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Chapter 1: Origins of Evolutionary Thought

Multiple Choice Questions

1. What was the result of the “Scopes Monkey Trial”?

a. Scopes was found guilty of teaching evolution and lost his job
b. The state of Tennessee was forced to allow the teaching of evolution in the classroom
c. Evolution was disproved
d. Scopes was found innocent

Correct Answer: a
Learning Objective: LO 1.1: Explain how science differs from other ways of understanding the world.
Topic: Chapter Opener
Difficulty Level: Easy
Skill Level: Apply What You Know

2. Science is a(n) _____, not a

a. result; process
b. process; method
c. process; result
d. observation; hypothesis

Correct Answer: c
Learning Objective: LO 1.1: Explain how science differs from other ways of understanding the world.
Topic: What Is Science?
Difficulty Level: Easy
Skill Level: Understand the Concepts

3. Which of the following is a step in the scientific method?

a. Experimentation
b. Verification
c. Dissemination
d. Identification

Correct Answer: a
Learning Objective: LO 1.1: Explain how science differs from other ways of understanding the world.
Topic: What Is Science?
Difficulty Level: Easy
Skill Level: Understand the Concepts

4. What is the difference between a deduction and a hypothesis?

a. A hypothesis is more accurate than a deduction
b. A deduction is a conclusion whereas a hypothesis is a preliminary explanation
c. A deduction cannot be disproven but a hypothesis can
d. Scientists work much more with hypotheses than with deductions

Correct Answer: b
Learning Objective: LO 1.1: Explain how science differs from other ways of understanding the world.
Topic: What Is Science?
Difficulty Level: Moderate
Skill Level: Understand the Concepts

5. What does Science is an *empirical* process mean?

a. Body of knowledge
b. Based on the hypothesis
c. Based on knowledge gained through observation
d. Falsifiable

Correct Answer: c
Learning Objective: LO 1.1: Explain how science differs from other ways of understanding the world.
Topic: What Is Science?
Difficulty Level: Moderate
Skill Level: Understand the Concepts

6. According to the scientific method, what is the first step scientist should take when they have a question about a natural phenomenon?

a. Perform an experiment
b. Develop a hypothesis
c. Analyze their data
d. Assess a paradigm

Correct Answer: b
Learning Objective: LO 1.1: Explain how science differs from other ways of understanding the world.
Topic: What Is Science?
Difficulty Level: Moderate
Skill Level: Apply What You Know

7. Scientific hypotheses are

a. derived from a nonempirical process
b. rarely tested
c. always assumed to be true
d. falsifiable

Correct Answer: d

Learning Objective: LO 1.1: Explain how science differs from other ways of understanding the world.
Topic: What is Science?
Difficulty Level: Easy
Skill Level: Understand the Concepts

8. Why do scientists avoid saying that a hypothesis is “proven”?

a. New data could falsify hypotheses or theories
b. Scientists are worried about their reputations
c. Only scientific laws and paradigms can be proven
d. It takes too much work to “prove” something, so it rarely occurs in science

Correct Answer: a
Learning Objective: LO 1.1: Explain how science differs from other ways of understanding the world.
Topic: What is Science?
Difficulty Level: Moderate
Skill Level: Analyze It

9. Aristotle believed in the immutability of species. This means he felt that species

a. are always changing
b. change only when it is possible
c. are fixed and unchanging
d. change sporadically and unpredictably

Correct Answer: c
Learning Objective: LO 1.2: Identify the contributions of the earliest scholars before Darwin to the development of evolutionary theory.
Topic: The Early Thinkers
Difficulty Level: Easy
Skill Level: Understand the Concepts

10. Which of the following is consistent with Aristotle’s ideas about nature?

a. The Earth is constantly changing
b. Changes to the environment will cause animals to evolve
c. All life is arranged in an orderly and hierarchical fashion
d. Humans evolved over millions of years

Correct Answer: c
Learning Objective: LO 1.2: Identify the contributions of the earliest scholars before Darwin to the development of evolutionary theory.
Topic: The Early Thinkers
Difficulty Level: Easy
Skill Level: Apply What You Know

11. During the Middle Ages, most people believed that the Earth

a. was constantly changing
b. was unchanged since its formation

c. was formed billions of years ago
d. had experienced several mass extinction events

Correct Answer: b
Learning Objective: LO 1.2: Identify the contributions of the earliest scholars before Darwin to the development of evolutionary theory.
Topic: The Early Thinkers
Difficulty Level: Easy
Skill Level: Understand the Concepts

12. The dominant belief system during the European Middle Ages was based on

a. science
b. falsifiability
c. theology
d. empirical experimentation

Correct Answer: c
Learning Objective: LO 1.2: Identify the contributions of the earliest scholars before Darwin to the development of evolutionary theory.
Topic: The Early Thinkers
Difficulty Level: Easy
Skill Level: Understand the Concepts

13. The main contribution of Renaissance artists Leonardo da Vinci and Andreas Vesalius was their

a. study of the stars and planets
b. discovery of the Americas
c. ideas about polygenism
d. anatomical drawings

Correct Answer: d
Learning Objective: LO 1.2: Identify the contributions of the earliest scholars before Darwin to the development of evolutionary theory.
Topic: The Early Thinkers
Difficulty Level: Easy
Skill Level: Apply What You Know

14. With the circumnavigation of the globe, Renaissance scholars developed a strong sense of

a. biological and cultural variation
b. the fixity of species
c. humanity’s inferiority in nature
d. monogenism

Correct Answer: a
Learning Objective: LO 1.2: Identify the contributions of the earliest scholars before Darwin to the development of evolutionary theory.
Topic: The Early Thinkers
Difficulty Level: Moderate
Skill Level: Understand the Concepts

15. Which of the following did the exploration of the Americas play in the development of evolutionary theory?

a. Exploration of the Americas did not impact the development of evolutionary theory
b. European scholars became increasingly aware of biological diversity on the planet
c. Europeans adopted new ideas from the people they interacted with in the Americas
d. Explorers immediately found fossils that made them think the Earth was very old

Correct Answer: b
Learning Objective: LO 1.2: Identify the contributions of earliest scholars before Darwin to the development of evolutionary theory.
Topic: The Early Thinkers
Difficulty Level: Moderate
Skill Level: Understand the Concepts

16. Why were sixteenth-century scholars who argued for polygenism imprisoned or burned at the stake?

a. They believed the Earth was much older than accepted by the church
b. They believed there was only one God
c. They followed a scientific doctrine instead of a Christian doctrine
d. They thought human origins were much more diverse than the church did

