

Test Bank, Chapter 2

1. Carlos Linnaeus:
 - (a) devised a system of taxonomy that is still used today
 - (b) accepted the idea that most of life's diversity arose through the process of evolution
 - (c) believed that life's diversity reflected a divine plan
 - (d) a and b are correct
 - (e) a and c are correct**

2. On which point(s) would Charles Darwin and Georges Buffon have likely disagreed:
 - (a) the idea that the earth was formed according to the laws of physics
 - (b) the idea that all life shares a common ancestor**
 - (c) the idea that species change over time
 - (d) they would have agreed on all of these points

3. On which point(s) would Charles Darwin and Georges Buffon have likely agreed:
 - (a) the idea that all of life shared a common ancestor
 - (b) the idea that species change over time**
 - (c) both are correct
 - (d) neither is correct

4. Jean-Baptiste Lamarck proposed:
 - (a) bacteria represent some of the youngest species on earth
 - (b) organisms can adapt to their environment
 - (c) life arises spontaneously
 - (d) all of the above**
 - (e) none of the above

5. Which of the following ideas was NOT accepted by Jean-Batiste Lamarck?
 - (a) bacteria represent some of the youngest species on earth
 - (b) life arises spontaneously
 - (c) organisms go extinct**
 - (d) none of the above

6. On what point(s) would Charles Darwin and Jean-Baptiste Lamarck have disagreed:

- (a) organisms change over time
- (b) adaptation occurs when individuals change to adapt to their environment**
- (c) species give rise to new species
- (d) they would have disagreed on all of the points
- (e) they would have agreed on all of these points

7. On what point(s) would Charles Darwin and Jean-Baptiste Lamarck have agreed:

- (a) adaptation occurs when individuals change to adapt to their environment
- (b) life is spontaneously generated all the time
- (c) species give rise to new species**
- (d) simple organisms have existed for a shorter period of time than complex organisms
- (e) they would have disagreed on all of these points

8. Which of the following is/are critical for Darwin's idea of natural selection:

- (a) individuals vary in their traits
- (b) natural resources are limited
- (c) some individual variation is heritable
- (d) All are critical**
- (e) None are critical

9. Which of the following is/are NOT critical for Darwin's idea for natural selection:

- (a) no two individuals are exactly the same
- (b) variable traits can influence reproductive success
- (c) features of individuals change during their lifetime**
- (d) None of these are critical
- (e) All of these are critical

10. Homologous traits:

- (a) always perform the same function in different species
- (b) always perform a different function in different species
- (c) are inherited from a common ancestor**
- (d) a and c are correct
- (e) b and c are correct

11. Homologous and analogous traits differ because:
- (a) analogous traits perform the same function in different species while homologous traits perform a different function
 - (b) homologous traits arise through convergent evolution while analogous traits do not
 - (c) analogous traits arise through convergent evolution while analogous traits do not**
 - (d) a and b are correct
 - (e) a and c are correct
12. Which of the following statements is central to the idea of uniformitarianism:
- (a) natural laws that are observable today also operated in the past
 - (b) catastrophic events such as floods and volcanoes have played the primary role in shaping the earth's existing features
 - (c) geological change happens gradually for the most part
 - (d) a and c are correct**
 - (e) all are correct
13. Nicolaus Steno:
- (a) was one of the first to recognize that fossils were the remains of once living organisms
 - (b) recognized the basic principles of stratigraphy
 - (c) a and b are correct**
 - (d) none of the above
14. William Smith:
- (a) created the first geological map**
 - (b) devised a system of taxonomy still in use today
 - (c) was the first to establish the fact of extinction
 - (d) first proposed the idea of natural selection
15. Which of the following was NOT proposed by Darwin:
- (a) sexual selection
 - (b) genetic drift
 - (c) DNA is the hereditary material
 - (d) a and c
 - (e) b and c**

16. How did James Hutton's ideas about geology differ from earlier views?

Before Hutton, most people thought that catastrophic processes such as floods and volcanoes shaped the major features of the earth. Hutton proposed that most of the major features of the earth arose through processes that were imperceptibly slow and observable in present day. For example, a stream causes erosion, which over long periods of time can create features such as deep canyons.

17. How would early geologists such as William Smith explain the observation that certain species were found only in small number of rock layers while others were found in many different layers?

