Name: _____ Class: _____ Date: _____

CHAPTER 1 - LIGHT AND LIFE

1. Suppose Monet did NOT have a reduced ability to see over the years. What would his paintings have looked like?

a. They would have been less vibrant.
b. They would have been less blue-green.
c. They would not have had narrow brush strokes.
d. They would not have consisted of bleeding colours.

ANSWER: d

2. Which of the following characteristics of light is most commonly used for defining light as a portion of the electromagnetic spectrum?

a. the fact that all living organisms can detect it
b. the fact that plants can detect it
c. the fact that humans can detect it with their eyes
d. the fact that non-human animals can detect it with their eyes

ANSWER: c

3. Which light transmittance decreases when the increased opaqueness of the lens absorbs certain wavelengths of light?

a. green light
b. red light
c. blue light
d. yellow light

ANSWER: c

4. Light serves two important functions for life on Earth. What is light's one source that sustains life, and what information does it provide organisms with?

a. energy; information about chemical life
b. chemicals; information about physical life
c. chemicals; information about surrounding life
d. energy; information about physical life

ANSWER: d

5. The light sensor in a *Chlamydomonas* cell allows it to sense both light direction and light intensity. What do we call this light sensor?

a. a vacuole
b. an eye
c. a spot
d. an eyespot

ANSWER: d

6. Which two things are sensed by a *Chlamydomonas* cell's eyespot?

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a. light location and colour
b. light location and intensity
c. light energy and colour
d. light energy and intensity

ANSWER: b

7. What is the light used for in *Chlamydomonas*?
a. as a source of information about the external environment
b. as a source of information about the internal environment
c. as a source of energy and as a source of information about the external environment
d. as a source of energy and as a source of information about the internal environment

ANSWER: c

8. Which natural phenomenon is the most fundamental?
a. warmth
b. sensitivity
c. sound
d. light

ANSWER: d

9. Which of the following allows energy to be used by living things?
a. It cannot cause changes.
b. It can be reflected.
c. It has no mass.
d. It can interact with matter.

ANSWER: d

10. Which phrase expresses what photons lack versus what they have a precise amount of?
a. mass versus atoms
b. atoms versus mass
c. energy versus mass
d. mass versus energy

ANSWER: d

11. Consider the range of electromagnetic spectrum. What is the relationship between the wavelength of light and the energy of the photons it carries?
a. the shorter the wavelength, the lower the energy of the photons it contains
b. the longer the wavelength, the higher the energy of the photons it contains
c. the longer the wavelength, the lower the energy of the photons it contains
d. the more average the wavelength, the higher the energy of the photons it contains

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ANSWER: c

12. Which term refers to an electromagnetic radiation that is of the shortest wavelength and highest energy?
    a. radio waves
    b. gamma rays
    c. UV light
    d. X-rays

ANSWER: b

13. Which term refers to an electromagnetic radiation that is of the longest wavelength and lowest energy?
    a. radio waves
    b. gamma rays
    c. UV light
    d. X-rays

ANSWER: a

14. Which of the following is within the range of heat escaping from the surface of Earth?
    a. infrared radiation
    b. gamma rays
    c. UV radiation
    d. X-rays

ANSWER: a

15. Which of the following are within the range of most radiation reaching the surface of Earth?
    a. near-infrared and infrared radiation
    b. infrared radiation and microwaves
    c. ultraviolet and near-infrared radiation
    d. ultraviolet radiation and X-rays

ANSWER: c

16. Which of the following must occur in order for light to be used by an organism?
    a. The light must be transmitted.
    b. The light must be absorbed.
    c. The light must be transferred.
    d. The light must be reflected.

