Biological Classification

Chapter 2

FACT/DEFINITION TYPE QUESTIONS

1. Which of the following characteristic(s) is/are used by Whittaker for the classification of organisms ?
(a) Mode of nutrition
(b) Thallus organisation
(c) Phylogenetic relationships
(d) All of the above

2. Organisms of which of the following kingdom do not have nuclear membrane ?
(a) Protista (b) Fungi
(c) Monera (d) Plantae

3. Protists are
(a) single-celled eukaryotes.
(b) multicellular eukaryotes.
(c) single-celled prokaryotes.
(d) single-celled akaryote.

4. Which of the following pigment is present in cyanobacteria?
(a) Chlorophyll '*a*' (b) Chlorophyll '*b*'
(c) Chlorophyll '*c*' (d) Chlorophyll '*d*'

5. Which of the following is the smallest living cell and can live without oxygen?
(a) *Mycoplasma* (b) Mycorrhiza
(c) *Euglena* (d) *Trypanosoma*

6. Which of the following processes are involved in the reproduction of protists ?
(a) Binary fission and budding
(b) Cell fusion and zygote formation
(c) Spore formation and cyst formation
(d) All of the above

7. Which of the following pairs come under the group chrysophytes?
(a) Diatoms and *Euglena*
(b) *Euglena* and *Trypanosoma*
(c) Diatoms and Desmids
(d) *Gonyaulax* and Desmids

8. Which of the following is an example of amoeboid protozoans ?
(a) *Trypanosoma* (b) *Paramecium*
(c) *Gonyaulax* (d) *Entamoeba*

9. Which of the following is a parasitic fungi on the mustard plant ?
(a) *Albugo* (b) *Puccinia*
(c) Yeast (d) *Ustilago*

10. Which of the following is used extensively in biochemical and genetic work ?
(a) *Agaricus* (b) *Alternaria*
(c) *Neurospora* (d) *Mucor*

11. Which of the following is/are example(s) of deuteromycetes?
(a) *Alternaria* (b) *Colletotrichum*
(c) *Trichoderma* (d) All of these

12. Which group of fungi is commonly known as imperfect fungi ?
(a) Phycomycetes (b) Ascomycetes
(c) Basidiomycetes (d) Deuteromycetes

13. Bladderwort and Venus fly trap are examples of
(a) insectivorous plants (b) parasitic plants
(c) N_2 – rich plants (d) aquatic plants

14. The subunit of capsid is called
(a) core (b) nucleotide
(c) amino acid (d) capsomere

15. Which of the following is not a viral disease ?
(a) AIDS and mumps (b) Small pox and herpes
(c) Influenza (d) Cholera

16. The symbiotic association between fungi and algae is called
(a) lichen (b) mycorrhiza
(c) rhizome (d) endomycorrhiza

17. The genetic material of virus includes
(a) only RNA.
(b) only DNA.
(c) RNA and DNA both
(d) RNA or DNA , *i.e.*, one nucleic acid in a virus.

18. Dikaryon formation is the characteristic feature of
(a) ascomycetes and basidiomycetes.
(b) phycomycetes and basidiomycetes.
(c) ascomycetes and phycomycetes.
(d) phycomycetes and zygomycetes.

19. Clamp connection is found in
(a) basidiomycetes (b) ascomycetes
(c) saccharomycetes (d) haplomycetes

20. Plasmogamy is the fusion of
(a) two haploid cells including their nuclei.
(b) two haploid cells without nuclear fusion.
(c) sperm and egg.
(d) sperm and two polar nuclei.

21. Which scientist classified plants into trees, shrubs and herbs and animals into two groups based on absence or presence red blood cells?
(a) Aristotle (b) R. H. Whittaker
(c) D. J. Ivanowsky (d) W. M. Stanley

22. Fungi are filamentous with the exception of "X" which is unicellular. Identify X.
(a) Yeast (b) Albugo
(c) Mucor (d) Lichen

23. The bacteria which oxidize various inorganic substances and use the released energy for the synthesis of food are called _____.
(a) Archaebacteria
(b) Heterotrophic bacteria
(c) Photosynthetic autotrophic bacteria
(d) Chemosynthetic autotrophic bacteria

STATEMENT TYPE QUESTIONS

24. Which of the following statements is not correct for viruses?
(a) Viruses are obligate parasites.
(b) Viruses can multiply only when they are inside the living cells.
(c) Viruses cannot pass through bacterial filters.
(d) Viruses are made up of protein and DNA or RNA (never both DNA and RNA).

25. Which of the following statements is correct for archaea?
(a) Archaea resemble eukaryotes in all respects.
(b) Archaea have some novel features that are absent in other prokaryotes and eukaryotes.
(c) Archaea completely differ from both prokaryotes and eukaryotes.
(d) Archaea completely differ from prokaryotes.

26. Which of the following statements is not correct for methanogens?
(a) They are archaebacteria.
(b) They live in marshy areas.
(c) Methane is their preferred carbon source.
(d) They are present in guts of several ruminant animals (cow, buffaloes) and produce biogas (CH_4) from the dung of these animals.

27. Which of the following statements is correct for both blue-green algae and bacteria ?
(a) Both show anaerobic respiration.
(b) Both have chlorophyll pigment.
(c) Both are devoid of true nucleus.
(d) None of the above

28. Which of the following statements is incorrect ?
(a) TMV has a double-stranded RNA molecule.
(b) Most plant viruses are RNA viruses.
(c) The bacteriophage has double-stranded DNA.
(d) Most animal viruses are DNA viruses.

29. Which of the following statement is/ are correct for bacteria?
(a) They are the members of the kingdom monera.
(b) They live in extreme habitats such as hot springs, deserts, snow and deep oceans.
(c) They show the most extensive metabolic diversity.
(d) All of the above

30. Which of the following statements is a characteristic feature of chrysophytes?
(a) They are parasitic forms which cause diseases in animals.
(b) They have a protein rich layer called pellicle.
(c) They have indestructible cell wall layer deposited with silica.
(d) They are commonly called dinoflagellates.

31. Which of the following statements is correct for dinoflagellates flagella ?
(a) A single flagellum lies in the transverse groove between the cell plates.
(b) A single flagellum lies in the longitudinal groove between the cell plates.
(c) Two flagella, one lies longitudinally and the other transversely in a furrow between the wall plates.
(d) Flagella are absent.