Correct Answer: d
Learning Objective: LO 1.2: Identify the contributions of the earliest scholars before Darwin to the development of evolutionary theory.
Topic: The Early Thinkers
Difficulty Level: Moderate
Skill Level: Apply What You Know

17. How did Renaissance thinkers, such as Galileo Galilei, best contribute to the progression of science?

a. With the discovery of the Americas, they were able to pinpoint the origin of humanity
b. They determined that all texts from the Middle Ages were incorrect and rewrote them
c. They performed research that laid a foundation for observation and experimentation devoted to scientific understanding of the natural world
d. They argued openly against church doctrine

Correct Answer: c
Learning Objective: LO 1.2: Identify the contributions of the earliest scholars before Darwin to the development of evolutionary theory.
Topic: The Early Thinkers
Difficulty Level: Moderate
Skill Level: Apply What You Know

18. Why was Galileo's work, *The Starry Messenger*, important in the development of scientific thought?

a. It proved church doctrine
b. It supported the theory of evolution
c. It supported the idea that the Earth is at the center of the universe

d. It supported an idea that challenged traditional church doctrine regarding the natural world

Correct Answer: d
Learning Objective: LO 1.2: Identify the contributions of the earliest scholars before Darwin to the development of evolutionary theory.
Topic: The Early Thinkers
Difficulty Level: Moderate
Skill Level: Analyze It

19. Which of the following sources did James Ussher use to calculate the age of the Earth?

a. Geological evidence, including stratigraphy
b. Astronomical data
c. The Old Testament of the Bible
d. Ancient Greek and Roman texts

Correct Answer: c
Learning Objective: LO 1.2: Identify the contributions of the earliest scholars before Darwin to the development of evolutionary theory.
Topic: The Early Thinkers
Difficulty Level: Easy
Skill Level: Understand the Concepts

20. What was one possible reason scientific thought remained stifled in the seventeenth and eighteenth centuries?

a. Naturalists did not have the proper technology to study evolution
b. The Americas had not yet been thoroughly examined
c. Naturalists still tried to fit their observations of the natural world into church doctrine
d. Too few fossils had been studied and classified

Correct Answer: c
Learning Objective: LO 1.2: Identify the contributions of the earliest scholars before Darwin to the development of evolutionary theory.
Topic: The Early Thinkers
Difficulty Level: Moderate
Skill Level: Apply What You Know

21. What became an important issue for naturalists in the seventeenth and eighteenth centuries?

a. Evolution
b. Polygenism
c. Classification
d. Geology

Correct Answer: c
Learning Objective: LO 1.2: Identify the contributions of the earliest scholars before Darwin to the development of evolutionary theory.
Topic: The Early Thinkers
Difficulty Level: Easy
Skill Level: Understand the Concepts

22. Who was the first to use the terms *genus* and *species*?

a. Galileo Galilei
b. Carolus Linnaeus
c. John Ray
d. Johannes Kepler

Correct Answer: c
Learning Objective: LO 1.2: Identify the contributions of the earliest scholars before Darwin to the development of evolutionary theory.
Topic: The Early Thinkers
Difficulty Level: Easy
Skill Level: Understand the Concepts

23. What does taxonomy refer to?

a. The theory of a single, divine origin of humanity
b. The theory of multiple origins of humanity
c. The science of classifying and naming organisms
d. The study of the age of the Earth

Correct Answer: c
Learning Objective: LO 1.2: Identify the contributions of the earliest scholars before Darwin to the development of evolutionary theory.
Topic: The Early Thinkers
Difficulty Level: Easy
Skill Level: Understand the Concepts

24. Who is most associated with the hierarchical taxonomic categories used today?

a. Carolus Linnaeus
b. Georges Cuvier
c. Comte de Buffon
d. Geoffroy Saint-Hilaire

Correct Answer: a
Learning Objective: LO 1.2: Identify the contributions of the earliest scholars before Darwin to the development of evolutionary theory.
Topic: The Early Thinkers
Difficulty Level: Easy
Skill Level: Apply What You Know

25. Any unit within the taxonomic hierarchy is called

a. species
b. nomenclature
c. particles
d. taxon

Correct Answer: d
Learning Objective: LO 1.2: Identify the contributions of the earliest scholars before Darwin to the development of evolutionary theory.
Topic: The Early Thinkers

Difficulty Level: Easy
Skill Level: Understand the concepts

26. Which of the following was Comte de Buffon's contribution to the development of evolutionary thought?

a. He identified the mechanism of evolutionary change
b. He recognized the importance environment
c. He identified many new animal species
d. He developed the principles of geology

Correct Answer: b
Learning Objective: LO 1.3: Identify the contributions of the thinkers just before Darwin's time and how they helped him formulate his ideas.
Topic: The Road to the Darwinian Revolution
Difficulty Level: Moderate
Skill Level: Understand the Concepts

27. During the eighteenth and nineteenth centuries, why had it become increasingly difficult to believe that the Earth was young and unchanged?

a. The church began accepting the idea of biological change
b. The work of James Ussher was disproven
c. Large animals were found in the Americas
d. Extinct animals with no living representatives were being found in deep geological strata

Correct Answer: d
Learning Objective: LO 1.3: Identify the contributions of the thinkers just before Darwin's time and how they helped him formulate his ideas.
Topic: The Road to the Darwinian Revolution
Difficulty Level: Moderate
Skill Level: Apply What You Know

28. Georges Cuvier is best associated with which of the following ideas?

a. The inheritance of acquired characteristics
b. Catastrophism
c. Evolution
d. Uniformitarianism

Correct Answer: b
Learning Objective: LO 1.3: Identify the contributions of the thinkers just before Darwin's time and how they helped him formulate his ideas.
Topic: The Road to the Darwinian Revolution
Difficulty Level: Easy
Skill Level: Understand the Concepts

29. Which of the following best describes catastrophism?

a. Animals inherit transformations from their parents
b. Individuals reproduce successfully
c. A natural disaster wiped out the dinosaurs

d. Life forms transform over time in reaction to changing environmental conditions

Correct Answer: c
Learning Objective: LO 1.3: Identify the contributions of the thinkers just before Darwin's time and how they helped him formulate his ideas.
Topic: The Road to the Darwinian Revolution
Difficulty Level: Easy
Skill Level: Analyze It

30. Which of the following is incorrect regarding the Theory of Inheritance of Acquired Characteristics?

a. Important for recognizing relationship between organism and environment
b. It was the first mechanism proposed for evolutionary change
c. Evolutionary change occurs over generations
d. Relied on concept of need and use

