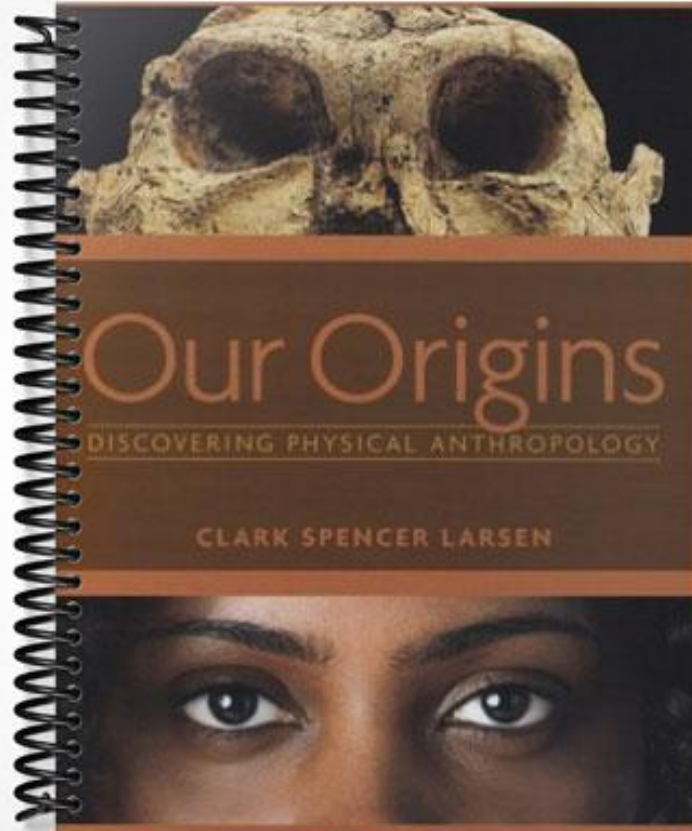


TEST BANK



Chapter 2—Evolution: Constructing a Fundamental Scientific Theory

TRUE/FALSE

1. Organisms classified in two different biological orders can still belong to the same genus.

ANS: F PTS: 1

2. Before 1700, most Western scientists thought the Earth was about 4.6 billion years old.

ANS: F PTS: 1

3. Like most of his contemporaries, Charles Darwin believed that physical traits were passed down from each parent and then blended together in the offspring.

ANS: T PTS: 1

4. Genetic drift is most powerful as an evolutionary cause when operating on small populations.

ANS: T PTS: 1

5. Thomas Henry Huxley was a fierce opponent of Darwin's theory of evolution by means of natural selection.

ANS: F PTS: 1

6. Mutation is the only source of new genetic material.

ANS: T PTS: 1

7. Mendel's discrete units responsible for the characteristics in his pea plants are now known as chromosomes.

ANS: F PTS: 1

8. Gene flow increases the number of genetic differences between populations.

ANS: F PTS: 1

9. The combined efforts of Rosalind Franklin, James Watson, and Francis Crick helped explain how chromosomes are replicated.

ANS: T PTS: 1

10. Natural selection works on preexisting variation in a population.

ANS: T PTS: 1

MULTIPLE CHOICE

1. Among the first scientists to conceive of evolutionary change was:
a. Charles Darwin.

- b. Jean-Baptiste de Lamarck.
- c. Erasmus Darwin.
- d. Alfred Wallace.
- e. Georges Cuvier.

ANS: C PTS: 1

2. Charles Darwin's most important contribution in his book *On the Origin of Species* (1859) was his:
- a. coining the concept of evolution.
 - b. synthesizing information from diverse scientific fields to document evolutionary change.
 - c. immediately and widely accepted mechanism for evolutionary change.
 - d. None of the above.

ANS: B PTS: 1

3. Darwin's theory of evolution drew from all of the following scientific disciplines EXCEPT:
- a. demography.
 - b. geology.
 - c. genetics.
 - d. systematics.
 - e. paleontology.

ANS: C PTS: 1

4. Alfred Wallace was:
- a. an English naturalist who arrived at many of the same conclusions as Darwin.
 - b. mistakenly credited with the theory of natural selection.
 - c. a British dog breeder who worked on artificial selection experiments.
 - d. known for gathering even more evidence to support evolution than Darwin did.

ANS: A PTS: 1

5. The evolutionary synthesis:
- a. occurred in 1900 immediately after Mendel's work was rediscovered.
 - b. emphasized the important role of mutation and macromutation in evolutionary change.
 - c. emphasized theoretical differences between diverse scientific fields.
 - d. accepted Darwin's theory of evolution and Mendel's theory of heredity as explaining most evolutionary change.