32. Choose the correct statements (i – v) regarding mycoplasma
(i) Mycoplasma has no cell wall.
(ii) Mycoplasma is the smallest living organism known.
(iii) Mycoplasma cannot survive without O_2.
(iv) Mycoplasma are pathogenic in animals and plants.
(v) A sort of sexual reproduction occurs in bacterium by adopting a primitive DNA transfer from one bacterium to the other.
(a) Only (iii) (b) (i), (iii) and (v)
(c) (i), (ii), (iv), and (v) (d) All of the above

33. Read the given statements and answer the question.
(i) It includes unicellular as well as multicellular fungi.
(ii) In multicellular forms, hyphae are branched and septate.
(iii) Conidiophore produces conidia (spores) exogenously in chain.
(iv) Sexual spores are ascospores produced endogenously in chain.
(v) Fruiting body is called ascocarp.
Identify the correct class of fungi which have all the above given characteristics.
(a) Phycomycetes (b) Sac fungi
(c) Club fungi (d) Fungi imperfecti

34. T. O. Diener discovered a new infectious agent that was smaller than viruses and have the following characteristics.
(i) It causes potato spindle tuber disease.
(ii) It has free RNA.
(iii) Molecular weight of RNA is low.
Identify the infections agent.
(a) Viruses (b) Viroids
(c) Virion (d) Mycoplasma

35. Consider the following statements with respect to characteristic features of the kingdom.
(i) In animalia, the mode of nutrition is autotrophic.
(ii) In monera, the nuclear membrane is present.
(iii) In protista, the cell type is prokaryotic.
(iv) In plantae, the cell wall is present.
Of the above statements, which one is correct ?
(a) (i) only (b) (ii) only
(c) (iii) only (d) (iv) only

36. Which of the following are the characters of dinoflagellates?
(i) They are planktonic golden yellow algae with soap box like structure.
(ii) They are marine red biflagellated protista.
(iii) They appear yellow, green, brown, blue and red in colour.
(iv) They are biflagellated organisms with pellicle.
(v) They are saprophytic (or) parasitic unicellular forms.
(a) (ii) and (iii) (b) (ii) and (v)
(c) (i), (ii) and (iii) (d) (ii), (iv) and (v)

37. The given characters are seen in which of the following group?
(i) Unicellular, colonial, filamentous, marine or terrestrial forms.
(ii) The colonies are surrounded by a gelatinous sheath.
(iii) Some can fix atmospheric nitrogen in specialized cells called heterocysts.
(iv) They often form blooms in water bodies.
(a) Archaebacteria (b) Cyanobacteria
(c) Chrysophytes (d) Dinoflagellates

38. Which of the following group of kingdom protista is being described in the statements given below ?
(i) This group includes diatoms and golden algae.
(ii) They are microscopic and float passively in water currents (plankton).
(iii) Most of them are photosynthetic.
(iv) They have deposits in their habitat; this accumulation over billion of years is referred to as 'diatomaceous earth'.
(a) Dinoflagellates (b) Chrysophytes
(c) Euglenoids (d) Slime moulds

39. The given statements are some characters of a particular group of Kingdom protista.
(i) Most of them are fresh water organisms found in standing water.
(ii) They have a protein rich layer (called pellicle) which makes their body flexible.
(iii) They have two flagella, a short and a long one.
(iv) Though they are photosynthetic in the presence of sunlight, but in the absence of sunlight they behave like heterotrophs by predating on other smaller organisms.
Identify the correct group on the basis of these characters.
(a) Protozoans (b) Chrysophytes
(c) Slime moulds (d) Euglenoids

40. Which of the following class of fungi is being described by the given statements ?
(i) They are found in aquatic habitats and on decaying wood in moist and damp places.
(ii) Mycelium is aseptate and coenocytic.
(iii) Asexual reproduction takes place by zoospores (motile) or by aplanospores (non-motile).
(iv) Some common examples are *Mucor*, *Rhizopus* and *Albugo*.
(a) Ascomycetes (b) Phycomycetes
(c) Basidiomycetes (d) Deuteromycetes

41. Which of the following statement(s) is/are correct about ascomycetes ?
(i) *Neurospora*, which is used in biochemical and genetic work is a member of this class.
(ii) They are mostly multicellular, *e.g.*, Yeast, or rarely unicellular, *e.g.*, *Penicillium.*
(iii) They are saprophytic, decomposers, parasitic or coprophilous.
(iv) Some examples are *Aspergillus*, *Claviceps* and *Neurospora*.
(a) Both (i) and (ii) (b) Only (ii)
(c) (i), (iii) and (iv) (d) All of these

42. Read the following statements and answer the question given below

(i) They are saprophytic protists.

(ii) Under suitable conditions, they form an aggregation (called plasmodium) which may grow and spread over several feet.

(iii) During unfavourable conditions, the plasmodium differentiates and forms fruiting bodies bearing spores at their tips.

Which of the following class of protists is being described by the above statements ?

(a) Euglenoids (b) Dinoflagellates

(c) Slime moulds (d) Protozoans

43. Which of the following statement(s) is/are correct about class basidiomycetes ?

(i) They are commonly known as imperfect fungi because only the asexual or vegetative phases of these fungi are known.

(ii) They grow in soil, on logs and tree stumps and in living plant bodies as parasites, *e.g.*, rusts and smuts.

(iii) The mycelium is branched and septate.

(iv) Some common members are *Agaricus*, *Ustilago* and *Puccinia*.

(a) Only (i) (b) Both (ii) and (iii)

(c) (ii), (iii) and (iv) (d) All of these

44. Read the following statements and answer the question.

(i) Some members are saprophytes or parasites while a large number of them are decomposers of litter and help in mineral cycling.

(ii) They reproduce only by asexual spores known as conidia.

(iii) Mycelium is septate and branched.

(iv) *Alternaria*, *Colletotrichum* and *Trichoderma* are examples of this class.

Which of the following class of fungi is being described by the above statements ?

(a) Phycomycetes (b) Deuteromycetes

(c) Basidiomycetes (d) Ascomycetes

45. Which of the following statement(s) is/are correct ?

(i) Reproduction in fungi can take place by vegetative means – fragmentation, fission and budding.

(ii) Fusion of two nuclei is called plasmogamy.

(iii) Fusion of protoplasms between two motile or non-motile gametes is called karyogamy.

(iv) Meiosis in zygote results in diploid spores.

(a) Only (i) (b) Both (ii) and (iii)

(c) (ii), (iii) and (iv) (d) All of these

46. Which of the following statements regarding cyanobacteria is incorrect?

(a) It is also called blue green algae.

