differ from bacteria in being
(1) unicellular (2) eukaryotic
(3) prokaryotic (4) akaryotic

131. An ascomycetes fungus is
(1) Yeast (2) *Phytophthora*
(3) *Pleurotes* (4) *Agaricus*

132. Rust fungus is included in the class
(1) Deuteromycetes (2) Phycomycetes
(3) Ascomycetes (4) Basidiomycetes

133. Protein rich edible fruiting bodies are produced by
(1) Puccinia (2) Saccharomyces
(3) Agaricus (4) Penicillium

134. In mushrooms and puffballs, edible part represents
(1) mycelium (2) ascocarp
(3) basidiocarp (4) rhizomorph

135. Deuteromycetes reproduce by
1) Gametes 2) Mottile spores
3) Conidia 4) Somatogamy

136. Dikaryoticphase occurs in

(1) Ascomycetes (2) Phycomycetes
(3) Basidiomycetes (4) 1 and 3

137. Kingdom fungi includes organisms that are

(1) Achlorophyllous (2) Non vascular
(3) Flower bearing (4) 1 and 2

138. A fungus Albugo that lives as a parasite on mustard belongs to class

(1) Ascomcyetes (2) Basidiomycetes
(3) Phycomycetes (4) Deuteromcyet

139. Ascomycetes members are commonly called

(1) Fission fungi (2) Club-fungi
(3) Sac fungi (4) Bread mould

140. Agaricus belongs to the class

(1) Ascomycetes (2) Phycomycetes
(3) Basidiomycetes (4) Deuteromycetes

141. A unicellular ascomycetes member is

(1) Phytophthora (2) Saccharomyces
(3) Sclerospora (4) Rhizopus

142. A fungus that produce an antibiotic penicillin belongs to this class

(1) Deuteromycetes (2) Ascomycetes
(3) Basidiomycetes (4) Phycomycetes

143. Fruiting body in Penicillium is known as

(1) Cleistothecium (2) Apothecium
(3) Perithecium (4) Hysterothecium

144. Puccinia is

(1) a fungus that produces antibiotic
(2) a fungus of class phycomycetes
(3) a fungus that causes rust disease
(4) an imperfect fungus

145. A dikaryotic phase is most commonly seen in the life history of these fungi

(1) Phycomycetes (2) Deuteromycetes
(3) Basidomycetes (4) All the above

146. One of the following is a Deuteromycetes fungus

(1) Aspergillus (2) Agaricus
(3) Alternaria (4) Albugo

147. Majority of members are decomposers of litter and help in mineral recycling in this class of fungus

(1) Ascomycetes (2)Deuteromcyetes
(3) Phycomycetes (4) Basidiomycetes

148. The mode of nutrition in all fungi is always

(1) autotrohic (2) saprophytic
(3) parasitic (4) heterotrophic

149. Fungi differ from other kingdoms in being

(1) unicellular decomposers
(2) unicellular consumers
(3) multicellular decomposers
(4) multicellular consumers

150. A multicellular mass of filaments that spreads through the organic matter formed by fungi is called

(1) mycelium (2) hyphae
(3) ascocarp (4) fruiting body

151. Homothallism is a kind of

(1) Physiological anisogamy
(2) Isogamy
(2) Anisogamy (3) Siphonogamy

152. Coenocytic, multinucleated, aseptate mycelium is found in

(1) Ascomyetes (2) Basidiomycetes
(3) Deuteromycetes (4) Phycomycetes

153. In which group of fungi, spores are flagellated?

(1) Ascomycetes
(2) Zygomycetes
(3) Phycomycetes
(4) Basidiomycetes

154. Fungi lacking cross walls in mycelium belong to

(1) Phycomycetes (2) Ascomycetes

(3) Basidiomycetes (4) Deuteromycetes

155. The term "Black mould" indicate the presence of

(1) black coloured hyphae in Rhizopus

(2) black coloured pigments in hyphae

(3) black pin head like structures present on the mycelium of Rhizopus

(4) black coloured rhizoidal hyphae

156. The hyphae of Rhizopus which help in spreading of the mycelium on bread are known as

(1) zygophores (2) sporangiophores

(3) stoloniferous hyphae

(4) rhizoidal hyphae

157. The negatively geotrophic and unbranched hyphae in Rhizopus are known as

(1) sporangiophores (2) zygophores

(3) stoloniferous (4) rhizoids

158. In Rhizopus and Spirogyra meiosis occurs at the time of

(1) Zoospore formation

(2) Gamete formation'

(3) Akinete formation

(4) Germination of Zygospore

159. Blue green mould is known as

(1) Rhizopus (2) Mucor

(3) Penicillium (4) Agaricus

160 Which of the following is not pathogenic?

(1) Yeast (2) Albugo

(3) Alternaria (4) Ustilago

161. The non mycelial unicellular ascomycetes having no fruiting bodies are known as

(1) Yeasts (2) Blue molds

(3) Lichens (4) Mushrooms

162. Guinea pig of plant kingdom is

(1) Neurospora (2) Chara

(3) Aspergillus (4) Pencillium

163. Dikaryotization (n + n) in Agaricus is brought about by

(1) clamp connections

(2) somatogamy between two hyphae of different strains

(3) both correct (4) basidiospores

164. Deadliest mushroom is

(1) Pleurotus (2) Amanita

(3) Volvariella (4) Agaricus

165. The name Club fungi is given to basidiomycetes due to the presence of

(1) club shaped basidia

(2) sac shaped basidia

(3) hymenium of basidia

(4) water droplet mechanism for dehiscence of basidiospores

166. The stalk of the basidiocarp of Agaricus is known as

(1) stipe (2) gill

(3) hymenium (4) pileus

ANSWERS

112) 3 113) 3 114) 2 115) 1 116) 3 117) 3
118) 1 119) 1 120) 4 121) 2 122) 4 123) 2
124) 2 125) 1 126) 1 127) 1 128) 4 129) 2
130) 2 131) 1 132) 4 133) 3 134) 3 135) 3
136) 4 137) 4 138) 3 139) 3 140) 3 141) 2
142) 2 143) 1 144) 3 145) 3 146) 3 147) 2
148) 4 149) 3 150) 1 151) 2 152) 4 153) 3
154) 1 155) 3 156) 3 157) 1 158) 4 159) 3
160) 1 161) 1 162) 1 163) 2 164) 2 165) 1
166) 1

KINGDOM PLANTAE

* Kingdom Plantae includes all eukaryotic chlorophyll-containing organisms commonly called plants.
* A few members are partially heterotrophic such as the insectivorous plants or parasites.
* Bladderwort and Venus fly trap are examples of insectivorous plants and *Cuscuta* is a parasite.
* The plant cells have an eukaryotic structure with prominent chloroplasts and cell wall mainly made of cellulose.
* Plantae includes algae, bryophytes, pteridophytes, gymnosperms and angiosperms.
* Life cycle of plants has two distinct phases – the diploid sporophytic and the haploid gametophytic – that alternate with each other.

➢ The phenomenon of occurence of diploid sporophytic generation and haploid gametophytic generation regularly one after the other in the life cycle of a plant is called **alternation of generations.**

➢ The alternation of generations were discovered and named by **Hofmeister** in mosses and ferns.

KINGDOM ANIMALIA

* This kingdom is characterised by heterotrophic eukaryotic organisms that are multicellular and their cells lack cell walls.
* They directly or indirectly depend on plants for food.
* They digest their food in an internal cavity and store food reserves as glycogen or fat.
* Their mode of nutrition is holozoic – by ingestion of food.
* They follow a definite growth pattern and grow into adults that have a definite shape and size.
* Higher forms show elaborate sensory and neuromotor mechanism.
* Most of them are capable of locomotion.
* The sexual reproduction is by copulation of male and female followed by embryological development.

VIRUSES, VIROIDS AND LICHENS

* In the five kingdom classification of Whittaker, there is no mention of lichens and acellular entities like viruses and viroids.
* Viruses did not find a place in classification since they are not truly 'living', if we understand living as those organisms that have a cell structure.
* The viruses are non-cellular organisms that are characterised by having an inert crystalline structure outside the living cell.
* Once they infect a cell they take over the machinery of the host cell to replicate themselves, killing the host.
* The name virus that means venom or poisonous fluid was given by Pasteur. D.J. Ivanowsky (1892) recognised certain microbes as causal organism of the mosaic disease of tobacco.
* These were found to be smaller than bacteria because they passed through bacteria-proof filters.

* M.W. Beijerinck (1898) demonstrated that the extract of the infected plants of tobacco could cause infection in healthy plants and called the fluid as *Contagium vivum fluidum* (infectious living fluid).
* W.M. Stanley (1935) showed that viruses could be crystallised and crystals consist largely of proteins.