Correct Answer: c
Learning Objective: LO 1.3: Identify the contributions of the thinkers just before Darwin's time and how they helped him formulate his ideas.
Topic: The Road to the Darwinian Revolution
Difficulty Level: Difficult
Skill Level: Analyze it

31. The Theory of Inheritance of Acquired Characteristics holds that

a. individuals transform over their lifetime and their offspring inherit those transformations
b. all species are fixed
c. random mutations provide a pool of variation from which nature selects
d. allele pairs correlate with one another

Correct Answer: a
Learning Objective: LO 1.3: Identify the contributions of the thinkers just before Darwin's time and how they helped him formulate his ideas.
Topic: The Road to the Darwinian Revolution
Difficulty Level: Easy
Skill Level: Understand the Concepts

32. Why did Trofim Lysenko's Soviet agricultural project fail?

a. He assumed that he could modify crops through artificial selection
b. He assumed that exposing seeds to the cold would result in cold-resistant seeds
c. He used methods developed from Darwinian evolution
d. Soviet technology was not advanced enough for the project to succeed

Correct Answer: b
Learning Objective: LO 1.3: Identify the contributions of the thinkers just before Darwin's time and how they helped him formulate his ideas.
Topic: The Road to the Darwinian Revolution
Difficulty Level: Easy
Skill Level: Understand the Concepts

33. Which of the following observation did Thomas Malthus have regarding human populations?

a. Mutations are rare in large populations
b. Populations have the potential to grow exponentially, outstripping resources
c. There is only a struggle for existence in small populations
d. Population size remains stable

Correct Answer: b
Learning Objective: LO 1.4: Describe the ideas of Charles Darwin, how he developed them, and how they were received in the nineteenth century.
Topic: The Darwinian Revolution
Difficulty Level: Moderate
Skill Level: Understand the Concepts

34. James Hutton is associated with _____, which argues that

a. Lysenkoism; changes to individuals over their lifetime can be passed on to the next generation
b. catastrophism; there have been multiple creations interspersed by great natural disasters
c. uniformitarianism; the same geological processes observed today also operated in the past
d. adaptive radiation; one founding species can diversify into multiple species in multiple environmental niches

Correct Answer: c
Learning Objective: LO 1.3: Identify the contributions of the thinkers just before Darwin's time and how they helped him formulate his ideas.
Topic: The Road to the Darwinian Revolution
Difficulty Level: Easy
Skill Level: Understand the Concepts

35. Which of the following statements best defines the idea of *uniformitarianism*?

a. All species are fixed and unchanging
b. The world is periodically destroyed by natural disasters followed by creation events
c. The geological processes that drive the world today have always done so
d. Creatures can transform during their lifetime and their offspring will inherit those transformations

Correct Answer: c
Learning Objective: LO 1.3: Identify the contributions of the thinkers just before Darwin's time and how they helped him formulate his ideas.
Topic: The Road to the Darwinian Revolution
Difficulty Level: Easy
Skill Level: Understand the Concepts

36. Although geological uniformitarianism was introduced by _____, it was greatly popularized by

a. Lyell; Darwin
b. Hutton; Lyell
c. Lamarck; Lyell
d. Ray; Hutton

Correct Answer: b

Learning Objective: LO 1.3: Identify the contributions of the thinkers just before Darwin's time and how they helped him formulate his ideas.
Topic: The Road to the Darwinian Revolution
Difficulty Level: Easy
Skill Level: Understand the Concepts

37. Darwin's role aboard the HMS *Beagle* was as a(n)

a. astronomer
b. chemist
c. conservationist
d. naturalist

Correct Answer: d
Learning Objective: LO 1.4: Describe the ideas of Charles Darwin, how he developed them, and how they were received in the nineteenth century.
Topic: The Darwinian Revolution
Difficulty Level: Easy
Skill Level: Apply What You Know

38. Darwin's ideas on evolution fell into place while he contemplated

a. horses from Patagonia
b. eagles from the Andes Mountains
c. finches from the Galapagos Islands
d. giant tortoises from the African coast

Correct Answer: c
Learning Objective: LO 1.4: Describe the ideas of Charles Darwin, how he developed them, and how they were received in the nineteenth century.
Topic: The Darwinian Revolution
Difficulty Level: Easy
Skill Level: Understand the Concepts

39. Which of the following did John Gould determine when studying Darwin's collected finch specimens from the Galapagos Islands?

a. The finches possessed very few differences from those species found on mainland South America
b. The finches could be sorted into different species and by island based on beak differences
c. The finches were changing their physical characteristics over their lifetimes in response to environmental pressures
d. The finches all descended from one founding group and then diversified across the islands

Correct Answer: b
Learning Objective: LO 1.4: Describe the ideas of Charles Darwin, how he developed them, and how they were received in the nineteenth century.
Topic: The Darwinian Revolution
Difficulty Level: Moderate
Skill Level: Apply What You Know

40. Which of the following best defines adaptive radiation?

a. As individuals transform over their lifetime, their offspring inherit those transformations
b. Survival of the fittest
c. A process by which many species result from a few ancient ones
d. Genetic change that occurs in a population over time

Correct Answer: c

Learning Objective: LO 1.4: Describe the ideas of Charles Darwin, how he developed them, and how they were received in the nineteenth century.
Topic: The Darwinian Revolution
Difficulty Level: Moderate
Skill Level: Understand the Concepts

41.Which are the two separate ideas that comprised Darwin's theory?

a. Descent from common ancestors; natural selection
b. Natural selection; environment
c. Survival of the fittest; natural selection
d. Individual change; Galapagos finches

Correct Answer: a
Learning Objective: LO 1.4: Describe the ideas of Charles Darwin, how he developed them, and how they were received in the nineteenth century.
Topic: The Darwinian Revolution
Difficulty Level: Easy
Skill Level: Understand the Concepts

42. In the years following his journey on the HMS *Beagle*, Darwin developed his ideas of evolution by studying

a. artificial selection
b. animals he found on subsequent journeys
c. the works of Alfred Russel Wallace
d. the works of Galileo

Correct Answer: a
Learning Objective: LO 1.4: Describe the ideas of Charles Darwin, how he developed them, and how they were received in the nineteenth century.
Topic: The Darwinian Revolution
Difficulty Level: Easy
Skill Level: Apply What You Know

43. Alfred Russel Wallace developed a theory of evolutionary change that paralleled Darwin's while working in what region of the world?