(b) They are chemosynthetic autotrophs.

(c) It forms blooms in polluted water bodies.

(d) It is unicellular, colonial or filamentous, marine or terrestrial bacteria.

ASSERTION/REASON TYPE QUESTIONS

In the following questions, a statement of Assertion is followed by a statement of Reason.

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

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

(c) If Assertion is true but Reason is false.

(d) If both Assertion and Reason are false.

47. **Assertion** : Euglena can be placed in the plant knigdom due to the presence of chlorophyll.

Reason : Euglena cannot be classified on the basis of two kingdom system of classification.

48. **Assertion :** Outside a living cell, viruses have must crystalline statements.

Reason : Viroids have a protein coat.

49. **Assertion :** TMV is a virus which causes mosaic disease.
Reason : TMV has RNA as genetic material.

50. **Assertion :** Lichen is important for chemical industries.

Reason : Litmus and Orcein are formed from lichens.

51. **Assertion :** Yeasts such as *Saccharomyces cerevisiae* are used in baking industry.

Reason : Carbon dioxide produced during fermentation causes bread dough to rise by thermal expansion.

MATCHING TYPE QUESTIONS

52. Match the class of fungi given in column-I with their common name given in column-II and select the correct option.

	Column-I (Class of fungi)		**Column-II (Common name)**
A.	Phycomycetes	I.	Sac fungi
B.	Ascomycetes	II.	Algal fungi
C.	Basidiomycetes	III.	Fungi imperfecti
D.	Deuteromycetes	IV.	Club fungi

(a) A – II, B – I, C – IV, D – III

(b) A – II, B – IV, C – I, D – III

(c) A – IV, B – I, C – II, D – III

(d) A – IV, B – III, C – II, D – I

53. Match the terms given in column-I with their examples given in column-II and choose the correct option

	Column-I (Terms)		**Column-II (Examples)**
A.	Ascus	I.	*Spirulina*
B.	Basidium	II.	*Penicillium*
C.	Protista	III.	*Agaricus*
D.	Cyanobacteria	IV.	*Euglena*
E.	Animalia	V.	Sponges

(a) A – II, B – III, C – IV, D – V, E – I

(b) A – I, B – II, C – III, D – V, E – IV

(c) A – II, B – V, C – III, D – I, E – IV

(d) A – II, B – III, C – IV, D – I, E – V

54. Match the class of fungi given in column I with their examples given in column II and choose the correct option

	Column-I (Class of fungi)		Column-II (Examples)
A.	Ascomycetes	I.	*Rhizopus*
B.	Basidiomycetes	II.	*Penicillium*
C.	Deuteromycetes	III.	*Ustilago*
D.	Phycomycetes	IV.	*Alternaria*

(a) A – IV, B – III, C – I, D – II
(b) A – II, B – III, C – IV, D – I
(c) A – IV, B – I, C – II, D – III
(d) A – III, B – IV, C – II, D – I

55. Match column I (Kingdom) with column II (Class) and select the correct options

	Column-I (Kingdom)		Column-II (Class)
A.	Plantae	I.	Archaebacteria
B.	Fungi	II.	Euglenoids
C.	Protista	III.	Phycomycetes
D.	Monera	IV.	Algae

(a) A – IV, B – III, C – II, D – I
(b) A – I, B – II, C – III, D – IV
(c) A – III, B – IV, C – II, D – I
(d) A – IV, B – II, C – III, D – I

56. Match the scientists given in column I with their discovery given in column II and choose the correct option.

	Column-I (Scientists)		Column-II (Discovery)
A.	Ernst Mayr	I.	Discovered Viroids
B.	Whittaker	II.	Gave the name virus
C.	Pasteur	III.	Proposed five kingdom classification
D.	Diener	IV.	Darwin of the 20^{th} century

(a) A – IV, B – III, C – II, D – I
(b) A – III, B – IV, C – II, D – I
(c) A – II, B – III, C – IV, D – I
(d) A – I, B – II, C – III, D – IV

57. Match column I (containing fungus name) with column II (common name) and choose the correct options.

	Column-I (Fungus name)		Column-II (Commonly called)
A.	*Puccinia*	I.	Yeast
B.	*Ustilago*	II.	Mushroom
C.	*Agaricus*	III.	Smut fungus
D.	*Saccharomyces*	IV.	Rust fungus

(a) A – I, B – II, C – III, D – IV
(b) A – II, B – III, C – IV, D – I
(c) A – III, B – IV, C – I, D – II
(d) A – IV, B – III, C – II, D – I

58. Match the type of protozoans given in column-I with their examples given in column-II and choose the correct option.

	Column-I (Type of Protozoans)		Column-II (Examples)
A.	Amoeboid protozoans	I.	*Paramecium*
B.	Ciliated protozoans	II.	*Plasmodium*
C.	Flagellated protozoans	III.	*Amoeba*
D.	Sporozoans	IV.	*Trypanosoma*

(a) A – I, B – III, C – IV, D – II
(b) A – III, B – I, C – II, D – IV
(c) A – III, B – I, C – IV, D – II
(d) A – III, B – IV, C – I, D – II

59. Match column-I (Characters/feature) with column-II (examples) and choose the correct option.

	Column-I (Characters/features)		Column-II (Examples)
A.	Red dinoflagellates	I.	*Rhizopus*
B.	Unicellular fungi used to make bread and beer	II.	*Gonyaulax*
C.	Source of antibiotics	III.	Yeast
D.	Bread mould	IV.	*Penicillium*

(a) A – III, B – II, C – I, D – IV
(b) A – II, B – III, C – I, D – IV
(c) A – II, B – III, C – IV, D – I
(d) A – II, B – IV, C – III, D – I

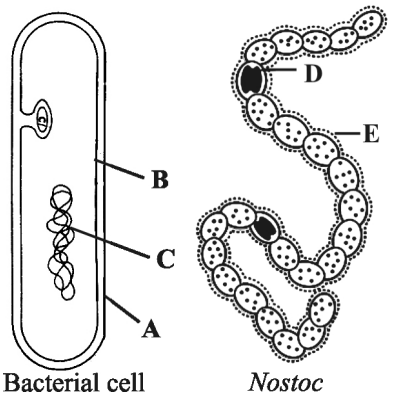
60. Which of the following pairs is not correctly matched ?
(a) *Anabaena* – Cyanobacteria
(b) *Amoeba* – Protozoa
(c) *Gonyaulax* – Dinoflagellates
(d) *Albugo* – Chrysophytes

61. Which of the following groups of protozoan is not correctly matched with its feature?
(a) Amoeboid - Marine forms have silica shells on their surface.
(b) Flagellated - Either free living or parasitic.
(c) Ciliated - Actively moving organisms due to presence of cilia.
(d) Sporozoans - Move and capture their prey with the help of false feet.