ANSWER: b

17. When does the absorption of light occur in matter?
    a. when the energy of the photon is transferred to a proton within a molecule
    b. when the energy of the photon is transferred to an electron within a molecule
    c. when the energy of the photon is transferred to an atom within a molecule

d. when the energy of the photon is transferred to another photon within a molecule

ANSWER: b

18. When does the electron become excited?
    a. when the energy of the photon is transferred to it
    b. when the light is not absorbed
    c. when the energy of the photon is taken away from it
    d. when the light does not exist

ANSWER: a

19. When light hits a pigment, what happens to the energy from a photon?
    a. It is reflected from an electron of the pigment molecule.
    b. It is transferred to an electron of the pigment molecule.
    c. It is transmitted through an electron of the pigment molecule.
    d. It is transmitted and reflected from an electron of the pigment molecule.

ANSWER: b

20. Which of the following must occur in order for a photon to excite an electron in a pigment molecule?
    a. The photon must match the energy difference between the ground state and one of the excited states.
    b. The photon must have lower energy than the electron at the ground state.
    c. The photon must have lower energy than the energy of the electron at the excited state.
    d. The photon must have higher energy than the electron at the ground state.

ANSWER: a

21. What enables the pigments indigo and carmine to capture light?
    a. a single hydrogen bond
    b. a single bond of any element
    c. a conjugated system
    d. a double oxygen bond

ANSWER: c

22. What is a conjugated system?
    a. a pigment region where hydrogen atoms are covalently bonded to each other with alternating single and double bonds
    b. a pigment region where oxygen atoms are covalently bonded to each other with alternating single and double bonds
    c. a pigment region where carbon atoms are covalently bonded to each other with alternating single and double bonds
    d. a pigment region where nitrogen atoms are covalently bonded to each other with alternating single and double bonds

ANSWER: c

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23. When light hits a pigment, how many electrons are excited by a single photon?

a. one
b. two
c. three
d. four

ANSWER: a

24. Which of the following describes a red pigment?

a. It can absorb the green wavelength.
b. It cannot absorb the red wavelength.
c. It cannot absorb the green wavelength.
d. It can absorb the red wavelength.

ANSWER: b

25. Which of the following describes a red pigment?

a. It can reflect the green wavelength.
b. It cannot reflect the red wavelength.
c. It cannot reflect the green wavelength.
d. It can reflect the red wavelength.

ANSWER: d

26. Which pair is properly matched?

a. chlorophyll *a* and photosynthesis
b. chlorophyll *a* and vision
c. indigo and photosynthesis
d. indigo and vision

ANSWER: a

27. Why is chlorophyll green in colour?

a. because it can absorb portions of blue light
b. because it can absorb some red light
c. because it can absorb green light
d. because it cannot absorb green light

ANSWER: d

28. Why is chlorophyll green in colour?

a. It can reflect the green wavelength.
b. It cannot reflect the red wavelength.
c. It cannot reflect the green wavelength.
d. It can reflect the red wavelength.

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ANSWER: a

29. Which of the following is characteristic of an object that is black in colour?
    a. It does not absorb any wavelength.
    b. It absorbs all wavelengths.
    c. It reflects some wavelengths, but not all.
    d. It reflects all wavelengths.

ANSWER: b

30. Why do red and blue light drive photosynthesis more effectively than green light?
    a. because chlorophyll cannot absorb red and blue light
    b. because chlorophyll can absorb green light
    c. because chlorophyll can absorb red and blue light
    d. because chlorophyll cannot absorb green light

ANSWER: c

31. Which phrase best explains why some photosynthesis still occurs under green light?
    a. because chlorophyll absorbs red and blue light
    b. because many different pigments are involved in photosynthesis
    c. because chlorophyll absorbs green light
    d. because chlorophyll is green in colour

ANSWER: b

32. Which aspect of pigments makes them efficient in capturing light?
    a. They all share a region where hydrogen atoms are covalently bonded to each other with single bonds.
    b. They all share a region where hydrogen atoms are covalently bonded to each other with alternating single and double bonds.
    c. They all share a region where carbon atoms are covalently bonded to each other with alternating single and double bonds.
    d. They all share a region where carbon atoms are covalently bonded to each other with double bonds.