a. England
b. South America
c. Galapagos Islands
d. Indonesia

Correct Answer: d

Learning Objective: LO 1.4: Describe the ideas of Charles Darwin, how he developed them, and how they were received in the nineteenth century.
Topic: The Darwinian Revolution
Difficulty Level: Difficult
Skill Level: Analyze It

44. In which of the following ways did Wallace's theory differ from Darwin's?

a. Rejected artificial selection as analogous to natural selection
b. Insisted on the fixity of species
c. Supported Lamarckian ideas
d. Rejected evolution

Correct Answer: a
Learning Objective: LO 1.4: Describe the ideas of Charles Darwin, how he developed them, and how they were received in the nineteenth century.
Topic: The Darwinian Revolution
Difficulty Level: Easy
Skill Level: Understand the Concepts

45. How were Darwin's and Wallace's theories presented to the scientific community?

a. Presented joint papers to the Linnaean Society
b. Wallace was never mentioned
c. Everyone liked Wallace's theory more
d. Revealed that all his own ideas were derived from correspondence with Wallace

Correct Answer: a
Learning Objective: LO 1.4: Describe the ideas of Charles Darwin, how he developed them, and how they were received in the nineteenth century.
Topic: The Darwinian Revolution
Difficulty Level: Easy
Skill Level: Apply What You Know

46. Upon its initial publication, Darwin's *On the Origin of Species*

a. was not widely read
b. quickly sold out
c. was written only for a scientific audience
d. was not popular with the general public

Correct Answer: b
Learning Objective: LO 1.4: Describe the ideas of Charles Darwin, how he developed them, and how they were received in the nineteenth century.
Topic: The Darwinian Revolution
Difficulty Level: Easy
Skill Level: Apply What You Know

47. Which of the following is an observation Darwin described in *On the Origin of Species*?

a. Populations are usually stable
b. Organisms will pass on traits acquired during their lifetime to their offspring

c. Species cannot adapt to changing environments
d. Repeated behaviors can facilitate anatomical transformations

Correct Answer: a
Learning Objective: LO 1.4: Describe the ideas of Charles Darwin, how he developed them, and how they were received in the nineteenth century.
Topic: The Darwinian Revolution
Difficulty Level: Moderate
Skill Level: Understand the Concepts

48. Which of the following needs to be present in a population for natural selection to act?

a. Population growth
b. Identical individuals
c. Variation
d. Artificial selection

Correct Answer: c
Learning Objective: LO 1.4: Describe the ideas of Charles Darwin, how he developed them, and how they were received in the nineteenth century.
Topic: The Darwinian Revolution
Difficulty Level: Difficult
Skill Level: Analyze It

49. Natural selection can be summarized by which statement?

a. All species are fixed and unchanging
b. Organisms transform and pass these transformations on to their offspring
c. A divine creator created all species according to an unknowable plan
d. Within a population, some traits are favored in certain environments

Correct Answer: d
Learning Objective: LO 1.4: Describe the ideas of Charles Darwin, how he developed them, and how they were received in the nineteenth century.
Topic: The Darwinian Revolution
Difficulty Level: Moderate
Skill Level: Understand the Concepts

50. Which statement best describes biological fitness?

a. Strength
b. Reproductive success
c. Physical fitness
d. Having the most resources

Correct Answer: b
Learning Objective: LO 1.4: Describe the ideas of Charles Darwin, how he developed them, and how they were received in the nineteenth century.
Topic: The Darwinian Revolution
Difficulty Level: Easy
Skill Level: Understand the Concepts

51. Why is the phrase “survival of the fittest” a misleading definition of natural selection?

a. Survival of the fittest is a term to describe artificial selection
b. In biological terms, “fitness” is a measure of reproductive success
c. Natural selection applies only to some organisms, whereas survival of the fittest applies to all organisms
d. Survival of the fittest is a better way to describe evolution than natural selection

Correct Answer: b
Learning Objective: LO 1.4: Describe the ideas of Charles Darwin, how he developed them, and how they were received in the nineteenth century.
Topic: The Darwinian Revolution
Difficulty Level: Difficult
Skill Level: Evaluate It

52. Which of the following is an example of an organism with high biological fitness?

a. A spider that lays 1000 eggs, with 1 offspring that survives and reproduces
b. A chimpanzee that has 6 total offspring, all of which survive and reproduce
c. A horse that has 8 offspring during its life, all of which die before adulthood
d. A turtle that lives for 200 years and has no offspring

Correct Answer: b
Learning Objective: LO 1.4: Describe the ideas of Charles Darwin, how he developed them, and how they were received in the nineteenth century.
Topic: The Darwinian Revolution
Difficulty Level: Difficult
Skill Level: Analyze It

53. In order for natural selection to occur

a. the trait in question must be inherited
b. the trait in question must be similar between individuals
c. there must be no environmental pressures
d. the trait in question must make the individual stronger

Correct Answer: a
Learning Objective: LO 1.4: Describe the ideas of Charles Darwin, how he developed them, and how they were received in the nineteenth century.
Topic: The Darwinian Revolution
Difficulty Level: Moderate
Skill Level: Understand the Concepts

54. A breeding group of organisms of the same kind defines which of the following key terms?

a. Social group
b. Natural selection
c. Population
d. Inheritance

Correct Answer: c
Learning Objective: LO 1.4: Describe the ideas of Charles Darwin, how he developed them, and how they were received in the nineteenth century.

Topic: The Darwinian Revolution
Difficulty Level: Moderate
Skill Level: Understand the Concepts

55. Evolution occurs at the level of the _____, natural selection occurs at the level of

a. population; the individual organism
b. mutation; the population
c. individual organism; the population
d. mutation; DNA

Correct Answer: a
Learning Objective: LO 1.4: Describe the ideas of Charles Darwin, how he developed them, and how they were received in the nineteenth century.
Topic: The Darwinian Revolution
Difficulty Level: Moderate
Skill Level: Understand the Concepts

56. Why did some scientists, such as Agassiz, not immediately accept Darwin's work on evolution?

a. It had been published previously
b. It discredited their own work
c. Darwin's work provided no new mechanism for explaining evolution
d. Darwin had not established himself as a scientist

Correct Answer: b
Learning Objective: LO 1.4: Describe the ideas of Charles Darwin, how he developed them, and how they were received in the nineteenth century.
Topic: The Response to Darwin
Difficulty Level: Easy
Skill Level: Apply What You Know

57. Choose the statement that best describes a creationist.

a. Belief that species are evolving
b. Belief that the world is only 3000 years old
c. Belief in a single creative force in the universe
d. Belief that geology is the direct result of Noah's flood

