CHAPTER 2: The Genetic and Evolutionary Roots of Behavior

MULTIPLE CHOICE

1. Which of the following is NOT a reason the public has rejected the theory of evolution?
   a. It is difficult to believe that humans and apes may share a common ancestor.
   b. The idea of natural selection is difficult to comprehend and understand.
   c. People are offended by the idea that natural laws shape living organisms.
   d. The data do not support the theory of evolution.

   ANS: D DIF: Medium OBJ: Applied
   REF: Introduction

2. Eugenics and social Darwinism _____.
   a. are examples of inappropriate applications of evolutionary theory
   b. are well-accepted applications of evolutionary theory
   c. are well-documented applications supporting evolution
   d. are useful only when applied to aspects of animal evolution

   ANS: A DIF: Medium OBJ: Applied
   REF: Introduction

3. Which of the following is NOT a modern scientific advancement that emerged from applications of evolutionary theory?
   a. explaining why some individuals do not respond well to antidepressant medication
   b. explaining why some individuals have difficulty with reasoning problems while others do not
   c. explaining why men and women may react differently to a partner's sexual infidelity
   d. explaining how IQ is directly inherited

   ANS: D DIF: Medium OBJ: Applied
   REF: Introduction

4. The idea that parents could pass on traits they had gained over the course of a single lifetime is _____.
   a. an easily provable tenet of evolution
   b. erroneous and led to the rejection of evolution by some individuals
   c. erroneous as it takes two generations to pass on a trait
   d. correct and provides data supporting evolution

   ANS: B DIF: Difficult OBJ: Applied
   REF: Introduction

5. The nucleus, chromosomes, and DNA compose most of the _____ in the human body?
   a. genetics
   b. cells
   c. neurons
   d. proteins

   ANS: B DIF: Easy OBJ: Factual
   REF: Genetics and DNA

6. Which of the following are contained in most human cells?
   a. chromosomes
   b. nucleus
   c. DNA
   d. all of the above

   ANS: D DIF: Easy OBJ: Factual
   REF: Genetics and DNA

7. Which of the following is NOT a subunit of DNA?
   a. guanine
   b. cytosine
   c. nadenine
   d. thymine

   ANS: C DIF: Easy OBJ: Factual
   REF: Genetics and DNA: Genes

8. How many *pairs* of chromosomes does the typical human cell contain?
   a. 46
   b. 23
   c. 2
   d. 20,000–30,000

   ANS: B DIF: Easy OBJ: Factual
   REF: Genetics and DNA: Genes

9. Approximately how many protein-coding genes does the human cell contain?
   a. 20,000–30,000
   b. 100,000–150,000
   c. 10–20
   d. 23 or 46

   ANS: A DIF: Easy OBJ: Factual
   REF: Genetics and DNA: Genes

10. The section of a DNA molecule that describes the structure of a protein together with its control sequences is called a _____.
    a. double helix
    b. gene
    c. chromosome
    d. protein

    ANS: B DIF: Medium OBJ: Factual
    REF: Genetics and DNA: Genes

11. A typical human cell has _____ genes as the roundworm (*C. elegans*).
    a. about 2 times more
    b. about 100 times more
    c. about the same number of
    d. about half as many

    ANS: C DIF: Medium OBJ: Applied
    REF: Genetics and DNA: Genes

12. A gene refers to _____.
    a. the section of a DNA molecule that describes the structure of a protein together with its control sequences
    b. the single long molecule of deoxyribonucleic acid
    c. the complete set of detailed instructions for making structural proteins that give a cell its shape
    d. the set of 46 chromosomes contained in a human cell

    ANS: A DIF: Difficult OBJ: Factual
    REF: Genetics and DNA: Genes

13. Which of the following is NOT a possible pairing of the subunits of DNA?
    a. A-T; C-G; A-T
    b. C-G; C-G; A-T
    c. C-G; A-G; A-T
    d. A-T; C-G; C-G

    ANS: C DIF: Difficult OBJ: Applied
    REF: Genetics and DNA: Genes

14. The copy of the same 46 chromosomes contained in most of one's cells is collectively called the _____.
    a. genome
    b. phenotype
    c. chromosome set
    d. protein set

    ANS: A DIF: Easy OBJ: Factual
    REF: Genetics and DNA: Gene Expression

15. Which of the following human cells contain 23 rather than 46 chromosomes?
    a. egg cells
    b. sperm cells
    c. both egg and sperm cells
    d. none of the above; all cells contain 46 chromosomes