62. Select the correct match from the given option.
(a) Occurrence of dikaryotic stage - ascomycetes and basidiomycetes.
(b) Saprophytes - They are autotrophic and absorb soluble organic matter from dead substrates.
(c) Vegetative mean of reproduction in fungi - fragmentation, budding and sporangiophores.
(d) Steps involved in asexual cycle of fungi - plasmogamy, karyogamy and meiosis in zygote resulting in haploid spores.

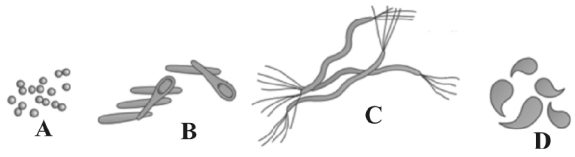
DIAGRAM TYPE QUESTIONS

63. Refer to the given figures of bacteria cell and *Nostoc* and choose the option which shows correct label for the structures marked as A, B, C, D and E ?



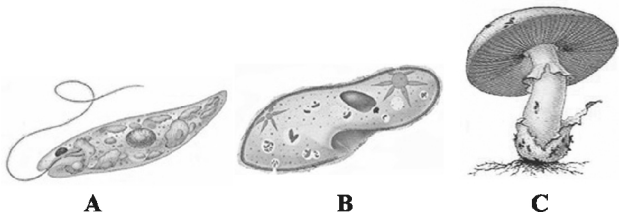
(a) A – Cell wall, B – Cell membrane, C – Heterocyst, D – DNA, E – Mucilagenous sheath
(b) A – Cell wall, B – Cell membrane, C – DNA, D – Heterocyst, E – Mucilagenous sheath
(c) A – Mucilagenous sheath, B – Cell membrane, C – DNA, D – Heterocyst, E – Cell wall
(d) A – Cell membrane, B – Cell wall, C – DNA, D – Heterocyst, E – Mucilagenous sheath

64. Choose the correct names of the different bacteria given below according to their shapes.



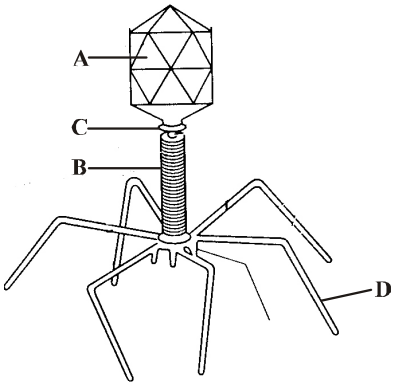
(a) A – Cocci, B – Bacilli, C – Spirilla, D – Vibrio
(b) A – Bacilli, B – Cocci, C – Spirilla, D – Vibrio
(c) A – Spirilla, B – Bacilli, C – Cocci, D – Vibrio
(d) A – Spirilla, B – Vibrio, C – Cocci, D – Bacilli

65. Identify the figures A, B and C given below.



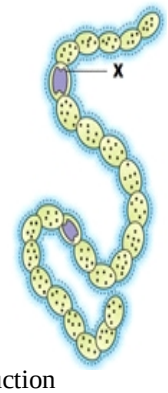
(a) A – *Euglena*, B – *Paramecium*, C – *Agaricus*
(b) A – *Euglena*, B – *Planaria*, C – *Agaricus*
(c) A – *Planaria*, B – *Paramecium*, C – *Agaricus*
(d) A – *Euglena*, B – *Paramecium*, C – *Aspergillus*

66. The figure given below shows the structure of a bacteriophage. Identify its parts labelled as A, B, C and D.



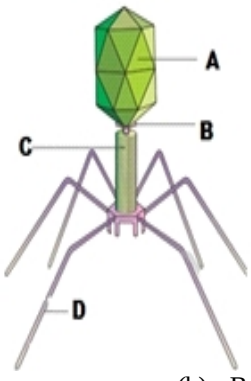
	A	B	C	D
(a)	Tail fibres	Head	Sheath	Collar
(b)	Sheath	Collar	Head	Tail fibres
(c)	Head	Sheath	Collar	Tail fibres
(d)	Collar	Tail fibres	Head	Sheath

67. The given figure shows the structure of filamentous blue green algae. Nostoc with a structure marked as "X". Select the option which shows the correct identification of "X" with its feature.



(a) Spores - Reproduction
(b) Heterocysts - Nitrogen fixation
(c) Pellicle - Recycling of nutrition
(d) Mucilaginous sheath - Photosynthesis

68. The given figure shows some structures labelled as A, B, C and D. Which structure has the protein coat that encloses the nucleic acid?



(a) A (b) B
(c) C (d) D

CRITICAL THINKING TYPE QUESTIONS

69. Bacteria lack alternation of generation because there is
(a) neither syngamy nor reduction division.
(b) no distinct chromosomes.
(c) no conjugation.
(d) no exchange of genetic material.

70. Yeast is not included in protozoans but are placed fungi because
(a) it has no chlorophyll.
(b) some fungal hyphae grow in such a way that they give the appearance of pseudomycelium.
(c) it has eukaryotic organization.
(d) cell wall is made up of cellulose and reserve food material is starch.

71. A virus can be considered a living organism because it
(a) responds to touch stimulus
(b) respires
(c) reproduces (inside the host)
(d) can cause disease

72. Lichens indicate SO_2 pollution because they
(a) show association between algae and fungi.
(b) grow faster than others.
(c) are sensitive to SO_2.
(d) flourish in SO_2 rich environment.

73. When a moist bread is kept exposed in air, it becomes mouldy and black because
(a) spores are present in the water.
(b) spores are present in the bread.
(c) spores are present in the air.
(d) the bread decomposes.

74. In some viruses, RNA is present instead of DNA indicating that
(a) their nucleic acid must combine with host DNA before replication.
(b) they cannot replicate.
(c) there is no hereditary information.
(d) RNA can transfer heredity material.

75. *Ustilago* causes plant diseases (called smuts) because
(a) they parasitize on cereals.
(b) they lack mycelium.
(c) they develop sooty masses of spores.
(d) their affected parts becomes completely black.