Correct Answer: c
Learning Objective: LO 1.6: Identify the difference between science and faith-based explanations for life.
Topic: Science and Creationism
Difficulty Level: Easy
Skill Level: Understand the Concepts

58. The Bible is not considered scientific evidence because

a. its contents are not testable
b. it is too new
c. it explicitly states that science is inaccurate

d. it does not accurately explain natural phenomena

Correct Answer: a
Learning Objective: LO 1.5: Identify the difference between science and faith-based explanations for life.
Topic: Science and Creationism
Difficulty Level: Easy
Skill Level: Understand the Concept

59. “Creation science” seeks to

a. prove Darwin correct using Biblical evidence
b. exploit gaps in the fossil record to dispute evolution
c. exclude religious instruction from science classes
d. disprove evolution by pointing to examples of “irreducible complexity”

Correct Answer: b
Learning Objective: LO 1.5: Identify the difference between science and faith-based explanations for life.
Topic: Science and Creationism
Difficulty Level: Moderate
Skill Level: Apply What You Know

60. Proponents of Intelligent Design argue for which of the following?

a. The fossil record is complete and there are no gaps
b. Irreducible complexity
c. Intelligent design fully embraces the mechanisms of Darwinian evolution
d. Biology

Correct Answer: b
Learning Objective: LO 1.5: Identify the difference between science and faith-based explanations for life.
Topic: Science and Creationism
Difficulty Level: Moderate
Skill Level: Understand the Concepts

True/False Questions

61. If two different scientists verify a hypothesis, that means the hypothesis is proven.

a. True
b. False

Correct Answer: b
Learning Objective: LO 1.1: Explain how science differs from other ways of understanding the world.
Topic: What Is Science?
Difficulty Level: Easy
Skill Level: Understand the Concepts

62. A paradigm is an intellectual framework that is the result of testing a theory for understanding a given set of information.

a. True
b. False

Correct Answer: a
Learning Objective: LO 1.1: Explain how science differs from other ways of understanding the world.
Topic: What Is Science?
Difficulty Level: Easy
Skill Level: Understand the Concepts

63. During the seventeenth and eighteenth centuries, classification took precedence over questions of origins.

a. True
b. False

Correct Answer: a
Learning Objective: LO 1.2: Identify the contributions of earliest scholars before Darwin to the development of evolutionary theory.
Topic: The Early Thinkers
Difficulty Level: Easy
Skill Level: Understand the Concepts

64. The anatomist Saint-Hilaire strongly agreed with Cuvier's ideas of biological change and catastrophism.

a. True
b. False

Correct Answer: b
Learning Objective: LO 1.2: Identify the contributions of earliest scholars before Darwin to the development of evolutionary theory.
Topic: The Early Thinkers
Difficulty Level: Moderate
Skill Level: Understand the Concepts

65. Although Lamarck's ideas are not generally accepted by biologists today, he was important to the development of evolutionary thought because he argued that change is gradual and takes place over time.

a. True
b. False

Correct Answer: b
Learning Objective: LO 1.3: Identify the contributions of the thinkers just before Darwin's time and how they helped him formulate his ideas.
Topic: The Road to the Darwinian Revolution
Difficulty Level: Easy
Skill Level: Apply What You Know

66. Darwin deduced that despite the potential for exponential population growth, many organisms do not reach adulthood.

a. True
b. False

Correct Answer: a
Learning Objective: LO 1.4: Describe the ideas of Charles Darwin, how he developed them, and how they were received in the nineteenth century.
Topic: The Darwinian Revolution
Difficulty Level: Difficult
Skill Level: Understand the Concepts

67. Intelligent design is unscientific because it is not empirical.

a. True
b. False

Correct Answer: a
Learning Objective: LO 1.5: Identify the difference between science and faith-based explanations for life.
Topic: Science and Creationism
Difficulty Level: Moderate
Skill Level: Understand the Concepts

Essays

68. Describe the famous “Scopes Monkey Trial.” What are some reasons people have difficulty accepting evolution by natural selection?

Learning Objective: LO 1.1: Explain how science differs from other ways of understanding the world.
Topic: Chapter Opener
Difficulty Level: Moderate
Skill Level: Analyze It

69. Explain the steps of the scientific method in detail.

Learning Objective: LO 1.1: Explain how science differs from other ways of understanding the world.
Topic: What Is Science?
Difficulty Level: Easy
Skill Level: Understand the Concepts

70. What does it mean to say that science is *self-correcting*? Be sure to include the terms *data*, *falsifiable*, and *paradigm* in your discussion.

Learning Objective: LO 1.1: Explain how science differs from other ways of understanding the world.

Topic: What Is Science?
Difficulty Level: Moderate
Skill Level: Apply What You Know

71. What does the *fixity of species* mean? Explain the history of this idea from Aristotle to the Renaissance.

Learning Objective: LO 1.2: Identify the contributions of earliest scholars before Darwin to the development of evolutionary theory.
Topic: The Early Thinkers
Difficulty Level: Moderate
Skill Level: Apply What You Know

72. Explain the artistic, scientific, and social developments in the Renaissance that contributed to our modern understanding of the world.

Learning Objective: LO 1.2: Identify the contributions of earliest scholars before Darwin to the development of evolutionary theory.
Topic: The Early Thinkers
Difficulty Level: Moderate
Skill Level: Analyze It

73. Explain the influence of the church on the natural sciences from the Renaissance through Carolus Linnaeus.

Learning Objective: LO 1.2: Identify the contributions of earliest scholars before Darwin to the development of evolutionary theory.
Topic: The Early Thinkers
Difficulty Level: Moderate
Skill Level: Evaluate It

74. Describe the contributions of Linnaeus, de Buffon, and Cuvier. In what ways did their ideas pave the way for the “Darwinian revolution”?

Learning Objective: LO 1.3: Identify the contributions of the thinkers just before Darwin’s time and how they helped him formulate his ideas.
Topic: The Road to the Darwinian Revolution
Difficulty Level: Moderate
Skill Level: Apply What You Know

75. What is The Theory of Inheritance of Acquired Characteristics? Describe how Lamarck’s mechanism for evolutionary change differ from Darwin’s.

Learning Objective: LO 1.3: Identify the contributions of the thinkers just before Darwin’s time and how they helped him formulate his ideas.
Topic: The Road to the Darwinian Revolution
Difficulty Level: Moderate
Skill Level: Understand the Concepts

76. Describe *uniformitarianism* and provide an example that demonstrates an old earth.

Learning Objective: LO 1.3: Identify the contributions of the thinkers just before Darwin's time and how they helped him formulate his ideas.
Topic: The Road to the Darwinian Revolution
Difficulty Level: Moderate
Skill Level: Understand the Concepts

77. Describe how the Galapagos Islands were instrumental in helping Darwin develop the theory of evolution by natural selection.