ANSWER: c

33. What does the conjugated system arrangement in pigments result in?
    a. delocalization of protons
    b. localization of electrons
    c. delocalization of electrons
    d. localization of protons

ANSWER: c

34. In which way are photosynthesis and cellular respiration related?

a. They both store heat.
b. They both release oxygen.
c. They both store energy.
d. They both use the waste material of the other.

ANSWER: d

35. In what way are bacteriorhodopsin and chlorophyll similar?
a. They are both found in archaea.
b. They both capture photons of light.
c. They are both found in protists.
d. They are both found in plants.

ANSWER: b

36. Why is light a source of energy?
a. It excites an electron within a pigment molecule, which then serves as a source of light energy that can be used for work.
b. It excites an electron within a pigment molecule, which then serves as a source of heat energy that can be used for work.
c. It excites an electron within a pigment molecule, which then serves as a source of potential energy that can be used for work.
d. It excites an electron within a pigment molecule, which then serves as a source of kinetic energy that can be used for work.

ANSWER: c

37. In which form does energy enter the ecosystem?
a. chemical energy
b. heat
c. light energy
d. magnetic energy

ANSWER: c

38. What is the raw material for photosynthesis?
a. sugar and water
b. sugar and oxygen
c. carbon dioxide and oxygen
d. carbon dioxide and water

ANSWER: d

39. What does photosynthesis capture?
a. chemical energy
b. light energy

c. heat
d. magnetic energy

ANSWER: b

40. What is the most common photoreceptor found in nature?
a. chlorophyll *b*
b. chlorophyll *a*
c. rhodopsin
d. carotene

ANSWER: c

41. In the model of a bacteriorhodopsin, which pigment is bound to the protein?
a. rhodopsin
b. retinal
c. chlorophyll *a*
d. indigo

ANSWER: b

42. What are opsins and what are they a part of?
a. membrane lipids that form a complex with a retinal molecule at the centre
b. membrane proteins that form a complex with a retinal molecule at the centre
c. retinal molecules that form a complex with membrane proteins at the centre
d. retinal molecules that form a complex with membrane lipids at the centre

ANSWER: b

43. The plant photoreceptor phytochrome is important for which of the following?
a. photomorphogenesis
b. photorespiration
c. growth
d. photosynthesis

ANSWER: a

44. Which best explains phototaxis?
a. swimming towards or away from the heat source
b. swimming towards or away from the magnetic source
c. swimming towards or away from the light source
d. swimming towards or away from the chemical source

ANSWER: c

45. What does phototaxis allow the cell to do?
a. stay in the optimum light environment

b. stay in the optimum magnetic environment
c. stay in the optimum chemical environment
d. stay in the optimum climate environment

ANSWER: a

46. What does light absorption trigger during phototaxis?
a. rapid changes in the concentrations of ions, including potassium and oxygen
b. rapid changes in the concentrations of ions, including sodium and oxygen
c. rapid changes in the concentrations of ions, including sodium and calcium
d. rapid changes in the concentrations of ions, including potassium and calcium

ANSWER: d

47. Which best explains photomorphogenesis?
a. the normal developmental process activated when seedlings are exposed to heat
b. the normal developmental process activated when seedlings are exposed to light
c. the normal developmental process activated when seedlings are exposed to cold
d. the normal developmental process activated when seedlings are exposed to salinity

ANSWER: b

48. When does phytochrome become active in seedlings?
a. when a seedling is exposed to wavelengths of blue light
b. when a seedling is exposed to wavelengths of red light
c. when a seedling is exposed to wavelengths of green light
d. when a seedling is exposed to wavelengths of yellow light

ANSWER: b

49. Why is the work of Sir Isaac Newton considered so revolutionary?
a. because he promoted only theory, but not experimental work
b. because he promoted only experimental work, but not theory
c. because he worked during a period when religion and superstition were dominant
d. because he worked during a period when religion and superstition were replaced by reason and knowledge

ANSWER: d

50. In what way are eyes and eyespots similar to each other?
a. They are both simple.
b. They both sense light.
c. They are both big.
d. They both sense the absence of light.