    ANS: C DIF: Easy OBJ: Applied
    REF: Genetics and DNA: Gene Transmission

16. Who is more likely to share an identical set of genes?
    a. identical or monozygotic twins
    b. fraternal or dizygotic twins
    c. brother and sister siblings
    d. brothers and brother siblings

    ANS: A DIF: Easy OBJ: Applied
    REF: Genetics and DNA: Gene Transmission

17. Which of the following is important for gene expression?
    a. the set of genes a cell contains
    b. the environment outside of a cell
    c. the biochemistry within a cell
    d. all of the above

    ANS: D DIF: Medium OBJ: Applied
    REF: Genetics and DNA: Gene Expression

18. The expression of some genes within one cell, but a different expression of the same set of genes within another cell refers to _____.
    a. gene expression
    b. phenotype
    c. genome biochemistry
    d. protein activation

    ANS: A DIF: Medium OBJ: Conceptual
    REF: Genetics and DNA: Gene Expression

19. Which of the following is the best statement regarding nature/nurture interactions?
    a. Nature, or genetics, is more important than nurture, or environmental factors.
    b. Nurture, or environmental factors, are more important than nature, or genetics.
    c. Nature and nurture interact in a highly complex manner.
    d. None of the above. Scientists cannot distinguish between nature and nurture effects.

    ANS: C DIF: Medium OBJ: Conceptual
    REF: Genetics and DNA: Gene Expression

20. Which of the following is likely to affect gene expression in humans?
    a. temperature
    b. stimulation of a cell
    c. social interactions
    d. all of the above

    ANS: D DIF: Difficult OBJ: Applied
    REF: Genetics and DNA: Gene Expression

21. A brother and sister born from the same parents _____.
    a. are highly likely to share the same set of 46 chromosomes
    b. are unlikely to share any of the same 46 chromosomes
    c. Will share approximately 50% of the same chromosomes
    d. will have identical chromosomes except for the sex chromosomes

    ANS: C DIF: Difficult OBJ: Applied
    REF: Genetics and DNA: Gene Transmission

22. The locus of a gene refers to _____.
    a. its specific position within a chromosome
    b. the location of the cell it occupies
    c. its specific action
    d. its partner gene

    ANS: A DIF: Easy OBJ: Factual
    REF: Genetics and DNA: Interactions among Genes

23. Genotype refers to _____.
    a. the specific genes of an organism
    b. what way an organism looks
    c. the specific location of a gene
    d. the specific way a gene interacts with the environment

    ANS: A DIF: Easy OBJ: Factual
    REF: Genetics and DNA: Interactions among Genes

24. Phenotype refers to _____.
    a. the specific genes of an organism
    b. the way an organism looks
    c. the specific location of a gene
    d. the specific way a gene interacts with the environment

    ANS: B DIF: Easy OBJ: Factual
    REF: Genetics and DNA: Interactions among Genes

25. If both genes in a pair of genes affect the phenotype, then the alleles may be considered _____.
    a. codominant
    b. incomplete dominant
    c. phenotypical
    d. genotypical

    ANS: A DIF: Easy OBJ: Applied
    REF: Genetics and DNA: Interactions among Genes

26. If a person with two different alleles has a phenotype that is an intermediate between the two types favored by each allele on its own, the trait may be considered to _____.
    a. be codominant
    b. have incomplete dominance
    c. be recessive
    d. have dominance

    ANS: B DIF: Easy OBJ: Applied
    REF: Genetics and DNA: Interactions among Genes

27. The serotonin transporter gene is an example of a _____ gene effect.
    a. codominant
    b. incomplete dominance
    c. recessive
    d. dominance

    ANS: B DIF: Easy OBJ: Applied
    REF: Genetics and DNA: Interactions among Genes

28. Blood type is an example of _____ gene effects.
    a. codominant
    b. incomplete dominance
    c. recessive
    d. incomplete recessive

    ANS: A DIF: Easy OBJ: Applied
    REF: Genetics and DNA: Interactions among Genes

29. Gregor Mendel _____.
    a. wrote the *Origin of Species*
    b. was one of the first to write about the laws of genetic inheritance
    c. believed that parents could pass on traits they had gained over the course of a single lifetime
    d. fought against the theory of evolution