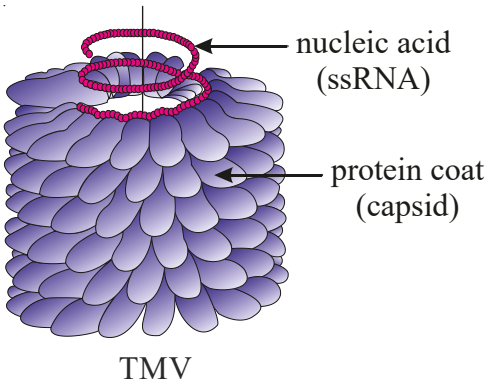
➢GENERAL STRUCTURE OF VIRUSES

Shape and Size

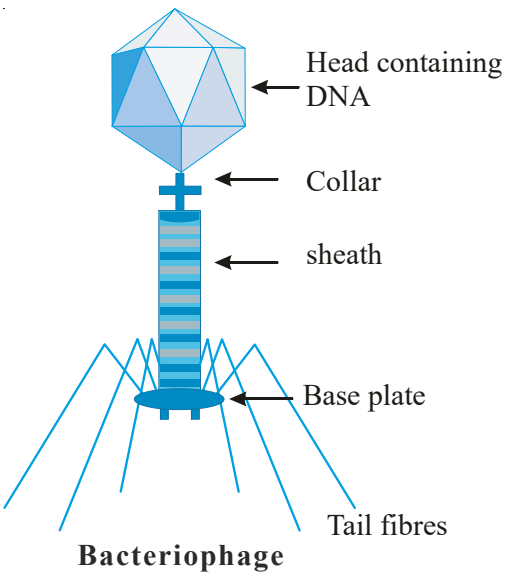
* The shape of different types of viruses varies considerably.
* They may be spherical or golf ball like (poliovirus, herpes virus), rod shaped (TMV), **tadpole like** (bacteriophages), **helical** (influenza virus) and **polyhedral** (adenovirus).
* The size ranges from 10 nm to 300 nm.
* Plant viruses, in general, are smaller than bacterial or animal viruses.

➢ Chemical structure and composition

* Viruses are made up of nucleic acid core enclosed inside a protein coat.
* The structure of TMV and T-even Bacteriophage have been shown as follows :



Structure of TMV



Structure of Bacteriophage

Nucleic acid

Nucleic acid can be either DNA or RNA. The nucleic acid may occur as single or double stranded.

Virus	Type of nucleic acid	Virus	Type of nucleic acid
Herpes	Double stranded DNA	Measles	Single stranded RNA
Chicken pox	Double stranded DNA	Mumps	Single stranded RNA
Hepatitis B	Double stranded DNA	Polio	Single stranded RNA
Cyanophages	Double stranded DNA	TMV	Single stranded RNA
Influenza virus	Single stranded RNA	Mycophages	Double stranded RNA
Rabies	Single stranded RNA	Reovirus	Double stranded RNA
HIV	Single stranded RNA	Wound tumour virus	Double stranded RNA

Capsid or Protein coat

* The protein coat is called *capsid*. It is made up of many identical subunits called *capsomeres*. The capsomeres are composed of either one or several types of proteins.
* Host specificity of viruses is due to the proteins of the capsid.
* In a virus particle, the capsomeres are arranged in a very symmetrical manner (helical or polyhedral) and give a specific shape to a particular virus.
* Some large virus particles have an additional covering of lipids or lipoproteins outside the capsid. Such virions are called enveloped (e.g., influenza virus, mumps virus) and those without this additional covering are refered to as naked (e.g., TMV).

PRIONS

- They are Proteinaceous infections particle, subviral entities and devoid of their own genetic material.
- **Stanley B. Prusiner :** Isolated and identified the prions in 1982 and was awarded Nobel prize for prions in 1997.
- They cause Scrapie in sheep, Kuru [laughing death in Waamn tribes of New Guinea] and Mad cow disease [BSE-Bovine spongiform encephalopathy] in cattle.
- They cause **CJD** [Creutzfeldt Jakob disease] in human .
- Prions are *resistant* to *nucleases, proteases,* radiations and disinfectants (phenols).

LICHENS

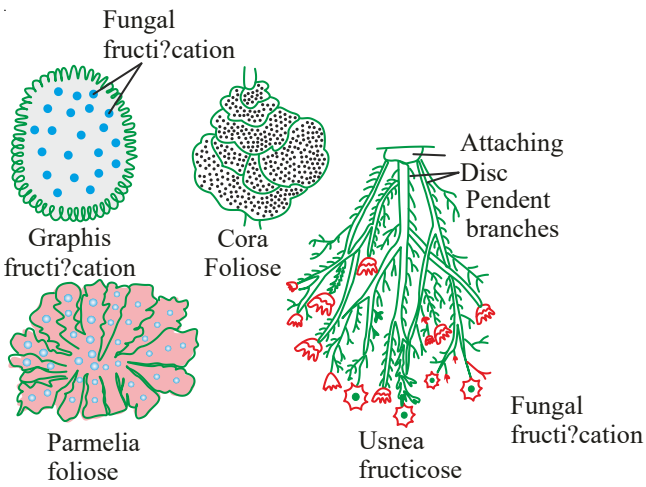
* **Lichens:** Lichens are symbiotic associations (mutualism) between algae and fungi.
* The algal component is known as **phycobiont** and fungal component as **mycobiont,** which are autotrophic and heterotrophic, respectively.
* Algae prepare food for fungi and fungi provide shelter and absorb mineral nutrients and water for its partner.
* Lichens are very good pollution indicators – they do not grow in polluted areas.

- Mycobiant is dominant partner and mostly belongs to Ascomycetes *e.g. Graphes, Cladonea, Parmelia, Usnea* etc.
- Phycobiant is mostly member of Chlorophyceae *e.g. Chlorella, Trebouxia, Protococcus* etc.
- **On the Basis of the Type of thallus :** The lichens are divided into three types:

1) **Crustose or Crustaceous :** These lichens occur as thin or thick crust over rock, soil, tree bark in which it is partially or completely embedded e.g. *Rhizocarpon, Graphis, Lecanora*.

2) **Foliose or Foliaceous :** Leaf like horizontally spreading lobed structure which attach to the substratum by means of special rhizoid like organ developed from lower side of thallus e.g. *Parmelia, Peltigera*.

3) **Fructicose or filamentous :** Cylindrical, flat or ribbon like upright generally branched structures attached to the substratum by their basal ends. They are shrubby lichens, e.g. *Cladonia, Usnea*.



Forms of Lichens

TEST YOUR I.Q. 5

167. Infectious agent which is smaller than virus and having no protein coat is
(1) Virion (2) Viroids
(3) Prions (4) Mycophages

168. Which of the following is true about virus:
(1) Having well developed enzyme system
(2) Having RNA or DNA as genetic material
(3) These can be facultative parasite also
(4) All of these

169 Lichens are ecologically important as they
(1) purify air
(2) are pioneers of ecological succession on barren rocks (Lithosere)
(3) are symbionts of algae and fungi
(4) are associated with mycorrhizal roots

170. The intact virus unit or infectious particle is called:
(1) Capsomere (2) Virions
(3) Bacteriophage (4) Muton

171. Viroids have
(1) Nucleic acid and protein
(2) DNA only
(3) RNA only (4) DNA and RNA

172. The name virus was given by
(1) Beijerinck (2) Pasteur
(3) Ivanowsky (4) W.M.Stanley

173. The protein coat of virus is called
(1) Capsule (2) Capsomere
(3) Capsid (4) Cypsela

174. Viroids were discovered by
(1) Prusiner (2) Diener
(3) Pasteur (4) Felix d' Herelle

175. Genetic material of TMV is
(1) DNA (2) Protein
(3) RNA (4) 1 or 3

176. Which of the following diseases is caused by virus?
(1) Diphtheria (2) Polio
(3) Tuberculosis (4) Typhoid

177. A virus can be considered as living entity because it
(1) reproduces (inside the host)
(2) can cause disease
(3) response to touch stimulus
(4) shows metabolism.

178. Plant viruses generally have
(1) Single stranded DNA
(2) Double stranded RNA
(3) Single stranded RNA
(4) Double stranded DNA

179. The viruses which infect bacteria are known as
(1) Zoophages (2) Bacteriophages
(3) Cyanophages (4) Phytophages

180. TMV was crystallised by
(1) Beijerinck (2) Pasteur
(3) W.M. Stanley (4) Franklin

181. Viroids differ from viruses
(1) in absence of RNA
(2) in the presence of DNA
(3) in the absence of a protein coat
(4) in the presence of nucleic acid and protein

182. Viruses are explain as 'contagium vivum fluidum' by
(1) Beijerinck (2) Pasteur
(3) Stanley (4) Ivanowsky

183. Which of these are viral diseases?
(1) Polio, mumps
(2) Influenza, small pox
(3) Chicken pox, measles
(4) All

184. Genetic material in Animal virus is
(1) DNA (2) DNA or RNA
(3) RNA (4) always ds DNA

185. Viroids have

(1) single stranded RNA not enclosed by protein coat

(2) single stranded DNA not enclosed by protein coat.

(3) double stranded DNA enclosed by protein coat

(4) double stranded RNA enclosed by protein coat

186. Prions posses

(1) DNA only (2) either DNA or RNA

(3) protein only

(4) amino acid and protein

187. Viruses that infect bacteria, multiply and cause their lysis are called

(1) lysozymes (2) lipolytic

(3) virulent (4) lysogenic

188. Which is correct?

(1) RNA is genetic material of bacteria.

(2) RNA is genetic material of all virus.