Learning Objective: LO 1.4: Describe the ideas of Charles Darwin, how he developed them, and how they were received in the nineteenth century.
Topic: The Darwinian Revolution
Difficulty Level: Moderate
Skill Level: Analyze It

78. Outline Darwin's three observations and two deductions of the theory of evolution by natural selection.

Learning Objective: LO 1.4: Describe the ideas of Charles Darwin, how he developed them, and how they were received in the nineteenth century.
Topic: The Darwinian Revolution
Difficulty Level: Difficult
Skill Level: Evaluate It

79. Describe the preconditions that must be met for natural selection to operate.

Learning Objective: LO 1.4: Describe the ideas of Charles Darwin, how he developed them, and how they were received in the nineteenth century.
Topic: The Darwinian Revolution
Difficulty Level: Difficult
Skill Level: Understand the Concepts

80. Explain the religious right's response to Darwin's ideas. Why are "Creation Science" and intelligent design not considered scientific?

Learning Objective: LO 1.5: Identify the difference between science and faith-based explanations for life.
Topic: Science and Creationism
Difficulty Level: Difficult
Skill Level: Analyze It

CHAPTER ONE
ORIGINS OF EVOLUTIONARY THOUGHT

LEARNING OBJECTIVES

Based on thorough reading and careful consideration of Chapter One, students should be able to:

- **1.1:** Explain how science differs from other ways of understanding the world.
- **1.2:** Identify the contributions of the earliest scholars before Darwin to the development of evolutionary theory.
- **1.3:** Identify the contributions of the thinkers just before Darwin's time and how they helped him formulate his ideas.
- **1.4:** Describe the ideas of Charles Darwin, how he developed them, and how they were received in the nineteenth century
- **1.5:** Identify the difference between science- and faith-based explanations for life.

LEARNING OBJECTIVE SUMMARY

WHAT IS SCIENCE
1.1 Explain how science differs from other ways of understanding the world.
- Science is a progressive, self-correcting, evidence-based way of understanding the world.
- Science works by proposing and testing hypotheses and rejecting explanations that are not supported by the hypothesis test.
- Faith-based explanations for the natural world require acceptance of the Bible as fact, and it is impervious to evidence and hypothesis testing.

THE EARLY THINKERS
1.2 Identify the contributions of the earliest scholars before Darwin to the development of evolutionary theory.
- Many pre-Darwinian thinkers accepted evolution and put forward theories for the mechanism.
- Carol von Linnaeus revolutionized the study of living things by classifying them according to similarities in form.

THE ROAD TO THE DARWINIAN REVOLUTION
1.3 Identify the contributions of the thinkers just before Darwin's time and how they helped him formulate his ideas
- Buffon argued that life on Earth was "mutable" and changed over time, but his views were ignored in favor of a more renowned French scientist, Georges Cuvier, who believed firmly in the fixity of life on Earth.
- Jean-Baptiste Lamarck proposed a theory of evolution, but without the mechanism of natural selection later discovered by Darwin.

THE DARWINIAN REVOLUTION
1.4 Describe the ideas of Charles Darwin, how he developed them, and how they were received in the nineteenth century.
- Charles Darwin spent his life thinking and writing about evolutionary change; he developed the theory of evolution by natural selection to account for it.
- Darwin's observations in the Galapagos and for many years after led him to develop his ideas about natural selection.

- Alfred Russel Wallace was a contemporary of Darwin and codiscoverer of the theory of evolution by natural selection.
- Evolution was accepted long before Darwin; he provided the mechanism for how it works: natural selection.
- Darwin drew on evidence from biogeography, embryology, the fossil record, and animal domestication to support his theory of natural selection.
- Darwin was deeply conflicted about the challenge his ideas brought to Christianity and potential embarrassment to his family.
- *The Origin of Species* was published in the fall of 1859 and quickly sold out of London bookstores.
- Darwin's rivals were slow to accept natural selection, whereas some scientists quickly embraced it.

SCIENCE AND CREATIONISM

1.5 Identify the difference between science- and faith-based explanations for life.

- Science can be falsified; faith-based explanations cannot.
- Science is progressive; new technologies improve our scientific understanding.
- Science does not claim to prove; instead, it upholds or refutes hypotheses.
- Intelligent design creationism is a recent attempt to repackage old creationist ideas in a way that argues for a divine force without calling it God.

LECTURE OUTLINE

I. Introduction
  A. Battles between teaching evolution and creationism
    1. The Dover Case and the Scopes Trial
  B. Life on Earth as unchanging
    1. The scale of evolution
    2. Uses of the term *theory*

II. What Is Science?
  A. The scientific method
    1. Developing a hypothesis: a preliminary explanation of a phenomenon
    2. Moving from observation to data to experiment
    3. Experiments: the testing of a hypothesis, before the researcher can truly stake their claim
  B. Science is an empirical process
    1. Theories are self-correcting.
      a. Contradicting claims can be examined and resolved by examining data.
    2. Theories are falsifiable
      a. Science uses paradigms, conceptual frameworks for understanding a body of evidence
      b. Changing paradigms may involve conflicting evidence and debate

III. The Early Thinkers
  A. Aristotle and the fixity of species
    1. The concept of immutability or fixity of species
      a. For centuries, life was thought of as an orderly, hierarchical ladder, with humans at the very top
  B. The Roots of Modern Science
    1. The Middle Ages
      a. Fixity of species was the spiritual, legal, and political norm.
      b. Adoption of Aristotle's Great Chain of Being
    2. The Renaissance and challenge to church doctrine
      a. da Vinci's and Vesalius's anatomical drawings changed scholars' perception of the human body
      b. The first circumnavigation of the globe and European exploration of the Americas

i. revealed the diversity of life in the Americas
ii. polygenism: idea that life derived from multiple creations
iii. monogenism: the ancient belief that all people are derived from a single creation
c. Samuel Stanhope Smith's and Johann Friedrich Blumenbach's strong support of monogenism
d. James Ussher's biblical calculations of the age of the Earth
e. Galileo's house arrest for his publication describing a helio-centric universe

C. Linnaeus and the Natural Scheme of Life
1. John Ray first to use the terms *genus* and *species*.
2. Carolus Linnaeus built on Ray's writings to create comprehensive classification of plant and animal life.
a. Taxonomy
i. sorting organisms into categories helped to establish their relationships
ii. Linnaean system of taxonomy uses binomial nomenclature, or a two-level genus-species label.
iii. "taxon" is any unit of Linnaean hierarchy