Smith recognized the importance of extinction and understood that rock strata were deposited in layers, with younger layers being above older layers. He therefore probably would have explained this observation by positing that species found in only of few layers existed for a shorter period before going extinct, while those species found in many layers existed for a longer period of time before going extinct.

18. Describe Jean-Baptiste Lamarck's ideas about evolution.

Lamarck argued that life was spontaneously generated all the time. Initially, new life forms were simple, like bacteria, but over time changed to become more complex. Thus, the simplest life forms on earth today were generated recently, while complex forms have been around for longer. Lamarck also proposed that organisms adapted to their environment through a transformational process—e.g. a giraffe might stretch its neck to reach for leaves, causing it's neck to lengthen. The offspring would inherit this acquired characteristic.

19. Charles Darwin and Jean-Baptiste Lamarck both argued that organisms could adapt to their environment. How did their ideas about how this occurred differ?

Lamarck's viewed adaptation as a transformational process—individuals themselves change to adapt to their environment, and these acquired changes are passed to offspring. Darwin argued that adaptation occurred through the process of natural selection, which is a variational process. Variation allows some individuals to reproduce more than others—these variations are passed to offspring with the result that the population adapts to the environment over time. Thus, one of the main differences between the ideas of Lamarck and Darwin is that Darwin thought that adaptation resulted at the level of the population, while Lamarck argued that individuals themselves can change to adapt to their environment.

20. Explain how the following individuals influenced Darwin:

George Lyell: Lyell was a proponent of uniformitarianism—the idea that the features of the earth are explained by observable processes that result in small, imperceptible changes over long periods of time. The idea of gradual change of long periods of time is central to Darwin’s ideas about evolution. Darwin’s ideas also require an old earth, which is suggested by uniformitarianism.

Thomas Malthus: Malthus described how human populations that grew too quickly would eventually outstrip resources. This would create unequal survival and reproductive success, with only those able to adapt to society’s needs would be successful. Darwin recognized that this sort of struggle for existence existed for all living organisms. Organisms compete to survive and reproduce and only those best adapted to their environment will be successful. These ideas helped form the basis for natural selection.

21. How can the wings of bats and birds be considered both homologous and analogous structures?

The fact that both have evolved wings for flight is an example of analogy because bats and birds did not inherit wings from their most recent common ancestor. However, the bones that make up the forelimb are homologous as this bone structure was inherited from the ancestor of all tetrapods.

22. How did the work of geologists such as James Hutton and Charles Lyell influence Darwin?

Hutton and Lyell both argued that slow, gradual, observable processes accumulate over time to produce large changes to features of the earth (e.g. rivers carving canyons). This influenced Darwin in at least two important ways. First, the ideas of Hutton and Lyell require an old earth, which was critical to Darwin’s arguments because life’s diversity would have taken a long time to evolve through descent with modification. Second, Darwin’s idea that evolutionary diversity arises through slow, gradual, observable processes that accumulate over time has obvious roots in the arguments of Hutton and Lyell.

23. Organisms are similar in many ways. Considering Darwin’s idea of descent with modification, what are two possible explanations for shared similarities between species?

- 1. Common descent: organisms often share similarities because they inherited the same trait(s) from their common ancestor.**

- 2. Convergent evolution: organisms sometimes share similarities because natural selection has selected for similar traits in response to the same environmental selective pressures.**

24. Please describe at least one scientific contribution made by each of the following individuals.

Charles Darwin: **proposed and described exhaustive evidence for the idea of descent with modification, which forms the foundation of modern evolutionary biology.**

Charles Lyell: **popularized the idea of uniformitarianism, which posits that observable natural processes working over long periods of time have shaped features of the earth.**

Alfred Russel Wallace: **posited a mechanism for evolutionary change that was essentially the same as Darwin's theory of natural selection.**

Jean-Baptiste Lamarck: **argued that life had evolved with species giving rise to new species.**

Georges Cuvier: **established that extinction occurs.**

Carl Linnaeus: **devised a system of taxonomy still being used today.**

Georges Buffon: **proposed that life is old and the earth has changed gradually.**

25. How did Charles Darwin draw on embryology to support the idea of common descent?

Darwin argued that the study of embryology can reveal that some structures that are highly dissimilar in adults may actually result from modification of underlying homologous structures/tissues present early in development.