ANSWER: b

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51. In what way are insects, arthropods, and molluscs similar to each other?
    a. They have a skeleton.
    b. They have eyespots.
    c. They have wings.
    d. They have ocelli.

ANSWER: d

52. Where are ocelli found?
    a. in planaria only
    b. in arthropods only
    c. in planaria, some insects, some arthropods, and some molluscs
    d. in insects only

ANSWER: c

53. How did the eye that exists in humans and other animals appear?
    a. It did not appear suddenly.
    b. It possibly appeared suddenly.
    c. It definitely appeared suddenly.
    d. It is not known.

ANSWER: a

54. Which wavelengths of the electromagnetic spectrum are the only ones used for photosynthesis?
    a. from about 300 to 600 nm
    b. from about 400 to700 nm
    c. from about 500 to 800 nm
    d. from about 600 to 900 nm

ANSWER: b

55. Which wavelengths are absorbed by the ozone layer high in the atmosphere?
    a. visible wavelengths of electromagnetic radiation
    b. longer wavelengths of electromagnetic radiation
    c. any wavelength of electromagnetic radiation
    d. shorter wavelengths of electromagnetic radiation

ANSWER: d

56. Why can shorter wavelengths NOT be used by pigments?
    a. They would oxidize the pigment.
    b. They would reduce the pigment.
    c. They would cause the excitation of electrons.
    d. They would cause electrons to gain insufficient energy.

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ANSWER: a

57. Which best describes photo-oxidative damage?
a. low energy environments associated with pigment molecules and excited electrons
b. high energy environments associated with pigment molecules and excited electrons
c. high energy environments associated with pigment molecules and non-excited electrons
d. low energy environments associated with pigment molecules and non-excited electrons

ANSWER: b

58. Which of the following is of particular concern for causing damage by light energy?
a. higher-energy gamma radiation
b. lower-energy gamma radiation
c. higher-energy ultraviolet radiation
d. lower-energy ultraviolet radiation

ANSWER: c

59. Suppose there is life on another planet within our galaxy. Which range of wavelengths of the electromagnetic spectrum would most likely be used by the planet's organisms?
a. 0–100 nm
b. 100–200 nm
c. 200–400 nm
d. 400–700 nm

ANSWER: d

60. If there is life on another planet within our galaxy, why would we expect to learn that this life would probably use the same narrow range of wavelengths of the electromagnetic spectrum as we do for a source of energy and information?
a. because all life must use the same electromagnetic spectrum by definition
b. because of the fundamental aspects of photon energy and light absorption
c. because this is the same wavelength that hits the Earth
d. because there is no other wavelength available in nature

ANSWER: b

61. Suppose living things are hit with radiation of a shorter wavelength than light. What would happen to the chemical bonds in living things?
a. The bonds would be weakened.
b. The bonds would remain intact.
c. The bonds would be strengthened.
d. The bonds would be destroyed.

ANSWER: d

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62. Which is a difference between eyes and the photosynthetic apparatus of plants and algae?
   a. The photosynthetic apparatus of plants and algae is particularly susceptible to photo-oxidative damage.
   b. The photosynthetic apparatus of plants and algae is not susceptible to photo-oxidative damage.
   c. Eyes are particularly susceptible to photo-oxidative damage.
   d. Eyes are not susceptible to photo-oxidative damage.