IV. The Road to the Darwinian Revolution
A. In the eighteenth and early nineteenth centuries, European natural historians focused on explaining the diversity of life.
B. Three prominent French philosophers
1. Comte de Buffon
a. Accepted general notion of biological change
b. Observed that animals in new climates often change in response to environments
c. Claimed that animals in the Americas were weaker and smaller than their counterparts in the rest of the world
2. Georges Cuvier
a. Steadfast opponent of modern concept of evolutionary change
b. Advocated catastrophism to explain presence of dinosaur bones and changing organisms
c. Catastrophism: the theory that cataclysmic events wiped out earlier forms of life on Earth
i. Noah's flood
ii. replacement populations more advanced than original forms
3. Geoffroy Saint-Hilaire
a. An anatomist and a strong advocate of evolutionary change
b. Publically debated Cuvier
c. Supported Lamarck's explanation for the mechanism of evolution

C. Jean-Baptiste Lamarck
1. Theory of Inheritance of Acquired Characteristics (*Lamarckianism*)
a. Organisms adjust to their environment during their lifetime
b. Relies on the concept of *need and use*
i. animals that swim frequently would theoretically have offspring who could swim well
c. Under *Lamarckianism*, adjusted traits would be passed down to offspring
2. His major breakthrough was the relationship between organism and environment
3. Theory's central error is that evolution would take during the lifetime of individual organism
4. a. Mode of inheritance (e.g., genes) unknown at time
b. Natural antecedent to Darwin's theory
5. Lysenkoism and its failure
a. Untrained Soviet biologist Trofim Lysenko argued Darwinian evolution was inherently capitalist
i. rejected capitalist focus on individual success
ii. rejected exponential population growth and competition for resources outlined by Thomas Malthus
b. Argued *Lamarchianism* was a Stalinist-Marxist model

i. stored wheat grains at low temperatures so they could “adjust” to colder weather conditions
c. Tragic and embarrassing failure

D. The Uniformitarians: Hutton and Lyell
1. James Hutton
a. Father of modern geology
b. Saw clear evidence of past worlds in rock formations
2. Uniformitarianism
a. Same geological processes observed today were the same as those operating in the past
3. Charles Lyell
a. Proponent of uniformitarianism
b. Friendship with Darwin helped influenced evolutionary ideas
c. Earth’s history understood in context of deep, ancient changes in geology

V. The Darwinian Revolution
A. Darwin’s early years
1. Born into life of affluence
2. Left medical studies at University of Edinburgh
3. Studied for the ministry at Cambridge University
a. Deeply influenced by his professor, botanist John Henslow
b. Inspired by travel and natural history accounts of Baron Friedrich Heinrich Alexander von Humboldt
c. Received divinity degree in 1831
4. HMS *Beagle*
a. Henslow recommended Darwin as the “gentleman” amateur naturalist

B. The Galapagos
1. Five-year voyage as naturalist aboard the HMS *Beagle* (1831–1836)
2. Explored South America, Australia, and Africa
3. Significant collections in the Galapagos Islands
a. Each island had its own species of finch with different physical traits
b. Darwin did not immediately formulate the theory of natural selection
c. Collected 13 species of finch for the British Museum
d. Gould’s discovery of beak differences among finches
4. Importance of the finches
a. Biogeography: the distribution of animals and plants on Earth
b. Adaptive radiation: biological process of many species emerging from a few ancient ones
c. Darwin referred to the process of biological change in a species as natural selection
5. Galapagos observations
a. Galapagos Islands perfect setting for Darwin’s theory
b. Isolated islands, geologically young, biologically simple
c. Species on islands found nowhere else, but many closely related
d. Islands lack many animal groups found on the mainland
e. Distinctive species tend to resemble close relatives on the mainland, even in different environments
i. incorporated evidence from embryology
ii. many organisms bear vestigial organs: body parts that seem to serve no modern purpose

C. Refining the Theory of Evolution by Natural Selection
1. Spent years developing theory of natural selection
2. Drew parallels to artificial selection
a. Local breeders of fancy pigeons
b. Selective breeding—specific traits are chosen by breeders and only individuals with those traits breed
c. What artificial breeders do in captivity; nature does in the wild
d. Key difference is that natural selection does not have goals

3. The two core concepts of evolution
    a. Life on Earth arose by evolution and that all life forms descended from common ancestors
    b. Natural selection is the mechanism by which evolution occurs
    c. Reworked theories, resisted going public, understanding theory would be controversial
4. Alfred Russel Wallace
    a. Developed his own theory of evolution by natural selection while collecting plant and animal specimens in Indonesia
    b. Sent Darwin a manuscript to ask for advice
    c. Galvanized Darwin to publish after receiving Wallace's manuscript
5. *On the Origin of Species* published in 1859
    a. Sells out the first day and widespread success
6. Darwin versus Wallace?
    a. Wallace's outlined theory differed from Darwin's in two ways
        i. Wallace rejected artificial selection
        ii. Wallace placed more emphasis on the replacement of groups and species by other groups, as opposed to Darwin who focused on individuals
7. Observations and deduction in *On the Origin of Species*
    a. Observation 1: Malthus's idea that all organisms have the potential for explosive growth
    b. Observation 2: In nature, populations are usually stable
    c. Deduction 1: There must be a struggle for existence
        i. bullfrog lays 100,000 eggs but only a handful or even one may survive to adulthood
    d. Observation 3: Nature is full of variation, size, shape, color, etc.
    e. Deduction 2: Some variations must be favored, and some disfavored, in natural selection.
8. Natural selection centers on reproductive success
    a. Social theorist Herbert Spencer's phrase "survival of the fittest" misleading
    b. Fitness: reproductive success—the number of offspring an organism leaves, which survive to reproductive age
    c. Natural selection defined as differential reproductive success across multiple generations and among the individuals of a given population
9. For natural selection to work
    a. The trait in question must be inherited
    b. The trait in question must show variation between individuals
    c. The environment must exert some pressure on organisms in order for natural selection to act
10. Evolution is about change
    a. Occurs at the level of the population
        i. population—a breeding group of organisms of the same kind
        ii. it is a change in a population in the frequency of a trait or a gene from one generation to the next
    b. Genetic material changes in which alterations in the DNA sequence provide sources of variation
        i. mutation
    c. Natural selection occurs at level of individual

