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Correct answers located at the end of the chapter.

1) Extant microorganisms are organisms from the fossil record that are no longer present on Earth today.
   - ◎ true
   - ◎ false

2) Microbiologists study a variety of organisms, but all are considered either *Bacteria* or *Archaea*.
   - ◎ true
   - ◎ false

3) All eukaryotes have a membrane-delimited nucleus.
   - ◎ true
   - ◎ false

4) Viruses are not generally studied by microbiologists because they are not classified as living organisms.
   - ◎ true
   - ◎ false

5) Viruses constitute the fourth domain of life in current biological classification schemes.
   - ◎ true
   - ◎ false

6) The earliest microbial fossils that have been found are dated from approximately 4.5 million years ago.
   - ◎ true
   - ◎ false

7) Fanny Hesse first suggested that agar be used to solidify microbiological media.
   - ◎ true
   - ◎ false

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8) M. J. Berkeley demonstrated that the great potato blight of Ireland was caused by a water mold (then thought to be a fungus).
   - ◎ true
   - ◎ false

9) Invisible living creatures were thought to exist and cause disease long before they were ever observed.
   - ◎ true
   - ◎ false

10) Koch's postulates were instrumental in establishing that the intracellular parasite *Mycobacterium leprae* is the causative organism of leprosy.
   - ◎ true
   - ◎ false

11) Edward Jenner's work in preventing rabies led to the use of the term vaccination to describe a type of procedure used in the prevention of disease.
   - ◎ true
   - ◎ false

12) Although developed over 100 years ago, Koch's postulates continue to be used successfully in all known human infectious diseases.
   - ◎ true
   - ◎ false

13) Viruses and bacteria were first cultured in the laboratory at about the same time.
   - ◎ true
   - ◎ false

14) Charles Chamberland developed porcelain filters that allowed other scientists to demonstrate that viruses are smaller than bacteria.
   - ◎ true
   - ◎ false

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15) The first disease to be identified as being caused by a virus was tobacco mosaic disease.
- ◎ true
- ◎ false

16) John Tyndall demonstrated that microorganisms present in the air are carried on dust particles.
- ◎ true
- ◎ false

17) Agostino Bassi demonstrated that a type of silkworm disease was caused by a fungus and proposed that many diseases are caused by microorganisms.
- ◎ true
- ◎ false

18) The usefulness of agar in solidifying microbiological growth media is limited because it does not remain solid at temperatures above 28°C.
- ◎ true
- ◎ false

19) Robert Koch developed a vaccine that could be used to prevent anthrax.
- ◎ true
- ◎ false

20) The endosymbiotic hypothesis is generally accepted as the origin of eukaryotic organelles.
- ◎ true
- ◎ false

21) The relationship between specific bacteria and specific diseases was first demonstrated by Koch.
- ◎ true
- ◎ false

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22) Some microorganisms are useful in bioremediation processes that reduce the effects of pollution.
- ◎ true
- ◎ false

23) Protists contain all of the following forms of life EXCEPT _____.
- A) protozoa
- B) fungi
- C) slime molds
- D) algae

24) Cells with a relatively complex morphology that have a true membrane-delimited nucleus are called_____.
- A) prokaryotes
- B) eukaryotes
- C) urkaryotes
- D) nokaryotes

25) Cells with a relatively simple cell morphology that do not have a true membrane-delimited nucleus are called_____.
- A) prokaryotes
- B) eukaryotes
- C) urkaryotes
- D) nokaryotes

26) The ribosomal RNA studies that led to the division of prokaryotic organisms into the Bacteria and the Archaea were begun by_____.
- A) Pasteur
- B) Woese
- C) Needham
- D) Watson

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27) Proteins function in modern cells as _____.
A) catalysts
B) hereditary information
C) structural elements
D) both catalysts and structural elements

28) RNA serves to convert the information stored in DNA to_____.
A) carbohydrates
B) protein
C) lipids
D) RNA

29) Which of the following distinguish the field of microbiology from other fields of biology?
A) The size of the organism studied.
B) The techniques used to study organisms regardless of their size.
C) Both the size of the organism studied and the techniques employed in the study of organisms.
D) Neither the size of the organism studied nor the techniques employed in the study of organisms regardless of their size.