(3) RNA is genetic material of some plants

(4) Some viruses have RNA as genetic material

189. Mad cow disease is coused by

(1) Protein (2) DNA

(3) RNA (4) Both 2 and 3

190. Virion is

(1) nucleic acid of virus

(2) antiviral agent

(3) protein of virus

(4) completely assembled virus

191. Viruses were first discovered by

(1) Ivanowsky (2) Bawden

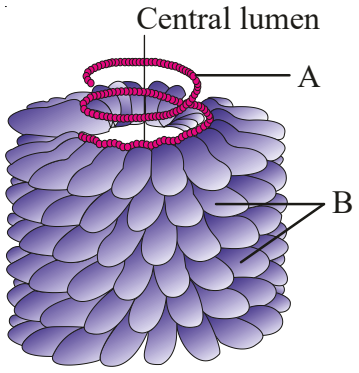
(3) W.M. Stanley (4) Smith

192. Genetic material of TMV is

(1) ssDNA (2) dsDNA

(3) ssRNA (4) dsRNA

193. Identify A and B from the given diagram.



	A	B
(1)	ssDNA	capsomere
(2)	dsDNA	capsomeres
(3)	ssRNA	capsomers
(4)	dsRNA	Tail fibres

194. Virus multiplies in

(1) living tissue (2) soil

(3) culture medium (4) dead tissue

195. Bacteriophages are

(1) viruses that infect bacteria

(2) bacteria that infect virus

(3) bacteria that infect other bacteria

(4) none of the above

196. Viruses are

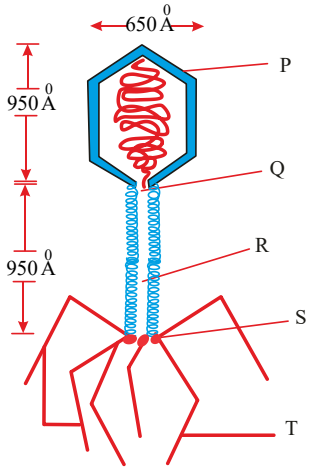
(1) Cellular organisms

(2) Non cellular organisms

(3) Unicellular organisms

(4) Cellular without wall

197. Identify the unlabelled parts P, Q, R and T from the T_2 bacteriophage diagram.



P Q R T

(1)	Head	Collar	Sheath	Tail fibres
(2)	Collar	Sheath	Tail fibres	Head
(3)	Sheath	Tail fibres	Collar	Head
(4)	Head	Collar	Tail fibres	Sheath

198. Which of the following is not true about lichens?

(1) Lichens can grow in adverse habitat where plants cannot grow

(2) Lichens can grow on base rocks

(3) Lichens can grow on arctic regions

(4) Lichens can grow near big cities

199. The dominant partner of lichen is

(1) Fungi (2) Algae

(3) Glomus (4) Bacteria

200. Lichen represents symbiotic relationship between

(1) Algae and fungi

(2) Viruses and algae

(3) Algae & bacteria

(4) Viruses and bacteria

201. Algal component in a lichen

(1) is called mycobiont

(2) absorbs water from substraction

(3) prepares food for fungi

(4) lives as a parasite on fungus

202. Lichens are

(1) Parasites (2) Saprophytes

(3) Symbionts (4) Chemotrophs

203. Lichens are indicators of

(1) water pollution (2) air pollution

(3) soil pollution (4) all of these

204. ..... are very good pollution indicators and act as pioneer community in ecological succession.

(1) Lichens (2) Bacteria

(3) Algae (4) Mosses

205. Parasitic member of kingdom plantae

1) Venus fly trap 2) Bladder wort

3) Cascuta 4) Lichens

ANSWERS

167) 2	168) 2	169) 2	170) 2	171) 3
172) 2	173) 3	174) 2	175) 3	176) 2
177) 1	178) 3	179) 2	180) 3	181) 3
182) 1	183) 4	184) 2	185) 1	186) 3
187) 3	188) 4	189) 1	190) 4	191) 1
192) 3	193) 3	194) 1	195) 1	196) 2
197) 1	198) 4	199) 1	200) 1	201) 3
202) 3	203) 2	204) 1	205) 3	

HINTS & SOLUTIONS

TEST YOUR I.Q. - 1

5) (1). Eukaryotes are protista, fungi, plantae and animalia. Muticellular are fungi, plantae and animalia so 4:3

8) (2). In five kindom classification only monera is prokaryote

11) (1). Fungi is seperated from planta and keptas as a kingdom in five kingdom calssification. based on nutrition

12) (3). Eukaryotes in five kingdom classification are protista, fungi, plante and animalia

19) (2). Some bactiria and most fungi are saprophytes or decomposers.

20) (4). Unicellular enkaryots are protists and they are precusors to plants, fungi, and animals

21) (3). Whittaker's protista includs unicellular eukaryotes

TEST YOUR I.Q. - 2

22) (2).Methenogens are useful in biogas production and it belongs to archaebacteria

23) (3).Ribosomes are organalls found in all living organisms

27. (1). Chemo synthetic auto triphic bacteria uses energy from the oxidation of inoganic chemical

41 (2). Cyanophyceae once placed under algae is now included under prokaryotes due to abscence of nuclear membran

43 (1). According to Carl Woese all organisms originate from a common ancester that i.e., progenite

44. (3). Halophiles are archaebaceteria so chemo heterotrophs

47. (1). Cyanobacteria are blue green algae so they are autotrophic producers

49. (4) Heterrocysts are impermeabla to O_2 so they protect dinitrogenase enzyme.

56) (4).Bacterial and cyanobacterial cell wall is made of peptidoglycan and amino acids

58) (3).Cyanobacterial filaments are covered by gelatinous sheath to retain moisture

TEST YOUR I.Q. - 3

67.(3) Red tides in Medeterranian sea are caused by Gonyaulax (Dinoflagelles)

70.(2) Blue green algae belongs to monera as they are unicellular prokaryotes

74.(4) Diatoms cell wall is silicaceous which is used as abrasive for metal polishing

76. (4) Chrysophytes and dinoflagelletes are microscopic photosynthetic organisms

78. (3) Flagella of dinoflagellates show spinning movement

82.(4) Euglena shows mixotrophic nutrition i.e., holophytic and holozoic

84.(2) During favourable condition slimemoulds form protoplasmic aggregate called plasmodium

93.(2) Slime moulds decomposes arganic matter and consume them

99. (4) Amoeba - psuedo podia, Euglena - Flagella, Paramoecium- Cilia

107.(1) Euglena shows plant characters like presence of chlorophyll and animal character like absence of cell wall

TEST YOUR I.Q. - 4

117.(3) Umbrealla shaped basidiocarp is found in club fungi (basidiomycetes)

119.(1) In phycomycetes spores are formd endogenously and in ascomycetes conidia are formed exogenously

120(4) Basidiospores are sexual spores produced exogenously by basidiomycetes (Agaricus)

130.(2) Yeast is unicellular but eukaryotic. Bacteria is also unicellular but prokaryotic

134.(3) Mushrooms and puffballs belong to basidiomycetes. Fruiting body of these are basidiocarp

139.(3) Ascomycetes members produce sac like ascus in their life cycle hence called sac fungi

151.(2) In homothalism mycelium involved in reproduction are similar

153.(3) Zoospores are flagellated spores produced by phycomycetes

157.(1) Erect hyphae in Rhizopus are called sporangiophores

TEST YOUR I.Q. - 5

167. (2) Infectious agent having only nucleic acid is vitoids

169. (2) Lichens are the first community (pioneers) In xerarch succussion.

172. (2) Term virus is derived from venum which means poision and was given by L. pasteur

177.(1) Viruses are acellular oganisms which do not show any

metabolism but can multiply inside the host

202.(3) Lichens are symbiotic associtation of algae and fungi

205.(3) Kingdom plantae includes autotrophs but Cascuta is a parasite

EXERCISE-I

1. All eukaryotic unicellular organisms belong to

(1) Monera (2) Protista
(3) Fungi (4) Bacteria

2. The five kingdom classification was proposed by

(1) R.H. Whittaker (2) C.Linnaeus
(3) A. Roxberg (4) Virchow

3. Organisms living in salty areas are called as

(1) Methanogens (2) Halophiles
(3) Heliophytes
(4) Thermoacidophiles

4. Naked cytoplasm, multinucleated and saprophytic are the characteristics of

(1) Monera (2) Protista
(3) Fungi (4) Slime molds

5. An association between roots of higher plants and fungi is called

(1) Lichen (2) Fern
(3) Mycorrhiza (4) BGA

6. A dikaryon is formed when

(1) Meiosis is arrested
(2) The two haploid cells do not fuse immediately
(3) Cytoplasm does not fuse
(4) None of the above

7. *Contagium vivum fluidum* was proposed by

(1) D.J. Ivanowsky
(2) M.W. Beijerinek
(3) Stanley (4) Robert Hook

8. Mycobiont and Phycobiont are found in

(1) Mycorrhiza (2) Root
(3) Lichens (4) BGA

9. Difference between Virus and Viroid is

(1) Absence of protein coat in viroid but present in virus

(2) Presence of low molecular weight RNA in virus but absent in viroid

(3) Both a and b

(4) None of the above

10. With respect to fungal sexual cycle, choose the correct sequence of events

(1) Karyogamy, Plasmogamy and Meiosis

(2) Meiosis, Plasmogamy and Karyogamy

(3) Plasmogamy, Karyogamy and Meiosis

(4) Meiosis, Karyogamy and Plasmogamy

11. Viruses are non-cellular organisms but replicate themselves once they infect the host cell. To which of the following kingdom do viruses belong to?