ANS: D PTS: 1

6. Deoxyribonucleic acid (DNA):
- a. was studied during Darwin's lifetime.
 - b. is the "recipe" for all biological characteristics and functions.
 - c. was discovered by Mendel.
 - d. is stored in the cells as ribosomes.

ANS: B PTS: 1

7. Carolus Linnaeus:
- a. was a proponent of evolutionary change.
 - b. developed a classification system for plants and animals.
 - c. was a supporter of Charles Darwin.
 - d. developed theories of natural selection.

ANS: B PTS: 1

8. James Hutton is associated with:
- adaptation.
 - catastrophism.
 - uniformitarianism.
 - principles of heredity.

ANS: C PTS: 1

9. The idea of catastrophism is attributed to:
- Charles Darwin.
 - Charles Lyell.
 - Georges Cuvier.
 - Comte Georges-Louis Leclerc de Buffon.

ANS: C PTS: 1

10. According to Darwin, natural selection operates at the level of:
- individuals.
 - genes.
 - populations.
 - species.

ANS: A PTS: 1

11. The idea that geologic processes operating today are the same as those that happened in the past is:
- catastrophism.
 - creationism.
 - anachronism.
 - uniformitarianism.

ANS: D PTS: 1

12. The English demographer whose work on population growth greatly influenced Darwin's thinking was:
- Jean-Baptiste de Lamarck.
 - Georges Cuvier.
 - Thomas Malthus.
 - Charles Lyell.

ANS: C PTS: 1

13. Lamarck proposed an erroneous evolutionary mechanism known today as:
- inheritance of acquired characteristics.
 - mutation.
 - natural selection.
 - gene flow.

ANS: A PTS: 1

14. The English scientist who independently codiscovered the theory of natural selection was:
- Charles Lyell.
 - Jean-Baptiste de Lamarck.
 - Alfred Russel Wallace.
 - Carolus Linnaeus.

ANS: C PTS: 1

15. Cuvier's work on fossil elephants in France supported the then controversial notion of:
- extinction.
 - evolution.
 - natural selection.
 - genetics.

ANS: A PTS: 1

16. The physical expression of an organism's genetic constitution is called the:
- karyotype.
 - phenotype.
 - stereotype.
 - genotype.

ANS: B PTS: 1

17. Different versions, or subunits, of the same gene are:
- chromosomes.
 - gemmules.
 - alleles.
 - blenders.

ANS: C PTS: 1

18. The only possible source of new genetic material is:
- natural selection.
 - mutation.
 - gene flow.
 - gene drift.

ANS: B PTS: 1

19. In 1962, Watson and Crick were awarded the Nobel Prize for their 1953 discovery that the structure of the DNA molecule was:
- a triple helix.
 - circular.
 - linear.
 - a double helix.

ANS: D PTS: 1

20. Recessive alleles will be expressed if they are inherited:
- from either parent.
 - from neither parent.
 - from both parents.
 - along with a dominant allele.

ANS: C PTS: 1

21. Which of the following is FALSE regarding populations of living organisms?
- Parents often produce many offspring.
 - Population size is limited by the food supply.
 - Individuals in populations actively compete for scarce resources.
 - Individuals in populations show little or no variation.

ANS: D PTS: 1

22. Mendel's plant hybridization experiments demonstrated that:
- inherited traits from each parent blended together in the offspring.
 - DNA was the molecule carrying the genetic code.
 - peas were a poor choice for understanding basic hereditary principles.
 - traits inherited from each parent remained distinct in the offspring.

ANS: D PTS: 1

23. The geneticist who studied the workings of fruit flies' chromosomes was:
- Charles Darwin.
 - Gregor Mendel.
 - Thomas Hunt Morgan.
 - Thomas Huxley.

ANS: C PTS: 1

24. The scientist who coined the name *Homo sapiens* for human beings and placed them in a higher taxonomic group he called primates was:
- Charles Darwin.
 - Georges Cuvier.
 - Carolus Linnaeus.
 - Robert Hooke.

ANS: C PTS: 1

25. The individual genotypes in a breeding population, taken as a whole, are the:
- gene pool.
 - DNA.
 - genome.
 - polygene.

ANS: A PTS: 1

26. In Europe before about 1800, it was believed that:
- all species evolved from a common ancestor.
 - all forms were created by God and did not change over time.
 - most species had become extinct over time.
 - evolution was the result of natural selection acting upon genetic variation.