76. A fungus contains cells with two nuclei from different genomes. The nuclei do not fuse but divide independently and simultaneously as new cells are formed. This fungus belongs to
(a) phycomycetes (b) zygomycetes
(c) deuteromycetes (d) basidiomycetes

77. Which of the following organisms is\are correctly assigned its/their taxonomic group?
(a) *Paramecium* and *Plasmodium* belong to the same kingdom as that of *Penicillium.*
(b) Lichen is a composite organism formed from the symbiotic association of an alga and a protozoan.
(c) Yeast used in making bread and beer is a fungus.
(d) *Nostoc* and *Anabaena* are examples of protista.

78. Bacteria are found to be primitive organisms because they
(a) are small, microscopic which are not seen with naked eye.
(b) cause serious diseases to human being, domestic animals and crop plants.
(c) produce endospores which are very resistant to adverse conditions.
(d) possess incipient nucleus and show amitotic division.

79. Food can be kept for a longer time in cold house than in normal conditions because
(a) insect cannot enter.
(b) bacterial multiplication stops.
(c) bacterial multiplication is reduced.
(d) there is plasmolysis at low temperature.

80. Mycorrhizae are useful for plants because they
(a) fix atmospheric nitrogen.
(b) enhance absorption of nutrients from the soil.
(c) kill insects and pathogen.
(d) provide resistance against abiotic stresses.

81. The most abundant prokaryotes helpful to humans in making curd from milk and in production of antibiotics are categorised as
(a) cyanobacteria
(b) archaebacteria
(c) chemosynthetic autotrophs
(d) heterotrophic bacteria

82. A specimen of fungus is brought by a student for identification. Upon close examination, he discovered that its hyphae are completely septate and it has gills on the underside of the pileus. To which fungal group does it most likely belong ?
(a) Basidiomycetes (b) Zygomycetes
(c) Ascomycetes (d) Chytrids

83. How many bacteria are produced in four hours if a bacterium divides once in half an hour ?
(a) 8 (b) 64
(c) 16 (d) 256

84. Fungi show asexual reproduction by all of the following kinds of spores except
(a) conidia (b) oospores
(c) sporangiospores (d) zoospores

85. Assume that two normal hyphal cells of different fungal mating types unite. After a period of time, the cell between these cells will dissolve producing a
(a) mycelium
(b) fruiting body
(c) zygote
(d) dikaryotic cell, which is also heterokaryotic

86. Protozons are not included in kingdom animalia because they are
(a) mostly asymmetrical.
(b) unicellular eukaryotes.
(c) heterotrophic in nature.
(d) multicellular prokaryotes.

87. Bacteria and yeast are similar in all the following features except that
(a) both are unicellular.
(b) both are prokaryotes.
(c) both are capable of causing fermentation.
(d) both produce spores.

88. Which of the following is the correct sequence of three steps in the sexual cycle of fungi?
(a) Mitosis → Meiosis → Fertilization
(b) Plasmogamy → Karyogamy → Meiosis
(c) Mitosis → Plasmogamy → Karyogamy
(d) Karyogamy → Plasmogamy → Meiosis

89. An "X" reproduces in such a great numbers that the water may appear, producing a red tides and kills large marine animals like "Z". "X" belongs to "Y". Identify "X", "Y" and "Z".
(a) X - Gonyaulax ; Y - Dinoflagellates; Z - Fishes
(b) X - *Paramecium* ; Y - Protozoa ; Z - Crocodiles
(c) X - *Trypanosoma* ; Y - Protozoa ; Z - Frogs
(d) X - *Plasmodium* ; Y - Euglenoids ; Z - Oysters

90. Identify the basis of classification of fungi into phycomycetes, ascomycetes, basidiomycetes and deuteromycetes.
i. Fruiting bodies
ii. Nature of habitat
iii. Morphology of mycelium
iv. Mode of spore formation
(a) i & ii only (b) ii & iii only
(c) i, iii, & iv only (d) All of these

91. Which class of fungi lacks sex organs but the process of plasmogamy is brought about by fusion of two vegetative or somatic cells of different strains or genotypes?
(a) Sac fungi (b) Bracket fungi
(c) Imperfect fungi (d) Phycomycetes

92. Refer to the statement and answer the question.
"Once the sexual stage of members of deuteromycetes were discovered, they were often moved to X and Y."
Identify X and Y.
(a) X - Monera ; Y - Protista
(b) X - Basidiomycetes ; Y - Phycomycetes
(c) X - Ascomycetes ; Y - Basidiomycetes
(d) X - Phycomycetes ; Y - Archaebacteria

93. A scientist "X" demonstrated that extract of infected plants of "Y" could cause infection in healthy plants and called the fluid as "Contagium vivum fluidum".
Identify X and Y.

	X	**Y**
(a)	W. M. Stanley	Potato
(b)	M. W. Beijerinek	Tobacco
(c)	D. J. Ivanowsky	Cauliflower
(d)	Pasteur	Tomato

Hints & Solutions

Chapter 2 : Biological Classification

1. (d) R.H. Whittaker (1969) proposed a five kingdom classification. The main criteria for classification used by him include cell structure, thallus organisation, mode of nutrition, reproduction and phylogenetic relationships.

2. (c) Monera is the group of prokaryotes. They are basically unicellular, may be mycelial, colonial and filamentous. They do not contain any organized nucleus with distinct membrane.

3. (a) Haeckel created the kingdom Protista to include all unicellular eukaryotic micro-organisms. They have a typical eukaryotic structure with membrane bound organelles and nucleus.

4. (a) The cyanobacteria or blue-green algae are the largest and most diverse group of photosynthetic bacteria. They have chlorophyll '*a*' similar to green plants. They are the first organisms to make atmosphere acrobic.

5. (a) Mycoplasma are the simplest or smallest known organisms that completely lack a cell wall and can survive without oxygen.

6. (d) In protists, reproduction takes place by means of asexual and sexual methods. Asexual reproduction occurs through binary fission (*e.g. Euglena*), cyst formation (*e.g., Entamoeba*), budding, sporulation, etc. In sexual reproduction, fertilization occurs through syngamy and conjugation.

7. (c) Chrysophytes are a group of diatoms, golden algae (desmids) and golden brown photosynthetic microscopic protists. Their body is covered by a transparent siliceous shell.

8. (d) Amoeboid protozoans are organisms that live in fresh water, sea water or moist soil. They move and capture their prey by putting out pseudopodia (*e.g. Amoeba*). Some of them such as *Entamoeba* are parasites.