(1) Monera (2) Protista
(3) Fungi (4) None of the above

12. Members of phycomycetes are found in

i) Aquatic habitats

ii) On decaying wood

iii) Moist and damp places

iv) As obligate parasites on plants

Choose from the following options

(1) None of the above

(2) i and iv

(3) ii and iii

(4) All of the above

13. ***Thermococcus, Methanococcus* and *Methanobacterium* exemplify**
(1) arachaebacteria that contain protein homologous to eukaryotic core histones
(2) archaebacteria that lack any histones resembling those found in eukaryotes, but whose DNA is negatively supercoiled
(3) bacteria whose DNA is relaxed or positively supercoiled but which have a cytoskeleton as well as mitochondria.
(4) bacteria that contain a cytoskeleton and ribosomes

14. **The bacterium (*Clostridium botulinum*) that causes botulism is**
(1) a facultative anaerobe
(2) an obligate anaerobe
(3) a facultative aerobe
(4) an obligate aerobe

15. **Bacteria are (were) considered more as polants than animals because of the presence of**
(1) small nucleus (2) plasma membrane
(3) cell wall (4) spore formation

16. **Nitrifying bacteria convert the**
(1) nitrates into nitrites
(2) nitrites into nitrates
(3) ammonium salts into nitrates
(4) ammonium salts into amino acid

17. **The bacterial genome is called**
(1) nucleus (2) nucleolus
(3) nucleoid (4) none of these

18. **All of the following statements concerning the actinomycetous filamentous soil bacterium Frankia are correct except that Frankia**
(1) can induce root nodules on many plant species
(2) can fix nitrogen in the free-living state
(3) like Rhizobium, it usually infects its host plant through root hair deformation and stimulates cell proliferation on the hosts' cortex.
(4) forms specialised vesicles, in which the nitrogenase is protected from oxygen by a chemical barrier involving triterpene hopanoids.

19. **The cells of cyanobacteria and bacteria exhibit similarity in having**
(1) plastids (2) nuclei
(3) centrosome (4) naked DNA

20. **Which one of the following statements about mycoplasma is wrong?**
(1) They are also called PPLO
(2) They are pleomorphic
(3) They are sensitive to penicillin
(4) They cause disease in plants

21. **In cyanophages, the genetic material is**
(1) DNA (2) RNA
(3) both (a) and (b) (4) Proteins

22. **Rickettsiae belong to the group under**
(1) an independent category between viruses an bacteria
(2) fungi
(3) viruses (4) bacteria

23. **The thalloid body of a slime mould (Myxomycetes) is known as**
(1) protonema (2) Plasmodium
(3) fruiting body (4) mycelium

24. **Slime moulds in the divison-Myxomycota(true slime moulds) have**
(1) pseudoplasmodia
(2) spores that develop into free-living amoeboid cells
(3) spores that develop into flagellated gametes
(4) feeding stages consisting of solitary individual cells

25. **The slime moulds and multicellular algae are present included in the kingdom-Protista because**
(1) they appear to be more closely related to unicellular eukaryotes
(2) they lack important characteristics of the fungi and plants.
(3) kingdom-Protista includes eukaryotic organisms that do not clearly belong in the other three kingdoms
(4) All of the above

26. Which of the following is not correctly matched?

(1) Amoeboid protozoan - Amoeba
(2) Flagellated protozoan - Trypanosoma
(3) Sporotozoan - Anopheles
(4) Ciliated protozoan - Paramecium

27. Nuclear dimorphism occurs in group

(1) zooflagellata (2) cilliata
(3) sporozoa (4) sarcodina

28. In the following table, identify the correct matching of the crop, its disease and the corresponding pathogen.

Crop	Disease	Pathogen
(1) Citrus	Canker	*Pseudomonas rubrilineans*
(2) Potato	Late blight	*Fusarium udum*
(3) Brinjal	Root-knot	*Meloidogynie incognita*
(4) Pigeon	Seed gall	*Phytophthora* pea*infestans*

29. A dikaryon is formed when

(1) meiosis is arrested
(2) the two haploid cells do not fuse immediately
(3) cytoplasm does not fuse
(4) none of the above

30. Which of the following is a cyanophage?

(1) S-13 (2) $\phi \times 174$
(3) SV - 40 (4) LPP - 1

THINK TWICE BEFORE YOU CHOOSE (ASSERTION & REASON TYPE)

NOTE :

1) Both A and R are correct and R is correct explanation of A
2) Both A and R are correct and R is not correct explanation of A
3) A is true but R is false
4) Both A & R are false

31. **Assertion (A) :** Two kingdom classification was proposed by Linnaeus
Reason (R) : Two kingdom classification shows clear distinction between prokaryotes and eukaryotes

32. **Assertion (A) :** Cell wall in all plants is cellulosic
Reason (R) : In fungi cell walls are composed with chitin

33. **Assertion (A) :** Kingdom monera includes all prokaryotes
Reason (R) : Archaebacteria are special monerans as they can live in harsh habitats

34. **Assertion (A) :** Archaebacteria are prokaryotes
Reason (R) : Archaebacteria cell wall shows murein

35. **Assertion (A) :** Archaebacteria can survive in extreme conditions
Reason (R) : Cell membrane in archaebacteria shows branched chain lipids

36. **Assertion (A) :** Methanogens are responsible for production of biogas in marshy areas
Reason (R) : Methanogens are found in guts of some ruminate animals.

37. **Assertion (A) :** All bacteria are parasites
Reason (R) : All bacteria contain photosynthetic pigments

38. **Assertion (A) :** Bacterial genetic material is double stranded, naked, circular DNA.
Reason (R) : Bacterial genophore lacks nuclear membrane as it is a prokaryote

39. **Assertion (A) :** Cyanobacteria are most primitive organisms, showing oxygenic photosynthesis
Reason (R) : Protoplasm of cyanobacterial cells show peripheral pigmented chromoplasm

40. **Assertion (A) :** Cyanobacteria often form blooms in polluted water bodies
Reason (R) :: Trichomes of blue-green algae are covered by gelatinous sheath

41. **Assertion (A) :** Chemoautotrophic bacteria help in recycling of nutrients like, N, P, Fe and S
Reason (R) : Chemoautotrophic bacteria derive energy (ATP) by oxidation of inorganic substances

42. **Assertion (A) :** Bacteria multiply in number by binary fission
Reason (R): Binary fission occurs during unfavourable conditions.

43. **Assertion (A):** Mycoplasma are described as wall less bacteria
Reason (R) : They are smallest, anaerobic, pleomorphic organisms

44. **Assertion (A) :**Branched filamentous bacteria contain mycolic acid in their cell walls
Reason (R) : Most of actionomycetes members are saprophytes and decomposers

45. **Assertion (A) :**Diatoms are planktonic forms that are chief producers of the oceans
Reason (R) : The left over cell walls of diatoms form diatomaceous earth

46. **Assertion (A) :** Auxospores are rejuvenatory spores of diatoms, formed by sexual reproduction.
Reason (R) : Pennale diatoms show radial symmetry.

47. **Assertion (A) :**Dinoflagellates are generally called as whirling whips.
Reason (R) : Dinoflagellates show two flagella at right angles therefore produce spinning movements.

48. **Assertion (A) ::** Red tides in Medeterranian sea are due to large number of *Gonyaulax.*
Reason (R) : Toxins released by *Gonyaulax* may kill some fishes also

49. **Assertion (A) :**Euglenoids show a rigid body.
Reason (R) : Euglenoids pellicle is tough and made up of proteins.

50. **Assertion (A) :** Euglena shows myxotrophic type of nutrition
Reason (R) : In the presence of light Euglena synthesis food and in the absence of light live as a heterotroph

51. **Assertion (A) :**Slime moulds are saprophytic protists without cell walls
Reason (R) : Spores formed from fruiting body of slime moulds show true cell walls

52. **Assertion (A) :** In the life cycle of fungi formation of embryo is absent
Reason (R) : Zygote formed in the life cycle under goes meiosis and forms haploid spores

53. **Assertion (A) :** Fungi belonging to ascomycetes and basidiomycetes show a dikaryotic stage in life cycle
Reason (R) : During sexual reproduction, these fungi show delayed karyogamy, thus forming a dikaryon.

54. **Assertion (A) :**Primitive class of fungi shows isogamy, anisogamy and oogamy type of sexual reproduction.
Reason (R) : Gametes produced in phycomycetes are isogamous or anisogamous

55. **Assertion (A) ::** Dueteromyctes fungi are called fungi imperfectii
Reason (R) : Dueteromycetes fungi lack sexual reproduction (perfect stage) in their life cycle.

56. **Assertion (A) :**Basidiospores are exogenously produced in bracket fungi.
Reason (R) : Meiosis takes place in basidium

57. **Assertion (A) :** Chemically viruses are nucleoproteins
Reason (R) : All viruses contain a protein coat (capsid) that encloses genetic material (core) both DNA and RNA

58. **Assertion (A) :** Infectious agents causing mad cow disease can not show genetic integrity
Reason (R) : Prions are infectious protein without nucleic acid.