30) Who of the following developed a set of criteria that could be used to establish a causative link between a particular microorganism and a particular disease?
A) Fracastoro
B) Koch
C) Pasteur
D) Lister

31) Who of the following was the first to observe and accurately describe microorganisms?
A) Pasteur
B) Lister
C) van Leeuwenhoek
D) Tyndall

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32) Who of the following provided the evidence needed to discredit the concept of spontaneous generation?
A) Pasteur
B) Koch
C) Semmelweiss
D) Lister

33) The concept that living organisms arise from nonliving material is called_____.
A) biogenesis
B) cell theory
C) spontaneous generation
D) germ theory

34) The concept that human and animal diseases are caused by microorganisms is called the_____.
A) cell theory
B) germ theory
C) causative theory
D) disease theory

35) Whose work on spontaneous generation first demonstrated the existence of a very heat-resistant form of bacteria that are called endospores?
A) Schwann
B) Redi
C) Tyndall
D) Pasteur

36) Antiseptic surgery was pioneered by_____.
A) Pasteur
B) Lister
C) Jenner
D) Kitasato

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37) Studies by Emil von Behring and Shibasaburo Kitasato demonstrated that inactivated toxins can induce the synthesis of antitoxins in the blood of rabbits. These antitoxins (antibodies) are the basis of_____.

A) humoral immunity
B) cell-mediated immunity
C) antibiotic immunity
D) phagocyte-mediated immunity

38) The first surgical antiseptic to be used was_____.

A) iodine
B) ethanol
C) phenol
D) None of the choices are correct.

39) Old cultures of bacteria that have lost their ability to cause disease are said to be_____.

A) impotent
B) virulent
C) pathogenic
D) attenuated

40) Who is credited with developing and documenting the first vaccination procedure against smallpox?

A) Koch
B) Pasteur
C) Jenner
D) Lister

41) Who is credited with developing a vaccine against chicken cholera?

A) Koch
B) Pasteur
C) Jenner
D) Lister

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42) Who of the following first discovered that some blood leukocytes could engulf disease-causing bacteria?
A) von Behring
B) Meister
C) Metchnikoff
D) Ivanowski

43) The use of enrichment cultures and selective media was pioneered by_____.
A) Beijerinck
B) Jenner
C) Pasteur
D) von Behring

44) Which of the following provides the *best* explanation for why viruses are *not* included in the three domain system?
A) Viruses are too small.
B) Viruses have either DNA or RNA, *not* both.
C) Viruses are not a cellular life form.
D) Viruses show no evidence of evolution.

45) A new microbe has been discovered in the rumen of sheep. Microscopy shows no evidence of a nuclear membrane and biochemical studies of the cell wall demonstrate the lack of peptidoglycan. Metabolic studies show that this microbe generates methane. This microbe would most likely be classified in _____.
A) domain Bacteria
B) domain Archaea
C) domain Eukarya, Kingdom Fungi
D) domain Eukarya, Protists

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46) What is the most compelling reason why "protists" are NOT considered to be a taxonomic group?
A) They are *not* cellular life forms.
B) They are too small to be included among the eukaryotes.
C) The group includes both prokaryotic and eukaryotic cell types.
D) The organisms often included in this group are very diverse and don't form a cohesive taxon.

47) Scientists study microorganisms on Earth today to search for life forms elsewhere, as well as to explore the origins of life on Earth. These microorganisms that are studied are referred to as _____.
A) existing
B) extant
C) extinct
D) extirpated

48) The most important aspect of agar that makes it a useful ingredient for solidifying media for bacterial culture is _____.
A) because it provides an excellent nitrogen source for bacteria
B) because bacteria are unable to break it down so it stays solidified
C) because it melts at 100°C and solidifies at temperatures below 40°C
D) because it provides an excellent carbon and energy source for bacteria

49) Which molecule is believed to have preceded the other two during the evolution of life?
A) Proteins
B) DNA
C) RNA

50) What is the most compelling reason why DNA, rather than RNA, evolved to be the storage repository for genetic information in cellular life forms?
A) DNA has deoxyribose rather than ribose.
B) DNA molecules are more chemically stable than RNA molecules.
C) DNA is double-stranded rather than single-stranded.