    ANS: B DIF: Medium OBJ: Factual
    REF: Genetics and DNA: Interactions among Genes

30. If an individual is homozygous for a particular gene, _____.
    a. the individual received that same identical gene from both parents
    b. the individual received different genes from the mother and the father
    c. the gene must be dominant
    d. the gene must be recessive

    ANS: A DIF: Medium OBJ: Applied
    REF: Genetics and DNA: Interactions among Genes

31. If an individual is heterozygous for a particular gene, _____.
    a. the individual received that same identical gene from both parents
    b. the individual received different genes from the mother and the father
    c. the gene must be dominant
    d. the gene must be recessive

    ANS: B DIF: Medium OBJ: Applied
    REF: Genetics and DNA: Interactions among Genes

32. A gene is said to be dominant. What is the likelihood that the trait controlled by that gene will be expressed?
    a. The trait has a high likelihood of being expressed.
    b. The trait has a low likelihood of being expressed.
    c. The trait will be expressed only if its paired gene is identical.
    d. The trait cannot be expressed.

    ANS: A DIF: Medium OBJ: Applied
    REF: Genetics and DNA: Interactions among Genes

33. A gene is said to be recessive. What is the likelihood that the trait controlled by that gene will be expressed?
    a. The trait has a high likelihood of being expressed.
    b. The trait will absolutely be expressed.
    c. The trait will be expressed only if the paired gene is identical.
    d. The trait cannot be expressed.

    ANS: C DIF: Medium OBJ: Applied
    REF: Genetics and DNA: Interactions among Genes

34. Carolyn has an allele for red hair and an allele for brown hair. She has brown hair. Which of the following statements is true about Carolyn?
    a. Carrie is heterozygous for the hair color gene.
    b. Carrie's phenotype does not match her genotype.
    c. The gene for red hair must be recessive.
    d. All of the above.

    ANS: D DIF: Medium OBJ: Applied
    REF: Genetics and DNA: Interactions among Genes

35. Which of the following is NOT a trait based on a distinct set of recessive trait gene pairings?
    a. baldness
    b. red-green color blindness
    c. high susceptibility to poison ivy
    d. intelligence

    ANS: D DIF: Medium OBJ: Applied
    REF: Genetics and DNA: Interactions among Genes

36. Phenylketonuria _____.
    a. is the result of a single recessive gene pairing
    b. may result in mental retardation
    c. results in the inability to metabolize phenylalanine
    d. all of the above

    ANS: D DIF: Medium OBJ: Applied
    REF: Genetics and DNA: Interactions among Genes

37. If an individual changes his diet because it is discovered he has phenylketonuria (PKU), then one can conclude that although he had the _____ for PKU, it did not lead to the _____ of retardation.
    a. genotype; phenotype
    b. phenotype; genotype
    c. dominant gene; recessive trait
    d. recessive gene; dominant trait

    ANS: A DIF: Medium OBJ: Applied
    REF: Genetics and DNA: Interactions among Genes

38. Carrie has two alleles for red hair, and she has red hair. Which of the following statements is true about Carrie?
    a. Carrie is homozygous for the hair color gene.
    b. Carrie's phenotype matches her genotype.
    c. The gene for red hair must be dominant.
    d. Both a and b.

    ANS: D DIF: Difficult OBJ: Applied
    REF: Genetics and DNA: Interactions among Genes

39. Polygenic inheritance refers to _____.
    a. how a trait is influenced by many genes
    b. the fact that we show many different inherited traits
    c. how both environment and genetics influence a trait simultaneously
    d. all of the above

    ANS: A DIF: Easy OBJ: Factual
    REF: Genetics and DNA: Polygenic Inheritance

40. Which of the following is NOT an example of polygenic inheritance?
    a. phenylketonuria or PKU
    b. schizophrenia
    c. bipolar disorders
    d. intelligence

    ANS: A DIF: Easy OBJ: Applied
    REF: Genetics and DNA: Polygenic Inheritance

41. Evolution can be said to focus on _____ causes.
    a. proximate
    b. ultimate
    c. natural
    d. specific

    ANS: B DIF: Easy OBJ: Factual
    REF: Evolution by Natural Selection: The Principles of Natural Selection

42. Which animal was highly influential in the development of Darwin's theory?
    a. apes
    b. tortoises
    c. finches
    d. beetles

    ANS: C DIF: Easy OBJ: Factual
    REF: Evolution by Natural Selection: The Principles of Natural Selection

43. The process in which traits that are more suited for survival are more likely to be passed on to offspring than traits less suited for survival is called _____.
    a. dominance
    b. natural selection
    c. genetic drift
    d. genetic fitness

    ANS: B DIF: Easy OBJ: Factual
    REF: Evolution by Natural Selection: The Principles of Natural Selection

44. Which of the following is NOT true regarding Charles Darwin?
    a. He was an English naturalist.
    b. His hobbies included collecting beetles.
    c. He spent long periods of time observing animals and plants during his voyage on the SS *Beagle.*
    d. He majored in biology in college.