9. (a) *Albugo* is the parasitic fungi on mustard and belongs to the class phycomycetes and kingdom fungi.

10. (c) *Neurospora* belongs to class ascomycetes and kingdom Fungi. It is used extensively in biochemical and genetic work.

11. (d) Deuteromycetes is also known as fungi imperfecti because the perfect (sexual) stage is either absent or not reported. *Alternaria*, *Colletotrichum* and *Trichoderma* belong to deuteromycetes.

12. (d) Deuteromycetes is commonly known as fungi imperfecti due to absence of perfect sexual stage. They are classed by the colour and structure of the conidia. Since most of the conidia structures look like ascomycetes type, they are believed to be derived from ascos which does not have the ability to reproduce sexually.

13. (a) Bladderwort and venus fly trap are partially antotrophs. They trap insects for obtaining mtrogen and are called insectivorous plants e.g. itcher plant.

14. (d) The capsomere is a subunit of the capsid, an outer covering of protein that protects the genetic material of a virus. Capsomeres self-assemble to form the capsid.

15. (d) Cholera is a bacterial disease caused by the pathogen, *Vibrio cholerae.*

16. (a) The symbiotic association of fungi and algae is called Lichen. In lichen, there are two components *i.e.,* algal partner called **phycobiont** and fungal partner called **mycobiont**.

17. (d) Viruses are obligate intracellular parasite which can reproduce only by invading and taking over other cells as they lack the cellular machinary for self reproduction. Viruses have either DNA or RNA as the genetic material. Viruses having RNA as the genetic material are known as Retroviruses.

18. (a) In fungi (ascomycetes and basidiomycetes), kayrogamy is delayed and occurs just before meiosis. In the stage intervening between plasmogamy and karyogamy the cells often contain two nuclei or **dikaryons** ($n + n$). Such cells are called **dikaryotic cells**. The phase is known as **dikaryophase**.

19. (a) In many members of basidiomycetes, cell division is accompanied by clamp connection. These are bridge (hook) like connections. They function as bypass hyphae through which nuclei migrate to make all of mycelium dikaryotic.

20. (b) Plasmogamy is the first stage of sexual reproduction in which the cytoplasm of two sex cells fuse with each other. The nuclei of sex cells come close to each other but do not fuse. Thus, the resulting cell becomes binucleate or dikaryon.

21. (a) Aristotle was the earliest scientist to attempt a more scientific basis of classification. He classified plants into trees, shrubs and herbs on the basis of simple morphological characters and animals into two groups based on absence of presence of red blood cells.

22. (a) Yeast being a unicellular fungus does not show filamentous nature. It is a microscopic fungus consisting of a single oval cell that reproduces by budding.

23. (d) Chemosynthetic autotrophic bacteria use the energy obtained by the oxidation of chemicals for the synthesis of food. They play a great role in recycling of nutrients like nitrogen, phosphorous, iron and sulphur.

24. (c) Virus is a small infectious agent that replicates only inside the living cells of other organisms. Viruses can infect all types of life forms, from animals and plants to microorganisms, including bacteria and archaea. Viruses can pass through bacterial proof filters as they are smaller than bacteria.

25. (b) Archaebacteria are found in most harsh habitats. Their cell wall is adapted to tolerate extreme conditions (wall contains protein and non-cellulosic polysaccharides). Cell membranes are characterized by the presence of branched chain lipids that make them highly resistent to heat and low pH.

26. (c) Methanogens are archaebacteria that live in marshy area produce methane as a metabolic byproduct in anoxic conditions. Methane is not their preferred carbon source.

27. (c) Cyanobacterial cells (blue-green algal cells) are larger and more elaborate than bacteria. In both the organisms the cell structure is typically prokaryotic type one envelope organisation with peptidoglycan wall, naked DNA, Blue- grenalgal have chlorophyll, bacteria is devold of chlorophyll.

28. (a) Tobacco mosaic virus (TMV) is a single stranded RNA virus that infects a wide range of plants, especially tobacco and other members of the family Solanacea.

29. (d) Bacteria are microscopic organisms placed under kingdom monera whose single cells have neither a membrane-enclosed nucleus nor other membrane-enclosed organelles like mitochondria and chloroplasts.

30. (c) Chrysophytes belong to the kingdom protista. Examples are diatoms and golden algae. Their walls are embedded with silica and thus the walls are indestructible.

31. (c) Dinoflagellates are mostly marine and photosynthetic organism. They appear yellow, green, brown, blue or red depending on the main pigments present in their cells. Most of them have two flagella; one lies longitudinally and the other transversely in a furrow between the cell plates.

32. (c) Mycoplasma refers to a genus of bacteria that lack cell wall around their cell membrane. Without a cell wall, they are unaffected by many common antibiotics such as penicillin or other beta-lactam antibiotics that target cell wall synthesis. They can be parasitic or saprotrophic.Mycoplasma are the facultative anaerobes, they grow best where there is little or no oxygen.

33. (b) Sac fungi is a common name of ascomycetes which produce spores in a distinctive type of microscopic sporangium called an ascus. They are characterized by well-developed thallus and production of ascospores. They are the largest class of fungi. Examples of sac fungi are yeasts, morels, truffles, and Penicillium.

34. (b) Viroids cause potato spindle tuber disease (PSTV), chrysanthemum stunt, citrus exocortis, cucumber pale fruit etc. They cause persistent infections, *i.e.*, never recovered.

35. (d) Kingdom animalia includes all heterotrophic, multicellular complex eukaryotes. They depend either upon plants or on other animals for their food requirements. Kingdom monera includes prokaryotic organisms lacking membrane bound nucleus. Hence, nuclear membrane cannot be found in Monera. Protista is a eukaryotic kingdom.

36. (c) Dinoflagellates are mostly single-celled organisms classified in the kingdom protista. Dinoflagellates characteristically have two flagella for locomotion and most have a rigid cell wall of cellulose encrusted with silica. Their cell wall is divided into two halves called theca that may fit as two halves of a soap box or a petri dish. Some species (*e.g., Noctiluca miliaris*) are bioluminescent.

37. (b) Cyanobacteria are aquatic and photosynthetic, *i.e.*, they live in the water, and can manufacture their own food. They are quite small and usually unicellular, though they often grow in colonies large enough to see. They are the first organisms to make the atmosphere aerobic.