59. **Assertion (A) :** All viruses are obligate parasites
Reason (R) : They are acellular particles, without cytoplasm

60. **Assertion (A) :** TMV and HIV show ss RNA as genetic material
Reason (R) : Generally phytophages show RNA as genetic material

61. **Assertion (A) :**Zygote is not formed in deuteromycetes.
Reason (R) : sexual reproduction is not found in deuteromycetes

62. **Assertion(A) :** Cyanobacteria are Archaebacteria
Reason (R) : Cyanobacteria are heterotrophic monerans

63. **Assertion (A) :** Both (autotrophic) photosynthetic and chemosynthetic bacteria obtain carbon from atmospheric CO_2
Reason (R) : Both photoautotrophs and chemoautotrophs differ in source of energy

64. **Assertion (A) :** Dikaryotic phase is common in Ascomycetes and Basidiomycetes fungi
Reason (R) : In both Ascomycetes and Basidiomycetes delayed karyogamy leads to dikaryotization

65. **Assertion (A) :** Slime moulds are saprophytic protists
Reason (R) : Mycelium of slime moulds aggregates to form a plasmodium

66. **Assertion (A) :***Penicillium* and *Streptomyces* are source of antibiotics
Reason (R) : *Penicillium* and *Streptomyces* belong to kingdom of heterotrophic thallophytes

67. **Assertion (A) :** Flask like ascocarp with an apical opening is called perithecium
Reason (R) : Perithecium is a fruiting body formed during sexual reproduction

68. **Assertion (A) :**Archaea and Eukarya are more closely related to each other than to bacteria (woese)
Reason (R) : Archaea, Eukarya and Bacteria are believed to be originated from different ancestral group.

69. **Assertion (A) :** Potato spindle tuber virus (PSTV) contains RNA.
Reason (R) : Viroids cause diseases in plants

70. **Assertion (A) :** In a lichen phycobiont synthesis food
Reason (R) : Mycobiont is heterotrophic.

ANSWERS

1) 2	2) 1	3) 2	4) 4	5) 3	6) 2
7) 2	8) 3	9) 1	10) 3	11) 4	12) 4
13) 1	14) 2	15) 3	16) 3	17) 3	18) 2
19) 4	20) 3	21) 1	22) 1	23) 4	24) 2
25) 4	26) 3	27) 2	28) 3	29) 2	30) 4

(ASSERTION & REASON TYPE)

31) 3	32) 2	33) 2	34) 3	35) 1	36)2
37) 4	38) 2	39) 2	40) 2	41) 1	42)3
43) 2	44) 2	45) 2	46) 3	47) 1	48)2
49) 4	50) 1	51) 2	52) 1	53) 1	54)1
55) 1	56) 2	57) 3	58) 1	59) 2	60)2
61) 1	62) 4	63) 2	64) 1	65) 2	66)3
67) 2	68) 3	69) 2	70) 2		

HINTS & SOLUTIONS

31. Two kingdom classification does not shows clear distinction between Prokaryotes and Eukaryotes. So 'A is true, 'R' false
32. Chitin is the cell wall material of fungi So 'A is true, 'R' is true and 'R' explains 'A'
33. Kingdom monera includes prokaryotes like Archaebacteria,Eubacteria, Cyanobacteria, Mycoplasma, Actinomycetes etc. So 'A is true, 'R' is true and 'R' explains 'A'

34. Archaebacteria are prokaryotes and the cell wall shows pseudomurein So 'A is true, 'R'is false
35. As the cell membrane of archaebacteria shows branched chain lipids, they can survive in extreme conditions So A is true,R is true and R explains A
36. 'A' is true, 'R' is true but not correct explanation
37. All bacteria are not parasites and also all bacteria does not contain photosynthetic pigments . So both 'A' and 'R' are false
38. 'A' is true, 'R' is true but not correct explanation
39. 'A' is true, 'R' is true but not correct explanation
40. 'A' is true, 'R' is true but not correct explanation
41. Chemoautotrophs derive energy by the oxidation of inorganic substances and helps in recycling of nutrients like nitrogen, phosphorus,iron and sulphur. So 'A' is true, 'R' is true , 'R' explains 'A'
42. Binary fission occurs during favourable condition. So 'A' is true and 'R' is false
43. 'A' is true 'R' is true but not correct explanation
44. 'A' is true 'R' is true but not correct explanation
45. 'A' is true 'R' is true but not correct explanation
46. Pennale diatoms show bilateral symmetry. So 'A' is true and 'R' is false
47. The flagella of dinoflagellates produce spinning movements and hence called whirling whips. So 'A' is true, 'R' is true and 'R' explains 'A'
48. 'A' is true, 'R' is true and 'R' does not explain'A'
49. Euglenoids have a protein rich layer called pellicle which makes their body flexible . So both 'A' and 'R' are false
50. Though euglenoids are photosynthetic in the presence of sunlight when deprived of sunlight, they behave like heterotrophs by predating on other smaller organisms. Hence they show mixotrophic type of nutrition. So 'A' is true, 'R' is true and 'R' explains 'A'
51. 'A' is true, 'R' is true but not correct explanation
52. Fungi show haplontic life cycle. The zygote undergoes meiosis and hence embryo formation does not occurs. So 'A' is true, 'R' is true and 'R' explains 'A'
53. In ascomycetes and basidiomycetes fungi through plasmogamy an interveining dikaryotic stage (n+n) i.e two nuclei per cell occurs. This is due to delayed karyogamy.So A is true,R is true and R explains A
54. Some species of phycomycetes produce isogametes and some produce anisogametes hence the gametic union may be isogamy anisogamy or oogamy. So 'A' is true , 'R' is true and 'R' explains 'A'
55. As dueteromycetes fungi lack sexual reproduction, they are also called fungi imperfecti. So 'A' is true , 'R' is true and 'R' explains 'A'
56. 'A' is ture, 'R' is true but not correct explanation
57. The core of virus show either DNA or RNA but not both. So 'A' is true, 'R' is false
58. As prions are made up of only infectious protein, they do not show genetic integrity. So 'A' is true, 'R' is true and 'R' explains 'A'
59. 'A' is true, 'R' is true but not correct explanation
60. Generally phytophages show RNA as genetic material. Here HIV is a zoophage that also shows RNA.A is ture,R is true but not correct explanation
61. Sexual reproduction is absent in deteuromycetes . Hence zygote is not formed.So 'A' is true, 'R' is true and 'R' explains 'A'
62. Cyanobacteria are not archaebacteria and are autotrophic monerans. So both 'A' and 'R are false

63. Photoautotrophs get energy from sunlight and chemo autotrophs get energy by the oxidation of inorganic substances. 'A' is ture, 'R' is true but not correct explanation

64. Plasmogamy is not followed by karyogamy in basidiomycetes and ascomycetes Fungi. This leads to dikaryotization . So 'A' is true 'R' is true and 'R' explains 'A'

65. 'A' is true, 'R' is true but not correct explanation

66. Penicillium belongs to kingdom Fungi where as streptomycetes belong to kingdom Monera. So 'A' is true and 'R' is false

67. 'A' is true, 'R' is true but not correct explanation

68. Bacteria, Archaea and Eukarya are believed to be originated from a common ancestral group of early living organisms (progenote). So 'A' is true and 'R' is false

69. 'A' is true, 'R' is true but not correct explanation

70. 'A' is true, 'R' is true but not correct explanation

EXERCISE-II

1. Ergot of rye is caused by a species of (CBSE PMT 2007)

(1) *Uncimula* (2) *Ustilago*
(3) *Claviceps* (4) *Phytophthora*

2. Which one of the following is a slime mould? (CBSE PMT 2007)

(1) *Physarum* (2) *Thiobacillus*
(3) *Anabaena* (4) *Rhizopus*

3. Which one of the following statements about mycoplasma is wrong? (CBSE PMT 2007)

(1) They are pleomorphic
(2) They are sensitive to penicillin
(3) They cause diseases in plants
(4) They are also called PPLO

4. Which pair of the following belongs to Basidiomycetes? (CBSE PMT 2007)

(1) Puffballs and *Claviceps*
(2) *Peziza* and stink borns
(3) *Morchella* and Mushrooms
(4) Birds nest fungi and Puffballs

5. Nitrogen fixation in root nodules or *Alnus* is brought about by (CBSE PMT 2008)

(1) *Frankia* (2) *Azorhizobium*
(3) *Bradyrhizobium* (4) *Clostridium*

6. In the following table identify the correct matching of the crop, its disease and the corresponding pathogen (CBSE PMT 2008)

Crop	Disease	Pathogen
(1) Citrus	Canker	*Pseudomonas rubrilineans*
(2) Potato	Late blight	*Fusarium Udum*
(3) Brinjal	Root - Knot	*Meloidogyne incognita*
(4) Pigeon pea	Seed gall	*Phytophthora infestans*

7. Nutrition in Protists is (CBSE PMT 2008)

(1) Holophytic (2) Holozoic
(3) Saprozoic (4) All of these

8. *Thermococcus, Methanococcus,* and *Methanobacterium* exemplify: (CBSE PMT 2008)