    ANS: D DIF: Easy OBJ: Applied
    REF: Evolution by Natural Selection: The Principles of Natural Selection

45. The idea that anything natural is good or that more recently evolved traits are better than traits evolved earlier is called _____.
    a. naturalistic fallacy
    b. evolutionary fallacy
    c. trait inheritance
    d. evolution

    ANS: A DIF: Medium OBJ: Factual
    REF: Evolution by Natural Selection: The Principles of Natural Selection

46. Which of the following is an example of natural selection?
    a. A breeder selects the darkest colored golden retrievers from each litter to pair and continue breeding.
    b. A dark-colored fish is more likely to survive, and thus more likely to reproduce than a light-colored fish.
    c. A dog learns to open the door to escape, and her pups learn it too.
    d. All of the above.

    ANS: B DIF: Medium OBJ: Applied
    REF: Evolution by Natural Selection: The Principles of Natural Selection

47. Proximate causes refer to the _____ while ultimate causes refer to _____.
    a. mechanisms within an organism's life; mechanisms within a population over many generations
    b. mechanisms within a population over many generations; mechanisms within an organism's life
    c. local cause of a trait; the final causation for a trait
    d. the final causation for a trait; the local cause of a trait

    ANS: A DIF: Medium OBJ: Conceptual
    REF: Evolution by Natural Selection: The Principles of Natural Selection

48. Which of the following statements best describes Darwin's theory of evolution?
    a. All life on Earth had a shared origin, so that all creatures descend from an ancient common ancestor.
    b. All life on Earth is related to one another because of natural selection.
    c. The most fit among creatures always survive and the weakest always die out.
    d. Animals survive because of their best physical features.

    ANS: A DIF: Medium OBJ: Conceptual
    REF: Evolution by Natural Selection: The Principles of Natural Selection

49. A wide-billed finch may be better suited for survival than a narrow-billed finch because _____.
    a. the wide mouth would better enable the finch to crack open seeds than a narrow bill
    b. the wide bill would provide a better competitive advantage
    c. the wide bill must be a dominant trait
    d. both a and b

    ANS: D DIF: Difficult OBJ: Applied
    REF: Evolution by Natural Selection: The Principles of Natural Selection

50. Which of the following is NOT one of Darwin's three principles of evolution?
    a. There must be variation among individuals within a population.
    b. Certain of the variants must survive and reproduce at higher rates than others.
    c. Traits associated with superior survival and reproduction must be passed from parents to offspring.
    d. In all populations, only the best fit of individuals survives and reproduces.

    ANS: D DIF: Medium OBJ: Conceptual
    REF: Evolution by Natural Selection: Genes and Evolution

51. Which of the following was a substantial obstacle(s) in Darwin's thinking that prevented him from further developing his theory?
    a. how organisms within a population differed from one another
    b. how traits could be transmitted from one generation to another
    c. which organism was the first original organism
    d. both a and b

    ANS: D DIF: Medium OBJ: Conceptual
    REF: Evolution by Natural Selection: Genes and Evolution

52. Which of the following is NOT true of a mutation?
    a. It is an error in replication of the DNA.
    b. It is always damaging to the organism.
    c. It happens randomly.
    d. It contributes to the genetic diversity of a species.

    ANS: B DIF: Medium OBJ: Conceptual
    REF: Evolution by Natural Selection: Genes and Evolution

53. According to your book, why would a mother bird feign injury and move away from her nest when she has hatchlings?
    a. The behavior protects the young hatchlings.
    b. It is learned.
    c. It appears to be an inherited ability that emerged over many generations.
    d. Both a and c.