ANS: B PTS: 1

27. All of the following are formal taxonomic categories EXCEPT:
- kingdom.
 - population.
 - order.
 - family.

ANS: B PTS: 1

28. The Human Genome Project is most likely to contribute to an understanding of which disease?
- cystic fibrosis
 - influenza
 - tuberculosis

d. smallpox

ANS: A PTS: 1

29. The classification of past and living life forms is:
- paleontology.
 - taxonomy.
 - geology.
 - demography.

ANS: B PTS: 1

30. The scientist whose work provided the foundation for later understandings of genetics was:
- John Ray.
 - Gregor Mendel.
 - Charles Darwin.
 - Robert Hook.

ANS: B PTS: 1

31. Thomas Hunt Morgan:
- demonstrated that chromosomes carry genetic material in the form of genes.
 - studied mutations in *Homo sapiens*.
 - thought change was gradual and occurred over long time periods.
 - None of the above.

ANS: A PTS: 1

32. Darwin observed that adaptations:
- resulted from supernatural forces.
 - did not vary among Galápagos finches living in different habitats.
 - were physical traits that enhanced survival and reproduction.
 - were peripheral to evolutionary change.

ANS: C PTS: 1

33. By the mid-twentieth century, the causes of evolution were seen as all of the following EXCEPT:
- natural selection.
 - macromutation.
 - gene flow.
 - genetic drift.

ANS: B PTS: 1

34. In your textbook, the smaller frequency of sickle-cell anemia among present-day American blacks than among West African blacks is attributed to:
- genetic drift.
 - gene flow.
 - new mutations.
 - None of the above.

ANS: B PTS: 1

35. Darwin's finches are good examples of:
- natural selection.
 - local adaptation to geographic conditions.

- c. adaptive radiation.
- d. All of the above.

ANS: D PTS: 1

ESSAY

1. Detail Darwin's major contribution to the theory of evolution.

ANS:

Darwin's key contribution was deducing that natural selection is the primary driver of evolution. According to this principle, the number of adults in a population remains the same even though parents tend to produce multiple offspring. Variation exists among members of a population. Individuals having variations that lend advantages for both survival and reproduction increase in relative frequency over time.

PTS: 5

2. Why was Darwin's 1859 published theory of natural selection not widely accepted by his peers? What later scientific advance was critical to the subsequent broad acceptance of natural selection as a major force in evolutionary change?

ANS:

Darwin's theory lacked a mechanism for the inheritance of desirable characteristics. Gregor Mendel discovered the principles of inheritance, i.e., the basis for understanding how traits are transmitted from parent to offspring. Mendel's discovery that traits are passed as discrete units (genes) laid the foundation for our understanding of chromosomes and of population genetics.

PTS: 5

3. What are some of the important scientific discoveries that laid the groundwork for Darwin's theory of evolution?

ANS:

Scientists working in geology, paleontology, taxonomy and systematics, demography, and what is now evolutionary biology had shown that the earth is old and has changed over its history; fossils represent remains of once living, sometimes extinct organisms and provide a record of the history of life; life evolves over time; groups of related species provide insight into evolutionary history; and the number of adults in a population tends to remain the same over time.

PTS: 5

4. What is the significance for evolutionary theory of Darwin's analysis of the Galápagos finches? Provide at least one example in your answer.

ANS:

The diversity of the various finch populations lent support to the idea that over time natural selection could transform a single common ancestral form into a variety of descendant species. This phenomenon is referred to as adaptive radiation. Each descendant species had adapted to its particular habitat; for example, the ground finch had evolved a more robust beak to accommodate a diet including hard objects such as seeds.

PTS: 5

5. Why is Linnaeus's taxonomic system called a "nested hierarchy"? Considering that Linnaeus was not an evolutionist, why is his system still used today by evolutionary biologists?

ANS:

Linnaeus organized species into ever more inclusive higher-order taxonomic groups based on overall similarity. So although each species was unique, several of them could be combined into a single genus as a result of their shared traits. Similarly, different genera could be collected into a single, more inclusive family, families combined into orders, etc. Linnaeus's system is still useful because in many cases he identified similarities among species that reflect common ancestry (homologous traits). For example, while Linnaeus placed humans, monkeys, and lemurs into a single order, the primates, based on a simple acknowledgement of similarity, a modern biologist would see those species' shared traits as evidence of common evolutionary history.

PTS: 5