38. (b) Chrysophytes are plant-like protists that can be found in marine and freshwater environments which are often low in calcium. There are three main types of chrysophytes: diatoms (bacillariophyta), golden-brown algae (chrysophyceae), and yellow-green algae (xanthophyceae).

39. (d) Euglenoids is one of the best-known groups of flagellates. They are commonly found in freshwater, especially when it is rich in organic materials, with a few marine, and endosymbiotic members. Most euglenoids are unicellular. Many euglenoids have chloroplasts and produce energy through the process of photosynthesis, but others feed by phagocytosis, or strictly by diffusion. This group is known to contain carbohydrate paramylon.

40. (b) Phycomycetes is a large and important class of parasitic or saprophytic fungi, the algal or alga like fungi. The plant body ranges from an undifferentiated mass of protoplasm to a well-developed and much-branched mycelium. Mycelium is aseptate and coenocytic. Asexual reproduction takes place by spores and sexual reproduction by the formation of conidia or sporangia.

41. (c) Ascomycetes are commonly known as sac-fungi. They are mostly multicellular *e.g., Penicillium* or rarely unicellular, *e.g.,* Yeast.

42. (c) All the described statements are related to slime moulds. Slime moulds are saprophytic protists. They are a simple organism that consists of an acellular mass of creeping jelly-like protoplasm containing nuclei, or a mass of amoeboid cells. When it reaches a certain size it forms a large number of spore cases.

43. (c) Basidiomycetes are commonly known as club fungi. Other commonly known forms of basidiomycetes are mushrooms, bracket fungi or puffballs.

44. (b) Deuteromycetes is an artificial group without any common relationship. They are commonly known as fungi imperfecti due to absence of perfect sexual stage. They have septate hyphae and reproduce asexually by means of conidia.

45. (a) Fusion of two nuclei is called karyogamy. Fusion of protoplasms between two motile or non-motile gametes called plasmogamy. Meiosis in zygote results in haploid spores.

46. (b) Cyanobacteria are photosynthetic (containing a blue photosynthetic pigment) autotrophs. They are prokaryotic and represent the earliest known form of life on the Earth.

47. (b) Euglena has chlorophyll so it can be regarded as plant. It is not possible to classify Euglena on the basis of two kingdom system of classification.

48. (c) Viruses maintain an inert crystalline structure outside living cell viroids do not have protein coat

49. (a) *Nostoc* is a cyanobacterium. Cyanobacteria are gram (–) ve prokaryotes which perform oxygenic photosynthesis like plants. Cyanobacteria can be unicellular (*e.g. spirulina*), colonial. (*e.g. Nostoc*) or filamentous (*e.g. Oscillatoria*)

50. (a) Cell wall is a characteristic of bacteria, plants and fungi.

51. (c) Heterotrophs were the first to be evolved and fungi in the plant kingdom are heterotrophs. Yeast with its characteristic absence of chlorophyll and its vegetative propagation through budding and saprophytic nature shows it is a fungus.

52. (a) Phycomycetes, ascomycetes, basidiomycetes and deuteromycetes are four classes of fungi which are divided on the basis of the septation of the mycelium and the characteristics features of reproduction. Phycomycetes, ascomycetes, basidiomycetes and deuteromycetes are respectively commonly known as algal like fungi, sac fungi, club fungi and fungi imperfecti.

53. (d) Ascus is a sac, typically cylindrical in shape, in which the spores of ascomycetes fungi develop. Basidium is a microscopic club-shaped spore-bearing structure produced by certain fungi. *Euglena*, *Spirulina* and sponges are the examples of protista, cyanobacteria and animalia respectively.

54. (b)

55. (a) Archaebacteria, euglenoids, phycomycetes and algae are classes of monera, protista, fungi and plantae respectively.

56. (a) Ernst Mayr was a renowned taxonomist, tropical explorer, ornithologist, and historian of science. His work contributed to the conceptual revolution that led to the modern evolutionary synthesis of Mendelian genetics, systematics, and Darwinian evolution, and to the development of the biological species concept. Robert Harding Whittaker was a distinguished American plant ecologist. He was the first to propose the five-kingdom taxonomic classification of the world's biota into the Animalia, Plantae, Fungi, Protista, and Monera in 1959. Louis Pasteur was a French chemist and microbiologist renowned for his discoveries of the principles of vaccination, microbial fermentation and pasteurization. He gave the name virus. Theodor Otto Diener discovered the viroid, a plant pathogen one fiftieth of the size of the smallest viruses.

57. (d) *Puccinia*, *Ustilago*, *Agaricus* and *Saccharomyces* are commonly called as rust fungi, smut fungi, mushroom and yeast respectively.

58. (c) Protozoans are single celled microscopic eukaryotic organisms that are noted for their ability to move independently. Protozoans are classified on the basis of their locomotion - amoeboid (*Amoeba*), ciliated (*Paramecium*), flagellated (*Trypanosoma*) and Sporozoans (*Plasmodium*).

59. (c) *Rhizopus* is a genus of common saprophytic fungi on plants and specialized parasites on animals. They are found on a wide variety of organic substrates, including "mature fruits and vegetables", jellies, syrups, leather, bread, peanuts and tobacco. *Rhizopus stolonifer* is more commonly known as black bread mold. *Gonyaulax* is one of the dinoflagellates responsible for the advent of red tides. Yeast is a unicellular fungus, used to make bread and beer. *Penicillium* is a genus of ascomycetous fungi of major importance in the natural environment as well as food and drug production. Some members of the genus produce penicillin, a molecule that is used as an antibiotic.

60. (d) *Albugo* is the parasitic fungi which is found on mustard. It is the member of phycomycetes that are found in aquatic habitats and on decaying wood in moist and damp places.

61. (d) Amoeboid protozoans move and capture their prey by putting out pseudopodia (false feet).

62. (a) Saprophytes are heterotrophic and absorb soluble organic matter from dead substrates. Vegetative mean of reproduction in fungi are fragmentation, budding and fission. Steps involved in sexual cycle of fungi are plasmogamy, karyogamy and meiosis in zygote resulting in haploid spores.

63. (b) The correct labeling in the figures of bacterial cell and *Nostoc* are - A- cell wall, B - cell membranes, C - DNA, D-heterocysts, E - mucilaginous sheath.

64. (a) A - Cocci (spherical), B - Bacilli (rod shaped), C - Spirilla (spiral), D - Vibrio (comma shaped). These are all the shapes of the bacteria.