ANSWER: a

63. If a photosystem II complex is under normal light conditions, how often might you expect that it needs to be repaired?
   a. 10 minutes
   b. 20 minutes
   c. 30 minutes
   d. 60 minutes

ANSWER: b

64. Why is ultraviolet radiation damaging?
   a. Because it consists of wavelengths that are longer than visible light, the energy of the photons of ultraviolet light is greater and more damaging to biological molecules.
   b. Because it consists of wavelengths that are shorter than visible light, the energy of the photons of ultraviolet light is greater and more damaging to biological molecules.
   c. Because it consists of wavelengths that are shorter than visible light, the energy of the photons of ultraviolet light is lesser and more damaging to biological molecules.
   d. Because it consists of wavelengths that are shorter than visible light, the energy of the photons of ultraviolet light is lesser and less damaging to biological molecules.

ANSWER: b

65. The UV light affects the nucleotide bases of DNA. What can UV light form, and how many neighbouring bases of DNA become covalently linked in this situation?
   a. It can form a primer with two bases linked.
   b. It can form a dimer with one base linked.
   c. It can form a trimer with three bases linked.
   d. It can form a dimer with two bases linked.

ANSWER: d

66. What is the importance of the pigment melanin in humans?
   a. It prevents destruction of vitamin D caused by UV light.
   b. It allows formation of vitamin B caused by UV light.
   c. It prevents DNA damage by absorbing UV light.
   d. It prevents DNA damage by reflecting UV light.

ANSWER: c

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67. What controls circadian rhythms, and which environment sets this clock?
   a. an internal clock; an external environment
   b. an artificial clock; a natural environment
   c. an external clock; an internal environment
   d. a natural clock; an artificial environment

ANSWER: a

68. What is the free-running nature of circadian rhythm analogous to?
   a. a desktop computer
   b. a digital telephone
   c. an old-fashioned wrist watch
   d. a modern calculator

ANSWER: c

69. Where is the central pacemaker that controls circadian rhythm found in many animals?
   a. in the suprachiasmatic nucleus
   b. in the eye
   c. in the skin
   d. in the optic nerve

ANSWER: a

70. How are leaf-dropping in trees and colour change in the coat of the Artic fox related?
   a. They are examples found in dark-dependent organisms.
   b. They are examples of adaptation to climate.
   c. They are examples found in organisms that live in the same area.
   d. They are examples of photoperiod-dependent phenomena.

ANSWER: d

71. Suppose that the suprachiasmatic nucleus within the brain is damaged. Which of the following is the most likely to occur?
   a. The organism would not be able to control its circadian rhythm.
   b. The organism would die.
   c. The organism would not experience any change.
   d. The organism would not be able to move.

ANSWER: a

72. Which colours are bees attracted to?
   a. green and red
   b. green and blue
   c. yellow and red
   d. yellow and blue

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ANSWER: d

73. Which colour are hummingbirds attracted to?
    a. yellow
    b. blue
    c. red
    d. green

ANSWER: c

74. Which of the following makes pollination important?
    a. It enables recognition of male and female flowers in plants.
    b. It enables the pollinator to feed.
    c. It enables fertilization and reproduction in plants, while the pollinator has no benefits.
    d. It enables fertilization and reproduction in plants, while the pollinator can feed.

ANSWER: d

75. Which of the following best describes coevolution?
    a. A change in one species has no effect on the other species.
    b. A change in one species has an effect on the other species.
    c. Neither of the two species change.
    d. Both species change, but independently of each other.

ANSWER: b

76. What does “light pollution” refer to?
    a. diminished natural lighting
    b. rapid proliferation of artificial lighting
    c. rapid proliferation of natural lighting
    d. diminished artificial lighting

ANSWER: b

77. Which of the following play a central role in animal camouflage?
    a. pattern and simple colour
    b. pattern and behaviour
    c. simple colour and behaviour
    d. simple colour, pattern, and behaviour

ANSWER: d

78. Which of the following is the purpose of the functional photoreceptors in a blind mole rat?
    a. They transmit light form the environment.
    b. They absorb light from the environment.
    c. They properly set the biological clock.

d. They properly set the position of the animal.