    ANS: D DIF: Medium OBJ: Conceptual
    REF: Evolution by Natural Selection: Genes and Evolution

54. According to your book, why might a ground squirrel sound an alarm cry when it sees a predator?
    a. to warn other ground squirrels, thus protecting the collection of ground squirrel genes
    b. to confuse the predator and lure the predator away from its nest
    c. to frighten the predator away
    d. both b and c

    ANS: A DIF: Medium OBJ: Conceptual
    REF: Evolution by Natural Selection: Genes and Evolution

55. Which of the following is NOT a reason for variation in genotypes?
    a. the enormous size of an organism's genome
    b. lack of uniformity across individual organisms within a species
    c. mutations
    d. experiences of an individual organism

    ANS: D DIF: Difficult OBJ: Applied
    REF: Evolution by Natural Selection: Genes and Evolution

56. Approximately what percentage of the general population accepts the theory of evolution?
    a. none
    b. 80%
    c. 40%
    d. Most people accept the theory.

    ANS: C DIF: Easy OBJ: Factual
    REF: Evolution by Natural Selection: Evidence for Evolution by Natural Selection

57. Approximately what percentage of scientists accept the theory of evolution?
    a. none
    b. 80%
    c. 40%
    d. Most scientists accept the theory.

    ANS: D DIF: Easy OBJ: Factual
    REF: Evolution by Natural Selection: Evidence for Evolution by Natural Selection

58. Which of the following may be used as scientific evidence to support the theory of evolution?
    a. understanding how genetic mutations occur
    b. how genes influence organisms' traits
    c. fossil evidence
    d. all of the above

    ANS: D DIF: Easy OBJ: Applied
    REF: Evolution by Natural Selection: Evidence for Evolution by Natural Selection

59. Which of the following is an example of how scientists may watch the process of evolution unfolding?
    a. changes in the body armor of the Lake Washington stickleback
    b. fossil evidence discovered by archeologists
    c. laboratory experiments with the crystal jellyfish
    d. both a and c

    ANS: D DIF: Easy OBJ: Applied
    REF: Evolution by Natural Selection: Evidence for Evolution by Natural Selection

60. Why might psychologists want to investigate evolutionary changes in humans?
    a. to gain an understanding of human memory
    b. to learn about the genetic roots of various mental disorders and diseases
    c. to develop new medications for the treatment of psychological disorders and diseases
    d. all of the above

    ANS: D DIF: Easy OBJ: Conceptual
    REF: Evolution by Natural Selection: Evidence for Evolution by Natural Selection

61. Why might a scientist want to transfer genes between species?
    a. to observe novel functions of that gene
    b. to restore function as the result of a genetic defect
    c. to increase the diversity of a species
    d. all of the above

    ANS: D DIF: Medium OBJ: Applied
    REF: Evolution by Natural Selection: Evidence for Evolution by Natural Selection

62. Which of the following is NOT an example of evidence for common ancestry?
    a. the high degree of overlap between the genome of birds and crocodiles
    b. the close relationship in genomes between whales and hippos
    c. the high degree of similarity in bone structure across mammals
    d. evidence showing that man is highly unique compared to other apes

    ANS: D DIF: Easy OBJ: Conceptual
    REF: Evolution by Natural Selection: The Unity of Life

63. Which of the following best describe Charles Darwin's two main ideas?
    a. natural selection and common ancestry
    b. natural selection and genetic evolution
    c. genetic evolution and common ancestry
    d. behavioral evolution and genetic evolution

    ANS: A DIF: Medium OBJ: Conceptual
    REF: Evolution by Natural Selection: The Unity of Life

64. According to the theory of evolution, behaviors emerging from natural selection should be _____ in form.
    a. rigidly defined
    b. flexible
    c. highly stereotyped
    d. mechanistic

    ANS: B DIF: Medium OBJ: Factual
    REF: The Genetics and Evolution of Behavior

65. Niche construction refers to _____.
    a. the process in which organisms make their nests, or niches
    b. the process in which organisms, through their behaviors, alter their environments and thus create their own circumstances
    c. the ability to make nests regardless of environments
    d. the ability to maintain a behavior consistently across environments

    ANS: B DIF: Medium OBJ: Factual
    REF: The Genetics and Evolution of Behavio

66. Which of the following would likely NOT be affected by natural selection, according to Darwin?
    a. an organism's structural traits
    b. an organism's genetic traits
    c. an organism's behavioral traits
    d. an organism's physical environment

    ANS: D DIF: Medium OBJ: Applied
    REF: The Genetics and Evolution of Behavior

67. Which of the following is NOT likely to be part of an animal's phenotype?
    a. personality
    b. intelligence
    c. behavioral disposition
    d. none of the above; all are part of an animal's phenotype

    ANS: D DIF: Medium OBJ: Applied
    REF: The Genetics and Evolution of Behavior

68. Why does natural selection favor flexibility in behavior?
    a. Species evolve in highly changing environments.
    b. Animals should be able to behave randomly to keep predators guessing about their behavior.
    c. Animals should behave in highly flexible ways so that they increase the chance of emitting the best behavior in the environmental situation.
    d. Both a and b.