65. (a) Euglenoids include flagellates like Euglana which have plant like characteristics (chlorophyll) in addition to some animal characteristics. *Paramoecium* is a ciliated protozoan, aquatic and actively moving organisms because of the presence of thousands of cilia. *Agaricus* (mushroom) belongs to class basidiomycetes of kingdom Fungi.

66. (c) The given diagram is of bacteriophage (viruses that infect the bacteria). They have tadpole-like structure, *i.e.*, with head and tail. Nucleic acid generally DNA is present inside the head. Tail is having hollow core end is surrounded by tail sheath. At the end of tail, end plate is present to which tail fibres are attached.

67. (b) Heterocysts are pale-yellow, thick-walled cells that are capable of nitrogen fixation and therefore play a major part in the nitrogen cycle.

68. (a) The structure marked as A, B, C and D are respectively head, collar, sheath and tail fibres. In head (structure marked as A), the protein coat (called the capsid) made of small subunits called capsomeres, protect the nucleic acid.

69. (a) True sexual reproduction is absent in bacteria, but there occurs genetic recombination, *i.e.*, bringing together of genetic material of two bacterial cells, *i.e.,* transformation, transduction, conjugation.

70. (b) The plant body of fungi typically consists of branched and filamentous hyphae, which form a net like structure, known as mycelium. In yeast, the plant body is unicellular but sometimes cells remain attached in short chains, forming a pseudomycelium.

71. (c) A virus is an infective agent that typically consists of a nucleic acid molecule in a protein coat. It is too small to be seen by light microscopy, and is able to multiply only within the living cells of a host. It can be considered living organisms because it reproduces inside the host cell.

72. (c) Lichens are formed by symbiotic relationship between algae or cyanobacteria and fungi. Lichens typically grow in harsh environments most lichens, especially epiphytic fruticose species and those containing cyanobacteria, are sensitive to pollutants. Hence, they have been widely used as SO_2 pollution indicator organisms.

73. (b) When moist bread is kept exposed in air, it becomes mouldly and black because spores are present in the bread.

74. (d) Viruses are defined as infectious nucleoproteins. A complete virus particle is called virion whose main function is to deliver its DNA or RNA gesnome into the host cell, so that genome can be expressed by the host cell. In a particular virus either DNA or RNA is genetic material, never both are present in a virus. Hence, viruses are:

(i) Double stranded DNA or ds DNA - Hepatitis B
(ii) Single stranded DNA or ss DNA - coliphage
(iii) Double stranded RNA or ds RNA - Reo virus, wound Tumor virus
(iv) Single stranded RNA or ss RNA - Tobacco mosaic virus (TMV)

75. (d) Smut disease is caused by *Ustilago* species of basidiomycetes fungi. It is characterized by formation of black coloured chlamydospores or teleutospores (called smut spores) due to which the affected part becomes black.

76. (d) Basidiomycetes are commonly known as club fungi. They are fungus whose spores develop in basidia. They include the majority of familiar mushrooms and toadstools.

77. (c) *Saccharomyces cervisiae* is a yeast used in making bread (Baker's yeast) and commercial production of ethanol. *Paramecium* and *Plasmodium* are of animal kingdom while *Penicillium* is a fungi. Lichen is composite organism formed from the symbiotic association of an alga and a fungus. *Nostoc* and *Anabaena* are examples of kingdom monera.

78. (d) Bacteria are microscopic organisms whose single cells have neither a membrane-enclosed nucleus nor other membrane-enclosed organelles like mitochondria and chloroplasts. Bacteria are found to be primitive organisms because they do not have well-defined nucleus and shows amitotic division.

79. (c) Food can be kept for a longer time in cold house than in normal condition because bacterial multiplication is reduced in cold house.

80. (b) Mycorrhizae is symbiotic association between fungi and roots of higher plants, *e.g.,* in the roots of *Pinus*. This association provides the fungus with food. Fungus help in the absorption of water and nutrient.

81. (d) The most abundant prokaryotes helpful to humans in making curd from milk and in production of antibiotics are the heterotrophic bacteria. *Lactobacillis* bacteria convert milk into curd.

82. (a) The pileus, or cap, is a common characteristic of the club fungi (basidiomycetes). The mycelium is branched and septate.

83. (d)

$$1 \xrightarrow{30\ min} 2 \xrightarrow{30\ min} 4 \xrightarrow{30\ min} 8 \xrightarrow{30\ min} 16 \xrightarrow{30\ min} 32 \xrightarrow{30\ min} 64 \xrightarrow{30\ min} 128 \xrightarrow{30\ min} 256$$

84. (b) In fungi, asexual reproduction takes place by spores-called conidia or sporangiospores or zoospores, and sexual reproduction is by oospores, ascospores and basidiospores.

85. (d) When two hyphal cells of different mating types fuse, they form a dikaryotic cell which is heterokaryotic.

86. (b) Protozoans comes under the kingdom protista (single-celled eukaryotes). They are heterotrophs and live as predators or parasites. They are divisible into four major groups — zooflagellata, sarcodina, sporozoa and ciliata.

87. (b) Bacteria are prokaryotes while yeast belongs to the kingdom Fungi (they are multicellular eukaryotes). Yeast is exception in fungi because it is unicellular but forms pseudomycelium.

88. (b) The sexual cycle in fungi involves the following three steps : plasmogamy, karyogamy and *meiosis*

(i) Fusion of protoplasm between two motile or non-motile gametes called plasmogamy.

(ii) Fusion of two nuclei called karyogamy.

(iii) Meiosis in zygote resulting in haploid spores.

89. (a) A *Gonyaulax* reproduces in such a great numbers that the water may appear red, producing a red tides and kills large marine animals like fishes. *Gonyaulax* belongs to dinoflagellates.

90. (c) Fruiting bodies, morphology of mycelium and mode of spore formation are the basis of classification of fungi into phycomycetes, ascomycetes, basidiomycetes and deuteromycetes.

91. (b) Bracket fungi belong to basidiomycetes. This class of fungi lacks sex organs but the process of plasmogamy is brought about by fusion of two vegetative or somatic cells of different strains or genotypes.

92. (c) Deuteromycetes is commonly known as fungi imperfecti. Once the sexual stage of members of deuteromycetes was discovered they were often moved to ascomycetes and basidiomycetes.

93. (b) M. W. Beijerinek demonstrated that extract of infected plants of tobacco could cause infection in healthy plants and called the fluid as "*Contagium vivum fluidum*".