(1) Bacteria that contain a cytoskeleton and ribosomes
(2) Archaebacteria that contain protein homologous to eukaryotic core histones
(3) Archaebacteria that lack any histones resembling those found in eukaryotes but whose DNA is negatively supercoiled
(4) Bacteria whose DNA is relaxed or positively supercoiled but which have a cytoskeleton as well as mitochondria

9. Sexual reproduction in fungi may occur by means of (AMU 2009)

(1) sporangiospore, oospore and ascospore
(2) zoospore, oospore and ascospore
(3) sporangiospore, ascospore and basidiospore
(4) oospore, ascospore, basidiospore

10. Which one of the following has haplontic life cycle? (AIPMT 2009)

(1) *Ustilago* (2) Wheat
(3) *Funaria* (4) *Polytrichum*

11. Which one is the wrong pairing for the disease and its causal organism? (AIPMT 2009)

(1) Loose smut of wheat – *Ustilago nuda*
(2) Root-knot of vegetables – *Meloidogyne sp*
(3) Late blight of potato – *Alternaria solani*
(4) Black rust of wheat – *Puccinia graminis*

12. The athlete's foot disease in humans is caused due to (AMU 2009)

(1) bacteria (2) fungi
(3) virus (4) none of these

13. Nonpathogenic bacteria found in our vermiform appendix is (AFMC 2009)

(1) *Entamoeba histolytica* (2) *Shigella*
(3) *Escherichia coli* (4) Ascaris

14. An example for symbiotic bacteria is

(1) *Erwinia amylovora* **(DPMT 2009)**
(2) *Rhizobium leguminosarum*
(3) *Xanthomonas campestris*
(4) *Agrobacterium tumefaciens*

15. Lung tuberculosis is caused by (DPMT-09)

(1) *Pseudomonas aeruginosa*
(2) *Mycobacterium tuberculosis*
(3) *Streptococcus pneumoniae*
(4) *Escherichia coli*

16. Mannitol is the stored food in (CBSE PMT 2009)

(1) *Porphyra* (2) *Fucus*
(3) *Gracillaria* (4) *Chara*

17. A bacterium is capable of withstanding extreme heat, dryness and toxic chemicals. This indicates that it is probably able to form (KCET 2009)

(1) a thick peptidoglycan wall
(2) endospores
(3) endotoxins (4) endogenous buds

18. Which of the following is a pair of viral diseases? (AIPMT 2009)

(1) Dysentery, Common cold
(2) Typhoid, Tuberculosis
(3) Ringworm, AIDS
(4) Common cold, AIDS

19. The genetic material of rabies virus is

(1) double stranded RNA
(2) single stranded RNA
(3) double stranded DNA
(4) ssDNA.

20. Which of the following statements is *false*? (DPMT 2009)

(1) TMV has double-stranded RNA molecule
(2) Most plant viruses are RNA viruses
(3) The bacteriophage has a double-stranded DNA molecule
(4) Most animal viruses are DNA viruses

21. Which one of the following are intracellular obligate parasites? (DPMT 2009)

(1) Bacteria (2) Viruses
(3) Slime moulds (4) Blue-green algae

22. Potato spindle tuber disease is caused by (DPMT 2009)

(1) a nematode (2) a virus
(3) a bacterium (4) a viroid

23. HIV is classified as a retrovirus because its genetic information is carried in (DPMT 2009)

(1) DNA instead of RNA (2) DNA
(3) RNA instead of DNA (4) Protein coat

24. If the person shows the production of interferons in his body, chances are that he is suffering from (KCET 2009)

(1) anthrax (2) malaria
(3) measles (4) tetanus

25. The beginning of understanding genetic transformation in bacteria was made by: (DPMT 2010)

(1) Frederick Griffith
(2) Hershey and Chase
(3) Watson and Crick (4)T.H. Morgan

26. HIV is a member of a group of viruses called (DPMT 2010)

(1) Bacteriophages (2) Geminiviruses
(3) Lysogenic viruses (4) Retroviruses

27. Typhoid fever is caused by a species of : (DPMT 2010)

(1) *Streptococcus* (2) *Staphylococcus*
(3) *Salmonella* (4) *Mycobacterium*

28. Some hyperthermophilic organisms that grow in highly acidic (pH-2) habitats belong to the two groups: (CBSE-Pre 2010)

(1) Protists and mosses
(2) Liverworts and yeasts
(3) Eubacteria and archaea
(4) Cyanobacteria and diatoms

29. Single-celled eukaryotes are included in (CBSE-Pre 2010)

(1) Protista (2) Fungi
(3) Archaea (4) Monera

30. Select the correct combination of the statements (a-d) regarding the *characteristics* of certain organisms : (CBSE 2010)

(a) Methanogens are Archaebacteria which produce methane in marshy areas
(b) *Nostoc* is a filamentous blue-green alga which fixes atmospheric nitrogen
(c) Chemosynthetic autotrophic bacteria synthesize cellulose from glucose
(d) Mycoplasma lack a cell wall and can survive without oxygen

The correct statements are :

(1) (b), (c), (d) (2) (a), (b), (d)
(3) (b), (c) (4) (a),(b),(c)

31. Membrane-bound organelles are absent in (CBSE-Pre 2010)

(1) *Saccharomyces* (2) *Streptococcus*
(3) *Chlamydomonas* (4) *Plasmodium*

32. Virus envelope is known as (CBSE-Pre 2010)

(1) Capsid (2) Virion
(3) Nucleoprotein (4)Core

33. The most abundant prokaryotes helpful to humans in making curd from milk and in production of antiobiotics are the one categorised as (CBSE - 2012)

(1) Chemosynthetic autotrophs
(2) Heterotrophic bacteria
(3) Cyanobacteria (4)Archaebacteria

34. Which of the following are likely to be present in deep sea water?(NEET - 2013)

(1) Eubacteria (2)Blue-green algae
(3) Saprophytic fungi (4) Archaebacteria

35. Archaebacteria differ from eubacteria in : (AIPMT - 2014)

(1) Mode of reproduction
(2) Cell membrane structure
(3) Mode of nutrition (4) Cell shape

36. Which of the following shows coiled RNA strand and capsomeres? (AIPMT - 2014)

(1) Retrovirus (2) Polio virus
(3) Tobacco mosaic virus
(4) Measles virus

37. Five kingdom system of classification suggested by R.H. Whittaker is not based on: (AIPMT - 2014)

(1) Complexity of body organisation
(2) Presence or absence of a well defined nucleus
(3) Mode of reproduction
(4) Mode of nutrition.

38. Which one of the following living organisms completely lacks a cell wall? **(AIPMT - 2014)**

(1) Blue-green algae (2) Cyanobacteria
(3) Sea-fan (*Gorgonia*)
(4) *Saccharomyces*

39. The motile bacteria are able to move by **(AIPMT - 2014)**

(1) pili (2) fimbriae
(3) flagella (4) cilia

40. Viruses have **(AIPMT - 2014)**

(1) Both DNA and RNA
(2) DNA enclosed in a protein coat
(3) Prokaryotic nucleus
(4) Single chromosome

41. True nucleus is absent in: **(AIPMT - 2015)**

(1) *Vaucheria* (2) *Volvox*
(3) *Anabaena* (4) *Mucor*

42. The guts of cow and buffalo possess: **(AIPMT - 2015)**

(1) Methanogens (2) Cyanobacteria
(3) *Fucus* spp. (4) *Chlorella* spp.

43. Which one of the following matches is correct? **(AIPMT - 2015)**

(1) *Mucor* Reproduction by Conjugation Ascomycetes
(2) *Agaricus* Parasitic fungus Basidiomycetes
(3) *Phytophthora* Aseptate mycelium Basidomycetes
(4) *Alternaria* Sexual reproduction absent Deuteromyctes

44. Choose the wrong statement: **(AIPMT - 2015)**

(1) Yeast is unicellular and useful in fermentation
(2) *Penicillium* is multicellular and produces antibiotics
(3) *Neurospora* is used in the study of biochemical genetics
(4) Morels and truffles are poisonous mushrooms

45. Tiny structures that help some bacteria to attach to rocks and/or host tissues are: **(AIPMT - 2015)**

(1) Holdfast (2) Rhizoids
(3) Fimbriae (4) Mesosomes

46. The imperfect fungi which are decomposers of litter and help in mineral cycling belong to: **(AIPMT - 2015)**

(1) Ascomycetes (2) Deuteromycetes
(3) Basidiomycetes (4) Phycomycetes

47. Pick up the wrong statement: **(AIPMT-'15)**

(1) Nuclear membrane is present in Monera
(2) Cell wall is absent in Animalia
(3) Protista have photosynthetic and heterotrophic modes of nutrition
(4) Some fungi are edible

48. The primary pro ducers of the deep-sea hydrothermal vent ecosystem are **(NEET - 2016)**

(1) Blue-green algae (2) Coral reefs
(3) Green algae
(4) Chemosynthetic bacteria

49. Methanogens belong to **(NEET - 2016)**

(1) Dinoflagellates (2) Slime moulds
(3) Eubacteria (4)Archaebacteria

50. Select the wrong statement **(NEET - 2016)**

(1) Diatoms are chief producers in the oceans
(2) Diatoms are microscopic and float passively in water
(3) The walls of diatoms are easilydestructible
(4) 'Diatomaceous earth' is formed by the cell walls of diatoms.