    ANS: D DIF: Medium OBJ: Applied
    REF: The Genetics and Evolution of Behavior

69. Which of the following is NOT an example of niche construction in humans?
    a. building new shelters
    b. finding new sources of food
    c. creating social alliances
    d. highly stereotyped fear behavior

    ANS: D DIF: Medium OBJ: Applied
    REF: The Genetics and Evolution of Behavior

70. What is the common theme among the human expression of emotions, human intelligence, and human patterns of sexual preproduction?
    a. All three may be used as examples of ultimate causes of natural selection.
    b. Expression of emotions and intelligence are important components of reproduction.
    c. Intelligence is a factor in how humans express emotions and their ability to successfully reproduce.
    d. All three may be used as examples of the proximate causes of natural selection.

    ANS: A DIF: Difficult OBJ: Conceptual
    REF: The Genetics and Evolution of Behavior

71. Surrender displays in mammals are an example of _____.
    a. aggression responses
    b. species-specific behaviors
    c. vulnerability displays
    d. species atypical behaviors

    ANS: B DIF: Easy OBJ: Factual
    REF: The Genetics and Evolution of Behavior: The Biological Roots of Smiling

72. When do most babies begin to socially smile?
    a. by 1 month of age
    b. by 6 months of age
    c. from birth
    d. by 1 year

    ANS: A DIF: Easy OBJ: Factual
    REF: The Genetics and Evolution of Behavior: The Biological Roots of Smiling

73. Data from the experiments conducted on the New Guinea tribe suggest that the expression of emotions is likely to be _____.
    a. innate
    b. learned
    c. culturally specific
    d. unknown in New Guinea tribesmen

    ANS: A DIF: Easy OBJ: Factual
    REF: The Genetics and Evolution of Behavior: The Biological Roots of Smiling

74. Evidence from animal studies suggests that other animals _____.
    a. do not smile
    b. show evidence for smiling behavior
    c. show facial expressions that look like smiling, but are not
    d. smile only in response to internal events

    ANS: B DIF: Easy OBJ: Factual
    REF: The Genetics and Evolution of Behavior: The Biological Roots of Smiling

75. The fact that babies blind since birth begin to smile at the same time as babies with normal vision suggests that _____.
    a. smiling is a learned response
    b. smiling occurs only if babies are around their parents
    c. smiling is a species-general behavior
    d. smiling occurs only if a baby is happy

    ANS: C DIF: Easy OBJ: Conceptual
    REF: The Genetics and Evolution of Behavior: The Biological Roots of Smiling

76. An expressive smile is characterized by _____.
    a. expression even when others are not around
    b. changes in both the shape of the mouth and the shape of the upper face and eyes
    c. when an animal or human experiences pleasure
    d. all of the above

    ANS: D DIF: Medium OBJ: Factual
    REF: The Genetics and Evolution of Behavior: The Biological Roots of Smiling

77. A social smile is characterized by _____.
    a. expression only when around others
    b. changes in the shape of the mouth but not the eyes
    c. use as a greeting
    d. all of the above

    ANS: D DIF: Medium OBJ: Factual
    REF: The Genetics and Evolution of Behavior: The Biological Roots of Smiling

78. In nonhumans, what is a common function of the social smile?
    a. aggression
    b. diffusing or avoiding a conflict
    c. indication of pleasure
    d. all of the above

    ANS: B DIF: Medium OBJ: Factual
    REF: The Genetics and Evolution of Behavior: The Biological Roots of Smiling

79. In the study examining smiling, the facial expression of groups of athletes who received an award at the Paralympic games was examined. Which group showed smiling?
    a. the blind group
    b. the group that once had vision, but then became blind
    c. the normally sighted group
    d. all three groups showed nearly identical smiling