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51) Each of the following provides evidence in support of the primary role of RNA in the evolution of life EXCEPT _____.
A) some RNA molecules are catalytic
B) RNA catalyzes peptide bond formation during protein synthesis
C) ATP (energy currency of the cell) is a ribonucleotide
D) RNA is less chemically stable than DNA
E) RNA can regulate gene expression

52) While each of these processes are believed to have evolved prior to aerobic respiration, which one is the most critical process, without which aerobic respiration could never have developed?
A) Oxygenic photosynthesis
B) Anoxygenic photosynthesis
C) Alcohol fermentation
D) Lactic acid fermentation

53) Which term is most inclusive? In other words, which term includes all the others?
A) Microbial species
B) Microbial strain
C) Biovars
D) Serovars

54) Which of the processes named here is the least likely to contribute to the evolution of genetic diversity of bacteria and archaea?
A) Mutation
B) Sexual reproduction
C) Binary fission
D) Horizontal gene transfer

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55) A student is observing microorganisms in a sample of pond water. One organism of interest has an obvious nucleus, small oval structures containing a green pigment, and does *not* appear to be motile. In which of the following groups would this microbe most likely be classified?

A) Eukaryotes (Fungi)
B) Eukaryotes (Algae)
C) Bacteria
D) Archaea
E) Eukaryotes (Protozoa)

56) A student is observing microorganisms in a sample of pond water. One organism of interest has an obvious nucleus and has been moving rapidly during observation and appears to have rows of cilia along its surface. In which of the following groups would this microbe most likely be classified?

A) Eukaryotes (Fungi)
B) Eukaryotes (Algae)
C) Bacteria
D) Eukaryotes (Protozoa)

57) Morphovars, serovars, biovars, and pathovars are examples of terms that refer to microbial _____.

A) species
B) strains
C) types
D) Archaea

58) In a search for new antibiotics, a previously unknown organism has been recovered from the soil. It is nonmotile and is composed of long threadlike structures formed from nucleated cells.It is non-photosynthetic and absorbs its nutrients. This organism will most likely be classified among the _____.

A) bacteria
B) Archaea
C) eukaryotes (fungi)
D) eukaryotes (protozoa)
E) eukaryotes (algae)

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59) Three of the SSU rRNA sequences of three organisms have been compared. For organisms 1 and 2, two of the twelve nucleotides in the sequence are different. For organisms 1 and 3, six of the twelve nucleotides are different. Which organism has greater evolutionary distance from organism 1?

A) Organism 2
B) Organism 3
C) The evolutionary distance is the same.
D) Evolutionary distance cannot be predicted from this data.

60) Which group of microbes contains organisms necessary for production of wine and bread?

A) Bacteria
B) Archaea
C) Fungi
D) Algae

61) You discover a new microbe while working on a citizen scientist project. The microbe is taken to a lab that specializes in placing organisms in their correct phylogenic niche. In order to determine its evolutionary relatedness to other microbes, the lab carries out_____.

A) SSU rRNA analysis
B) microscopic analysis
C) biochemical tests
D) DNA fingerprinting

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62) You are a medical microbiologist in Dallas, TX. A small population of individuals spread throughout the city have been experiencing alarming yet similar symptoms affecting the liver that have physicians puzzled as to the etiology, although they all suspect it is microbial in nature. What steps would you take to elucidate the organism?

A)

1. 1. Sample the livers from affected patients to culture and compare organisms;
2. 2. Grow the suspected organisms in culture;
3. 3. Inoculate the cultured organisms into a laboratory animal and monitor for similar symptoms;
4. 4. Culture and analyze the organism from the lab animal and determine relatedness.

A)

1. 1. Inoculate all suspected organisms into a laboratory animal and monitor for similar symptoms;
2. 2. Biopsy the original patient's liver to look for organisms;
3. 3. Grow the suspected organisms from the liver in culture;
4. 4. Culture and analyze the organism from the lab animal and determine relatedness.