51. Select the wrong statement **(NEET - 2016)**

(1) Cyanobacteria lack flagellated cells.
(2) Mycoplasma is a wall-less microorganism
(3) Bacterial cell wall is made up of peptidoglycan.
(4) Pilli and fimbriae are mainly involved in motility of bacterial cells

52. Which one of the following statements is wrong? (NEET - 2016)

(1) Cyanobacteria are also called blue-green algae

(2) Golden algae are also called desmids

(3) Eubacteria are also called false bacteria

(4) Phycomycetes are also called algal fungi

53. Chrysophytes, Euglenoids, Dinoflagellates and Slime moulds are included in the kingdom (NEET - 2016)

(1) Monera (2) Protista

(3) Fungi (4) Animalia

54. The primitive prokaryotes responsible for the production of biogas from the dung of ruminant animals, include the (NEET-2016)

(1) Halophiles (2) Thermoacidiophiles

(3) Methanogens (4) Eubacteria

55. Which among the following are the smallest living cells, known without a definite cell wall, pathogenic to plants as well aaas animals and can survive without oxygen? (NEET - 2017)

1) Bacillus 2) Pseudomonas

3) Mycoplasma 4) Nostoc

56. Which of the following are found in extreme saline conditions? (NEET - 2017)

1) Archaebacteria 2) Eubacteria

3) Cyanobacteria 4) Mycobacteria

57. Viroids differ from viruses in having (NEET - 2017)

1) DNA molecules with protein coat

2) DNA molecules without protein coat

3) RNA molecules with protein coat

4) RNA molecules without protein coat

58. Which of the following components provides sticky character to the bacterial cell? (NEET - 2017)

1) cell wall 2) Nuclear membrane

3) Plasma membrane 4) Glycocalyx

NEET-2018

59. Which among the following is not a prokaryote?

(1) Saccharornyces (2) Mycobacterium

(3) Nostoc (4) Oscillatoria

60. Select the wrong statement :

(1) Cell wall is present in members of Fungi and Plantae

(2) Mushrooms belong to Basidiomycetes

(3) Pseudopodia are locomotory and feeding structures in Sporozoans

(4) Mitochondria are the powerhouse of the cell in all kingdoms except Monera

61. After karyogamy followed by meiosis, spores are produced exogenously in

(1) Neurospora (2) Alternaria

(3) Agaricus (4) Saccharomyces

62. Many ribosomes may associate with a single mRNA to form multiple copies of a polypeptide simultaneously. Such strings of ribosomes are termed as

(1) Polysome (2) Polyhedral bodies

(3) Plastidome (4) Nucleosome

63. Which of the following organisms are known as chief producers in the oceans ?

(1) Dinoflagellates (2) Diatoms

(3) Cyanobacteria (4) Euglenoids

NEET-2019

64. Which of the following statements is incorrect ?

1) Viroids lack protein coat

2) Viruses are obligate parasites

3) Infective constituent in viruses is the protein coat

4) Prions consist of abnormally folded proteins

65. Which of the following statement is incorrect ?

(1) Morels and truffles are edible delicacies.

(2) Claviceps is a source of many alkaloids and LSD.

(3) Conidia are produced exogenously and ascospores endogenously.

(4) Yeasts have filamentous bodies with long thread-like hyphae.

1) 4 2) 3 3) 2 4) 1

66. Match Column - I with Column - II

(a) Saprophyte	(i) Symbiotic association
(b) Parasite	(ii) Decomposition of dead organic materials
(c) Lichens	(iii)Living on living plants or animals
(d) Mycorrhiza	(iv) Symbiotic association of algae and fungi

Choose the correct answer from the options given below :

	(a)	(b)	(c)	(d)
(1)	(i)	(ii)	(iii)	(iv)
(2)	(iii)	(ii)	(i)	(iv)
(3)	(ii)	(i)	(iii)	(iv)
(4)	(ii)	(iii)	(iv)	(i)

ANSWERS

1) 3	2) 1	3) 2	4) 4	5) 1	6) 3
7) 4	8) 3	9) 4	10) 3	11) 3	12) 2
13) 3	14) 2	15) 2	16) 2	17) 2	18) 4
19) 2	20) 1	21) 2	22) 4	23) 3	24) 3
25) 1	26) 4	27) 3	28) 3	29) 1	30) 2
31) 2	32) 1	33) 2	34) 4	35) 2	36) 3
37) 2	38) 3	39) 3	40) 2	41) 3	42) 1
43) 4	44) 1	45) 3	46) 2	47) 1	48) 4
49) 4	50) 3	51) 4	52) 3	53) 2	54) 3
55) 3	56) 1	57) 4	58) 4	59) 1	60) 3
61) 3	62) 1	63) 2	64) 3	65) 1	66) 4

EXERCISE-III

1. **Which one of the following fungi contains hallucinogens ?**
(1) *Morchellaesculenta*
(2) *Amanita muscaria*
(3) *Neurospora sp.* (4) *Ustilago sp.*

2. ***Thermococcus*, *Methanococcus* and *Methanobacterium* exemplify :-**
(1) Bacteria whose DNA is relaxed or positivelysupercoiled but which have a cytoskeleton aswell as mitochondria
(2) Bacteria that contain a cytoskeleton andribosomes
(3) Archaebacteria that contain protein homologous to eukaryotic core histones
(4) Archaebacteria that lack any histonesresembling those found in eukaryotes butwhose DNA is negatively supercoiled.

3. **In the light of recent classification of livingorganisms into three domains of life (bacteria,archaea and eukarya), which one of the followingstatements is true about archaea ?**
(1) Archaea completely differ from bothprokaryotes and eukaryotes
(2) Archaea completely differ from prokaryotes
(3) Archaea resemble eukarya in all respects
(4) Archaea have some novel features that areabsent in other pyokaryotes and eukaryotes

4. **Which one of the following does not differ in*E.coli*and *Chlamydomonas*?**
(1) Cell wall (2) Cell membrane
(3) Ribosomes
(4) Chromosomal Organization

5. **Which one single organism or the pair oforganisms is correctly assigned to its or theirnamed taxonomic group ?**
(1) Yeast used in making bread and beer is afungus
(2) *Nostoc*and *Anabaena* are examples of protista
(3) *Paramecium* and *Plasmodium* belong to thesame kingdom as that of *Penicilium*
(4) Lichen is a composite organism formed fromthe symbiotic association of an algae and aprotozoan

6. How many organisms in the list given below are *autotrophs*?

Lactobacillus, Nostoc, Chara, Nitrosomonas, Nitrobacter, Streptomyces, Sacharomyces, Trypanosoma, Porphyra, Wolfia

(1) Six (2) Three (3) Four (4) Five

7. A nitrogen fixing microbe associated with *Azolla* in rice-fields is :-

(1) *Frankia* (2) *Tolypothrix*

(3) *Spirulina* (4) *Anabaena*

8. Choose the incorrect statement of following:-

(1) Dinoflagellates have stiff cellulose plates onthe outer surface.

(2) Euglenoids have two flagella one lieslongitudinally and the other transversely.

(3) Slime mould's spores are dispersed by aircurrent.

(4) In diatoms the cell wall from two thinoverlapping shells.

9. Choose the correct statement :-

(1) *E. coli* show amphitrichous nature

(2) *Rhodospirillum* is a example of purple sulphurbacteria

(3) *Acetobacteraceti* is a example of facultativeanaerobic

(4) *Nitrosomonas* and *Nitrobacter* are example ofnitrogen fixating bacteria.

10. Read the following pair :-

(A) Diatoms-haploid body

(B) Dinoflagellates-water bloom

(C) Slime mould -decomposer nature

(D) Euglenoids-some time behave like predator

(E) Protozoa-Unicellular prokaryotes

Choose the correct pair :-

(1) A, B, C, D (2) B, C, D, E

(3) B, C, D (4) A, C, D, E

11. Choose the incorrect statement regardingMycoplasma :-

(1) They lack cell wall.

(2) They are smallest living cells.

(3) They can survive without oxygen.

(4) They are sensitive to penicilin

12. Study the following characters carefully and giveanswer :-

(A) Bacterial structure is very simple because theyare prokaryotic and unicellular

(B) Bacteria as a group show most extensivemetabolic diversity

(C) Based on shape, bacteria are grouped into twocategories only.

(D) Most of the bacteria do not have cell wall.

(1) A,B-correct ; C,D-incorrect

(2) C,D-correct ; A,B-incorrect

(3) A,D-correct ; B,C-incorrect

(4) B,C-correct ; A,D-incorrect

13. *Chlorella*, *Chlamydomonas* and *Paramoecium*, *Amoeba* were earlier placed with plants and animals respectively but after Whittaker's 5 kingdomclassification, they should be brought together in:-

(1) Monera (2) Protista

(3) Plantae (4) Animalia

14. Some members are given here. They all belongto how many genus, species and kingdom.Lion, Tiger, Potato, Brinjal, Mango, Wheat.