    ANS: D DIF: Medium OBJ: Factual
    REF: The Genetics and Evolution of Behavior: The Biological Roots of Smiling

80. A species-specific behavior is one that _____.
    a. is exhibited by all members of a species
    b. only occurs in single species
    c. forms an aggressive response
    d. communicates needs to other animals

    ANS: A DIF: Medium OBJ: Factual
    REF: The Genetics and Evolution of Behavior: The Biological Roots of Smiling

81. Putting your hands up and showing that you are not armed could be classified as a(n) _____.
    a. aggression behavior
    b. surrender display
    c. animalistic ritual
    d. all of the above

    ANS: B DIF: Difficult OBJ: Applied
    REF: The Genetics and Evolution of Behavior: The Biological Roots of Smiling

82. Intelligence may be defined as the _____.
    a. capacity that allows people to acquire new knowledge and use it to draw conclusions, solve problems, and adapt to new circumstances
    b. capacity that allows people to learn new knowledge, excel in schooling, participate in everyday life, and adapt to new surroundings
    c. potential to acquire new knowledge, use it to draw conclusions, solve problems, and excel in school
    d. potential to learn

    ANS: A DIF: Easy OBJ: Factual
    REF: The Genetics and Evolution of Behavior: The Genetics of Intelligence

83. Identical twins are also called _____.
    a. dizygotic twins
    b. monozygotic twins
    c. mixed zygotic twins
    d. none of the above

    ANS: B DIF: Easy OBJ: Factual
    REF: The Genetics and Evolution of Behavior: The Genetics of Intelligence

84. The correlation between intelligence in identical or monozygotic twins is approximately _____.
    a. 1.0
    b. 0.86
    c. 0.44
    d. 0.60

    ANS: B DIF: Easy OBJ: Factual
    REF: The Genetics and Evolution of Behavior: The Genetics of Intelligence

85. The correlation between intelligence in fraternal or dizygotic twins is approximately _____.
    a. 1.0
    b. 0.86
    c. 0.44
    d. 0.60

    ANS: D DIF: Easy OBJ: Factual
    REF: The Genetics and Evolution of Behavior: The Genetics of Intelligence

86. Heritability ratios for low SES groups are _____.
    a. higher than those for high SES groups
    b. near zero
    c. nearly 100%
    d. identical to those obtained from high SES groups

    ANS: B DIF: Easy OBJ: Factual
    REF: The Genetics and Evolution of Behavior: The Genetics of Intelligence

87. Which of the following is a debated question regarding intelligence and intelligence testing?
    a. whether IQ tests are fair to all groups.
    b. the definition of intelligence itself
    c. whether IQ tests actually measure intelligence
    d. all of the above

    ANS: D DIF: Easy OBJ: Applied
    REF: The Genetics and Evolution of Behavior: The Genetics of Intelligence

88. Performance on intelligence tests may be influenced by _____.
    a. environmental variables such as poverty
    b. early experiences, such as having books read to you as a young child
    c. the amount of time spent in school
    d. all of the above

    ANS: D DIF: Easy OBJ: Applied
    REF: The Genetics and Evolution of Behavior: The Genetics of Intelligence

89. If a woman releases two eggs, and both eggs are fertilized, this would result in _____.
    a. dizygotic twins
    b. monozygotic twins
    c. mixed zygotic twins
    d. none of the above

    ANS: A DIF: Easy OBJ: Applied
    REF: The Genetics and Evolution of Behavior: The Genetics of Intelligence

90. If intelligence were 100% inheritable, then monozygotic twins should show _____.
    a. similar but not identical intelligence
    b. identical intelligence
    c. highly individualized intelligences
    d. somewhat related but not highly related intelligence

    ANS: B DIF: Easy OBJ: Applied
    REF: The Genetics and Evolution of Behavior: The Genetics of Intelligence

91. Why might monozygotic twins show highly related intelligence scores?
    a. genetic influences
    b. environmental influences
    c. both genetic and environmental influences
    d. neither genetic or environmental influences

    ANS: C DIF: Easy OBJ: Applied
    REF: The Genetics and Evolution of Behavior: The Genetics of Intelligence

92. What conclusions can be made regarding the ultimate causes of intelligence?
    a. Intelligence evolved because it allows humans a high degree of flexible behavior.
    b. Intelligence evolved because it helps humans have a high degree of consistency in their behavior.
    c. Intelligence evolved because animals that are smarter also tend to have better genes for survival.
    d. There is no evidence that intelligence is an evolved behavior.