ANSWER: c

79. In what way are animals that are normally active during the daytime different than animals that are normally active at night?

a. Animals that are normally active during the daytime display worse visual acuity under high-light conditions compared to animals that are normally active during the night.
b. Animals that are normally active during the daytime display improved visual acuity under high-light conditions compared to animals that are active during the night.
c. Animals that are normally active at night display worse visual acuity under low-light conditions compared to animals that are normally active during the daytime.
d. Animals that are normally active at night display improved visual acuity under low-light conditions compared to animals that are normally active during the daytime.

ANSWER: d

80. What do tarsiers and giant squids have in common?

a. They are both active during daytime as well as at night.
b. They both live in water.
c. They are both active during daytime.
d. They are both nocturnal.

ANSWER: d

81. How is the eye of a tarsier similar to the eye of a giant squid?

a. Both are compound.
b. Both are simple.
c. Both are blue.
d. Both are blind.

ANSWER: a

82. Why do animals in deep ocean depths live in complete darkness?

a. because 100% of the ocean is at a depth where no light penetrates
b. because over 90% of the ocean is at a depth where no light penetrates
c. because over 80% of the ocean is at a depth where no light penetrates
d. because over 70% of the ocean is at a depth where no light penetrates

ANSWER: b

83. What is the cause of blindness in mole rats?

a. They live in dry areas that do not provide enough moisture.
b. They live in a group and do not need to see.
c. They live in the light and are blinded by it.
d. They live in underground darkness.

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ANSWER: d

84. What is the purpose of the functional photoreceptors in mole rats, even though the image-forming part of the brain is dramatically reduced?

a. It allows them to set their biological clock properly, which is necessary for reproduction.
b. It allows them to hunt successfully.
c. It allows them to see other individuals in their group properly.
d. It allows them to set their biological clock properly, which is necessary for the proper regulation of circadian rhythm.

ANSWER: d

85. How do bioluminescent animals deal with light?

a. They absorb light from the environment.
b. They reflect light to the environment.
c. They produce their own light.
d. They transmit light form the environment.

ANSWER: c

86. What is one difference between the energy produced from the light bulb and the energy produced during the process of bioluminescent light production?

a. Less than 5% of the energy converted is lost as chemical energy during the process of bioluminescent light production.
b. Less than 5% of the energy converted is lost as heat energy during the process of bioluminescent light production.
c. The conversion of heat energy produced during the process of bioluminescent light production is very inefficient.
d. The conversion of chemical energy produced during the process of bioluminescent light production is very inefficient.

ANSWER: b

87. Suppose that dinoflagellates are NOT bioluminescent. Which of the following would most likely characterize them?

a. They will not be able to feed.
b. They will not be able to reproduce.
c. They will not be able to scare off potential predators.
d. They will not be able to expel wastes.

ANSWER: c

88. Suppose that some marine bacteria that are normally bioluminescent are NOT any more. As a result, what would the bacteria most likely be unable to do?

a. They would be unable to scare off potential predators.
b. They would be unable to feed.

c. They would be unable to communicate.
d. They would be unable to reproduce.

ANSWER: c

89. Do we know why bioluminescence is absent in land plants?
a. We do not know this yet.
b. It is because they live on land.
c. It is because they do not live in deep oceans.
d. It is because they are plants.