	Genus	Species	Kingdom
(1)	Four	Six	Two
(2)	Five	Four	One
(3)	Five	Six	Two
(4)	Three	Six	Three

15. Fungi resemble monerans on the basis of

(1) Structure of fruiting body

(2) Mycelium

(3) Absorptive heterotrophy

(4) Cellular structure

16. Which of the following statements about virusesis correct :-

(1) Nucleic acid of viruses is known as plasmid

(2) Viruses posses their own metabolic system

(3) All viruses contain both DNA and RNA

(4) Viruses are obligate parasites

17. Match the column I with column-II:-

Diseases	Canslaorganisms
(A) Citrus canker	(i) Bacteria
(B) Little leaf of Brinjal	(ii) *Helminthosporium*
(C) Brown leaf spot of Rice	(iii) *Cephaluros*
(D) Rust of Tea	(iv) Mycoplasma

	A	B	C	D
(1)	(iii)	(iv)	(i)	(ii)
(2)	(i)	(ii)	(iv)	(iii)
(3)	(i)	(iv)	(ii)	(iii)
(4)	(ii)	(iv)	(iii)	(i)

18. Of the following types of organism, which do nothave a membrane surrounding their chromosome?

(a) Archaebacteria (b) Eubacteria(c) Fungi
(d) Protozoa (e) Blue-green algae

Options :-

(1) a,c,d,e (2) a, b, c
(3) a, b, d (4) a, b, e

19. Match the column correctly -

Column I	Column II
A Leprosy	i Mycobacterium
B Plague	ii Yersinia
C Tetanus	iii Clostridium
D Cholera	iv Vibrio cholerae

(1) A - (i), B - (ii), C - (iii), D - (iv)
(2) A - (ii), B - (i), C - (iii), D - (iv)
(3) A - (iii), B - (ii), C - (i), D - (iv)
(4) A - (iv), B - (iii), C - (ii), D - (i)

20. In Carl woese's classification system, the domainthat includes the blue-green algae, nitrogen-fixingbacteria and mycoplasma is

(1) Bacteria (2) Eukarya
(3) Monera (4) Archaea

21. Find out the correct statement

(1) All bacteria are autotrophs
(2) All bacteria are phosynthetic
(3) All bacteria are parasite
(4) Majority of bacteria are heterotrophic, whilesome bacteria are autotrophs

22. Match the following :

Column I	Column II
p) Halophiles	i Protein particle
q) Cyanobacteria	ii Bacteria
r) Clostridium	iii Habitat in saline area
s) Prion	iv Photosynthetic bacteria

(1) p–i,q–ii, r–iii, s–iv
(2) p–iv,q–iii,r–ii,s–I
(3) p–iii,q–iv,r–ii,s–i
(4) p–ii,q–i,r–iii, s–iv

23. Cynobacteriaare not included in plantbecause-

(1) Absence of cell wall
(2) Have glactance and manose in cell wall
(3) Absence of membrane bound organelles
(4) Absence of reproduction

24. *Euglena, Nostoc, Chlorella* and *Spirogyra.* Choose correct option regarding aboveorganism:-

(1) All are unicelleular eukaryotes
(2) All are autotrophic multicellular
(3) All have chlorophyll 'a' and photosynthetic ability
(4) All are belong to green algae

25. Which statement is/are correct regarding heterocyst?

(1) It is non photosynthetic
(2) Can fix atmospheric nitrogen
(3) Found in *Nostoc* (4) All the above

26. Mark out the correct statements

(I) Mesosomesarespecialised differentiated formof cell membrane.
(II) Glycoclayx is not the part of cell envelope
(III) Mesosome helps in distribution of DNA tothe daughter cells in prokaryotes.
(IV) Fimbrae could be helpful in attaching thebacteria to the substrate.

(V) Chromatophores are the reserve food of cyanophycean cell.

(1) II, III and IV (2) I, II and V

(3) I, III and IV (4) I, II and III

27. Match the following :–

Column – I	Column – II
(A) Green algae	(I) Cyanophycean starch
(B) Blue green algae	(II) Laminarian
(C) Diatom	(III) Leucosin starch
(D) Brown algae	(IV) Starch

	A	B	C	D
(1)	I	II	IV	III
(2)	IV	I	III	II
(3)	II	I	III	IV
(4)	I	III	II	IV

28. Clamp junction are present in ?

(1) Ascomyceties (2) Basidiomyceties

(3) Phycomyceties (4) Deutiriomyceties

29. Denitrification is carried by bacteria :-

(1) *Pseudomonas* (2) *Xanthobacter*

(3) *Nitrococcus* (4) *Rhizobium*

30. In which of the following plasmogamy is followedby karyogamy immediately?

(1) *Mucor* (2) *Aspergillus*

(3) *Ustilago* (4) *Puccinia*

31. Which of the following secretes maximum typesof antimicrobial substances to compete with othermicrobes ?

(1) Actinomycetes (2) Ascomycetes

(3) Chloromycetes (4) Eubacteriales

32. Blue green algae store food in the form of α –granules and β–granules. γ–granules arecomposed of cyanophycean starch and β–granules are composed of fat droplets. This cyanophyceanstarch is structurally related to

(1) Glycogen (2) Mannitol

(3) Laminarin (4) Paramylum

33. How many of the following list of organisms lacks cell wall in their vegetative stage ? Diatoms, Cyanobacteria, *Chlorella*, *Chlamydomonas*, *Spirogyra*, *Nostoc*, *Anabaena*,Archaea, PPLO, Dinoflagellates, *Gonyaulax*, Slime moulds

(1)5 (2) 2 (3) 6 (4) 10

34. Match the following :-

Column I		Column II
a Viroid	i	Phosphateabsorption
b Rhizobium	ii	Nucleoproteinparticle
c Virus	iii	ss RNA
d Mycorrhiza	iv	N2 fixation

(1) a-(iii), b-(iv), c-(ii), d-(i)

(2) a-(iii), b-(ii), c-(iv), d-(i)

(3) a-(i), b-(ii), c-(iv), d-(iii)

(4) a-(i), b-(iv), c-(ii), d-(iii)

35. Two kingdom classification system used for a longtime was inadequate, so a need was felt forincluding besides gross morphology,othercharacteristics also. Which of the followingcharacters are the base of five kingdom ?

(a) Cell structure (b) Mode of nutrition

(c) Methods of reproduction

(d) Evolutionary relationships **Options :-**

(1) a& b (2) a, b & c

(3) a, c & d (4) a, b, c & d

36. Read the following statements regarding Euglenoids and select the incorrect ones :-

(i) These are mostly fresh water organisms foundin stagnant water.

(ii) Their body is covered by a protein rich layercalled pellicle which makes their body flexible.

(iii) They are photosynthetic in presence ofsunlight but become heterotrophs in theabsence of sunlight.

(iv) They usually possess two flagella, one longand one short.

(v) Euglenoids are multicellular ciliate protists.

(1) (i) and (v) (2) (iv) and (v)
(3) (iii) only (4) (v) only

37. Read the following statements. Find out whichone is incorrect ?

(1) Virus takes over the machinery of the host cellto replicate themself
(2) Virus contains both RNA and DNA
(3) AIDS in human is caused by a virus
(4) Generally in plant viruses, ss RNA is present

38. Even though the two domains areprocaryotic, the Archaea domain differs from the Bacteriadomain in that the Archaea

I. lack muramic acid in their cell walls.

II. posses membrane lipids with ether-linkedbranched aliphatic chains.

(1) Only I is true (2) Only II is true
(3) Both I and II are true
(4) Neither I nor II true

39. Superficial symbiosis occurs in between members of graminal and symbiotic bacteria

(1) Rhizobium (2) Azospirillum
(3) Nitrosomonas (4) Pseudomonas

40. Which structure helps in attachement of bacteriato rocks in streams and to host tissues?

(1) Longer pili (2) Flagella
(3) Mesosome (4) Fimbriae

41. Toad stool and Bracket fungi belong to the class :-

(1) Phycomycetes (2) Ascomycetes
(3) Basidiomycetes (4) Deuteromycetes

42. Choose the incorrect statement aboutlichen

(1) Some species are eaten by reindeer.
(2) Lichens are indicators of pollution.
(3) They are symbiotic association between fungiand roots of higher plants
(4) They are made up of phycobiont andMycobiont

43. Decomposers like fungi and bacteria are :-

i. autotrophs ii. Heterotrophs
iii. saprotrophs iv. chemo-autotrophs
(1) i and iii (2) i and iv
(3) ii and iii (4) i and ii

44. Moneran flagella are :-

(1) Single stranded of tubulin protein
(2) Single stranded of actin protein
(3) Single stranded of flagellin protein
(4) Multistranded (9 + 2)

45. Members of phycomycetes are found in:-

(A) Aquatic habitats
(B) On decaying wood
(C) Moist and damp places
(D) As obligate parasites on plants

Choose from the following options

(1) Only (A) and (C) (2) Only (A) and (D)
(3) Only (B) and (C) (4) All are correct

ANSWERS

1)2	2)3	3)4	4)2	5)1	6)1
7)4	8)2	9)3	10)3	11)4	12)1
13)2	14)1	15)3	16)4	17)3	18)4
19)1	20)1	21)4	22)3	23)3	24)3
25)4	26)3	27)2	28)2	29)1	30)1
31)1	32)1	33)2	34)1	35)4	36)4
37)2	38)3	39)2	40)4	41)3	42)3
43)3	44)3	45)4			