VI. The Response to Darwin
A. Opposition to evolution
1. Church and many religious scholars offended and outraged.
2. Prominent naturalist Louis Agassiz's work rendered obsolete.
    a. Agassiz opposed Darwin for years.
    b. Argued for theory based on Cuvier's catastrophism
    c. Tried to disprove evolution by demonstrating Galapagos species' tameness after hunting

VII. Science and Creationism
A. Creationism

1. Belief in single creative force in the universe

B. Conflict between evolution and creationism
   1. Book of Genesis viable alternative to science as explanation for human origins
   2. Argument that evolution is a theory with no scientific validity
   3. Earth is very young
   4. Sedimentary evidence of Earth's antiquity is result of Noah's flood

C. Reliance on faith
   1. Old Testament of the Judeo-Christian Bible, not testable evidence
   2. Must be accepted without scientific method
   3. Political agenda of creationism
   4. Legal battles to teach creationism in schools
      a. Louisiana's unconstitutional disclaimer on evolution
      b. Local public school boards in many states have recommended the inclusion of "alternatives" (e.g., creationism) to explain life on Earth

D. Creation Science and Intelligent Design
   1. Challenges to evolution in the form of new incarnations of creationism
      a. Creation Science
         i. emphasize gaps in the fossil record
      b. Denial of science rather than science itself
      c. Includes Intelligent Design
   2. What is Intelligent Design?
      a. Repackaging of creationist ideas
      b. Irreducible complexity
         i. proposes that natural selection cannot account for the diversity and complexity of form and function in nature
         ii. aspects of the design of some organisms are so complex, that gradual, successive small modifications of earlier forms could not have produced them.
   3. Mandated division between church and state in U.S. Constitution
      a. Rights of religious faiths or lack of faith equally respected
      b. Science classrooms intended to train scientific thinking

LECTURE AND DISCUSSION TOPICS

Each of these topics is intended to generate ideas for either a lecture/recitation format or discussion in the classroom. For most topics, students should be able to respond and participate in discussions based solely on reading the text. For others, you may need to provide further reading or other forms of information so that students can develop some personal perspective and become equipped to make independent decisions about the topics.

1. Lecture on evolution: Consider a lecture using some of the fossil evidence that Darwin had available when he was forming his theory. This would be an opportunity to show the differences between giant sloths, which Darwin observed in Argentina and modern-day sloths. Discuss the role environment plays in evolution.

2. Discuss the scientific method including its procedures and limitations. It can only deal with questions that are repeatable. Its steps include: (1) observation; (2) question or problem; (3) hypothesis/null hypothesis; (4) data collection/experimentation; and (5) formation of a conclusion. Stress the equal importance of honest, effective methodology and conclusion formation. Also explain that the scientific method is a continuous process, and these five steps repeat with major/minor modifications to the hypothesis.

3. Discuss scientific theory. This is an opportunity for students to learn the difference between the "theory" in the vernacular versus a scientific theory. This would also be an opportunity to expand on the evolution lecture from option number one and discuss the observations that support the theory of evolution.

4. Lecture on the history of evolutionary thought: This can be used to discuss pre-Darwinian ideas such as environment and variation. One could go into greater detail about Comte de Buffon, Cuvier, Saint-Hilaire, among others, and how these naturalists helped influence Darwin.

5. Lecture on the observations made by Darwin during his voyage. His visit to the mainland and observations of fossils, discuss the finches and tortoises on the Galapagos, Malthus's essay on the Principles of Population, and Darwin's observations of artificial selection.

6. Natural selection is the mechanism for evolutionary change, yet students often have trouble grasping the concept. Discuss real examples of natural selection (i.e., Blue moon butterfly population on Samoa Islands) in detail and explore what "fitness" means in evolutionary terms.

7. Discuss opposition to Darwin's theory. Who opposed it and why?

8. Examine the influence of the Church on science during Darwin's time. Discuss examples of how the Church regarded life on earth and how that position has changed over time.

CLASSROOM ACTIVITIES

1. Have students list cosmologies and origin myths; they can share their own if comfortable. Discuss the similarities and differences in the ones expressed. As always with such discussions, it is necessary to establish a neutral atmosphere, with acceptance and patience for hearing others' ideas.

2. Provide students with two short readings, one written by a proponent of Intelligent Design, and the other, a reply to that article. Have students answer a series of questions following the readings, such as what were the main points, which argument was more convincing and why, who do you think should decide what is and is not science, how would you define theory, how would you define belief, and so on. Students can then discuss their responses in small groups.

3. Either create a hands-on experiment or provide students with an experimental design case study (e.g., drug study with an independent and dependent variable) to help students identify the hypothesis, alternative hypothesis, acceptance or rejection of the hypothesis.

4. Have your students read the 1858 paper titled "On The Tendency of Varieties to Depart Indefinitely from the Original Type" by Alfred Wallace. Students should then compare Wallace's conclusions to Darwin's ideas about natural selection. Have them report their findings.

5. Have students watch the documentary "What Darwin Never Saw." It is a documentary about the ongoing research by Rosemary and Peter Grant who returned to the Galapagos to continue studying Darwin's finches. The documentary can be followed by a discussion on natural selection.

6. Ask students to describe what kinds of species they see around them, at school or at home. Can they use any to talk about evolution? Have them list characteristics that might have been influenced by natural selection.

RESEARCH AND WRITING TOPICS

1. Have students research an origin myth that is not their own using library sources and/or interviewing. Have them compare and contrast this myth with their own and explain how they reconcile competing claims of truth. This may be presented in written or oral form.

2. Have students complete written or oral biographical reports on one of the following men and how their scientific ideas contributed to Western thought: Georges Cuvier, Comte de Buffon, James Hutton, Charles Lyell, Charles Darwin, Jean-Baptiste Lamarck, or Alfred Russel Wallace.

3. Have students outline the steps Darwin used to describe how descent with modification worked. They should try to describe how he argued for the veracity of his findings and the evidence he used.

4. Have your students research scientific creation science, evolutionism, theistic evolutionism, and creationism. In written or oral reports, or in a debate, have students defend a position they do not hold. Monitor, using a brief essay or opinion poll, how the students' opinions may have changed based on what they have learned in the chapter.

5. Have students research the origins of *Systema Naturae* written by Linnaeus and explain how it contributed to the development of modern biology. Students should understand how the nomenclature helps with information organization, which is critical to science.

REVEL RESOURCES AND ACTIVITIES

Activity: The Scientific Method

Reading: Happy Birthday Linnaeus

Activity: Explore Darwin's voyage on the HMS *Beagle*

Reading: Testing Darwin

Reading: Testing Natural Selection