ANSWER: a

90. The Sun converts over 4 million tonnes of matter into energy every minute.
a. True
b. False

ANSWER: False

91. A discrete particle of energy is called a photon.
a. True
b. False

ANSWER: True

92. Individual pigments do NOT differ in the wavelengths of light they can absorb.
a. True
b. False

ANSWER: False

93. For a chlorophyll molecule, the electron involved in photon capture can exist in many excited states.
a. True
b. False

ANSWER: False

94. Bacteriorhodopsin, as a pigment in *Halobacterium*, functions in photosynthesis.
a. True
b. False

ANSWER: False

95. Absorption of a photon of light causes the retinal pigment molecule to change shape.
a. True
b. False

ANSWER: True

96. Each rhodopsin consists of a protein called opsin that binds to a single pigment molecule called retinol.
a. True

b. False

ANSWER: False

97. Phytochrome is present in the cytosol of all plant cells.

a. True
b. False

ANSWER: True

98. When the plant is exposed to wavelengths of red light, phytochrome becomes inactive and initiates a signal transduction pathway.

a. True
b. False

ANSWER: False

99. We "see" not with our eyes but rather with our brain.

a. True
b. False

ANSWER: True

100. A planarian orients itself such that an equal amount of light falls on its two ocelli so that the amount of light enhances as the animal swims.

a. True
b. False

ANSWER: False

101. In many ways, the eyes of *Planaria* is much more advanced than the eyespot of *Chlamydomonas*.

a. True
b. False

ANSWER: False

102. The "image-forming eyes" are found in both compound eyes and double-lens eyes.

a. True
b. False

ANSWER: False

103. A plot of the effectiveness of different wavelengths of light on a biological process is called an action spectrum.

a. True
b. False

ANSWER: False

104. A person who is of African descent living in Norway cannot suffer from vitamin D deficiency.

a. True

b. False

ANSWER: False

105. Jet lag is a result of the disturbance of your biological clock.

a. True
b. False

ANSWER: True

106. The reason why many animals are able to attract other organisms is because they use colour.

a. True
b. False

ANSWER: True

107. Birds that are brightly coloured have a good diet.

a. True
b. False

ANSWER: True

108. If a plant has bright flowers, it is very likely that it is attracting animals.

a. True
b. False

ANSWER: True

109. Carotenoids are accessory pigments that can protect the photosynthetic apparatus from high light levels by absorbing excess light and safely dissipating the energy as heat.

a. True
b. False

ANSWER: False

110. Some animals camouflage themselves by having the patterns difficult to see when they do not move.

a. True
b. False

ANSWER: True

111. All animals see very well under dim light conditions.

a. True
b. False

ANSWER: False

112. Although they are now blind, mole rats had ancestors with functional eyes.

a. True
b. False

ANSWER: True

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113. Bioluminescent organisms do NOT need to be exposed to light at all.

a. True
b. False

ANSWER: True

114. Quorum sensing is now believed to be the basis for what are termed “milky seas.”

a. True
b. False

ANSWER: True

115. Bioluminescence found in marine bacteria is used for communication.

a. True
b. False

ANSWER: True

116. “Milky seas” is a phenomenon resulting from bioluminescence of marine bacteria.

a. True
b. False

ANSWER: True

117. Bioluminescence has been reported in land plants or higher vertebrates.

a. True
b. False

ANSWER: False

118. Explain why, after the Industrial Revolution in England, dark-coloured pepper moths became more abundant than the usual light-coloured moths, and why this case is often cited as an example of evolution by natural selection.

ANSWER: Before the Industrial Revolution, light-coloured pepper moths were prevailing. However, during the Revolution, many tree trunks became darker in colour due to pollution. In this setting, light-coloured moths became easy prey for predators and were mostly exterminated. This is a good example of evolution by natural selection, because dark-coloured moths were left behind to reproduce, and therefore became more abundant.

119. Explain how light pollution may affect natural populations. Give two examples.

ANSWER: The presence of artificial light (light pollution) disrupts orientation in nocturnal animals accustomed to operating in the dark. Newly hatched sea turtles emerge from nests on sandy beaches and orient and move toward the ocean because it is brighter than the silhouette of dark dunes. With increased lighting, they sometimes become disoriented, head inland, and then die. Many migrating birds die in collisions with lighted buildings and towers. Many species of nocturnal frogs and salamanders are also disrupted by light pollution.