A) Sample the livers of all sick individuals and culture the organisms, comparing symptoms and microscopic characteristics.

B)

1. 1. Biopsy the patient's liver to look for organisms;
2. 2. Culture the organisms obtained from the liver and run biochemical tests to determine similarities to other known liver pathogens;
3. 3. Inoculate liver pathogens into lab animals to compare symptoms.

63) Which microbial group members cause serious diseases such as smallpox, AIDS, and Ebola fever?

A) Algae
B) Bacteria
C) Fungi
D) Prions
E) Viruses

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64) Which microbial group members are photosynthetic, include unicellular and multicellular forms, and are the foundation of aquatic food chains?
A) Algae
B) Bacteria
C) Fungi
D) Prions
E) Viruses

65) Which microbial group includes beneficial microorganisms that fix nitrogen and make antibiotics, as well as harmful microorganisms that cause disease such as plague and strep throat?
A) Algae
B) Bacteria
C) Fungi
D) Prions
E) Viruses

66) Which microbial group members have caused "mad cow disease" and Creutzfeld-Jacob disease?
A) Algae
B) Bacteria
C) Fungi
D) Prions
E) Viruses

67) Which microbial group members include decomposers, associate with plant roots and help plants grow, produce antibiotics, help bread rise, and help make wine?
A) Algae
B) Bacteria
C) Fungi
D) Prions
E) Viruses

68) All cellular organisms can be placed into one of three_____, which include the *Bacteria, Archaea,* and the *Eukarya*.

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69) *Archaea*are cellular organisms that have unique cell membrane _____.

70) Elie Metchnikoff discovered_____, which is a major feature of the host immune response.

71) An Italian physician,_____, challenged the concept of spontaneous generation by demonstrating that maggots do not arise from decaying meat but rather from developing fly eggs.

72) _____discovered that soil bacteria could oxidize iron, sulfur, and ammonia to obtain energy.

73) _____was the first to isolate a root nodule bacterium capable of nitrogen fixation.

74) The branch of microbiology that deals with diseases of humans and animals is called_____ microbiology.

75) The branch of microbiology that deals with the mechanisms by which the human body protects itself from disease-causing organisms is called_____.

76) _____ _____ microbiologists monitor community food establishments and water supplies in order to control the spread of communicable diseases.

77) The branch of microbiology that studies the relationship between microorganisms and their habitats is called _____ _____.

78) _____microbiology involves the use of microorganisms to make products such as antibiotics, vaccines, steroids, alcohols, vitamins, amino acids, and enzymes.

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79) Microbial_____ are scientists who investigate the synthesis of antibiotics and toxins, the production of energy with microorganisms, and the ways in which microorganisms survive harsh environmental conditions.

80) Microbial_____ focuses on the nature of heredity and how it regulates the development and function of cells and organisms.

81) A microbial _____ is a collection of strains that share many stable properties and differ significantly from other groups of strains.

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Answer Key

Test name: Chapter 01

1) FALSE
2) FALSE
3) TRUE
4) FALSE
5) FALSE
6) FALSE
7) TRUE
8) TRUE
9) TRUE
10) FALSE
11) FALSE
12) FALSE
13) FALSE
14) TRUE
15) TRUE
16) TRUE
17) TRUE
18) FALSE
19) FALSE
20) TRUE
21) TRUE
22) TRUE
23) B
24) B
25) A
26) B
27) D
28) B
29) C
30) B
31) C
32) A
33) C
34) B
35) C
36) B
37) A

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38) C
39) D
40) C
41) B
42) C
43) A
44) C
45) B
46) D
47) B
48) B
49) C
50) B
51) D
52) A
53) A
54) B
55) B
56) D
57) B
58) C
59) B
60) C
61) A
62) A
63) E
64) A
65) B
66) D
67) C
68) domains
69) lipids
70) phagocytosis
71) Redi
72) Winogradsky
73) Beijerinck
74) medical
75) immunology
76) Public health
77) microbial ecology

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78) Industrial
79) physiologists
80) genetics
81) species

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