    ANS: A DIF: Easy OBJ: Applied
    REF: The Genetics and Evolution of Behavior: The Genetics of Intelligence

93. What is the ultimate cause of differences in intelligence from one person to another?
    a. Variations in intelligence are nature's way of eliminating unfit individuals.
    b. It is plausible that differences in intelligence are the result of many factors, including an important contribution from an individual's genotype.
    c. Variations in intelligence are unreliable, and thus the ultimate cause cannot be determined.
    d. There is no evidence that variations in intelligence are inherited.

    ANS: B DIF: Easy OBJ: Conceptual
    REF: The Genetics and Evolution of Behavior: The Genetics of Intelligence

94. Heritability ratios _____ for age, but are _____ for social/economic status (SES).
    a. high; low
    b. low; high
    c. highly variable, highly consistent
    d. highly consistent; highly variable

    ANS: A DIF: Medium OBJ: Factual
    REF: The Genetics and Evolution of Behavior: The Genetics of Intelligence

95. For what reasons do burrowing owls collect animal dung and put it around their nests?
    a. to repel predators
    b. to attract dung beetles, which provide food while nesting
    c. both to attract predators and to have extra food
    d. The reason is unknown; scientists have been unable to determine the function.

    ANS: C DIF: Medium OBJ: Factual
    REF: The Genetics and Evolution of Behavior: The Genetics of Intelligence

96. A heritability ratio is a statistic that _____.
    a. summarizes how much of the variance in a population can be attributed to genetic differences across individuals
    b. summarizes how much of the variance in a population can be attributed to genetic differences across species
    c. averages the variance in inheritance of a characteristic across a sample of individuals
    d. averages the variance in a genetic difference within an individual

    ANS: A DIF: Medium OBJ: Factual
    REF: The Genetics and Evolution of Behavior: The Genetics of Intelligence

97. Which question(s) must be asked when calculating a heritability ratio?
    a. How much phenotype variance is there in the group?
    b. How much of the phenotypic variance in a group is caused by differences in the genome?
    c. How much of the genotypic variance in a group is caused by differences in the genome?
    d. Both a and b, but not c.

    ANS: D DIF: Medium OBJ: Conceptual
    REF: The Genetics and Evolution of Behavior: The Genetics of Intelligence

98. The heritability ratio is calculated by _____.
    a. dividing genetic variation by total phenotypic variance
    b. dividing total phenotypic variance by genetic variation
    c. averaging the genetic variation with the total phenotypic variance
    d. subtracting the genetic variation from the total phenotypic variance

    ANS: A DIF: Difficult OBJ: Factual
    REF: The Genetics and Evolution of Behavior: The Genetics of Intelligence

99. What do heritability estimates tell us about the degree of genetic influence on an individual's traits?
    a. the certainty of the measurement
    b. the range of the influence
    c. the magnitude of the influence
    d. absolutely nothing

    ANS: D DIF: Difficult OBJ: Factual
    REF: The Genetics and Evolution of Behavior: The Genetics of Intelligence

100. Heritability ratios for human intelligence suggests that the degree of heritability _____.
    a. depends on the group being considered
    b. depends on the environment being considered
    c. depends on both the group and environment being considered
    d. is stable and does not change across groups

    ANS: C DIF: Difficult OBJ: Factual
    REF: The Genetics and Evolution of Behavior: The Genetics of Intelligence

101. The environment that was in place when a trait was evolving, and that accounts for a trait's function, is called _____.
    a. environment of evolutionary usefulness (EEU)
    b. environmental utility (EU)
    c. environment of evolutionary adaptiveness (EEA)
    d. evolutionary adaptiveness factor (EAF)

    ANS: C DIF: Difficult OBJ: Factual
    REF: The Genetics and Evolution of Behavior: The Genetics of Intelligence

102. Two sets of identical twins are given an intelligence test. One set of twins was reared by the same parents, while the second set of twins was separated at birth. Which set of twins will show highly similar intelligence test scores?
    a. only the set of twins reared together
    b. only the set of twins reared apart
    c. Both sets of twins, but the score for the twins reared together will be more similar than the twins reared apart.
    d. Neither set of twins will show a higher degree of similarity than two randomly chosen people.

    ANS: C DIF: Difficult OBJ: Applied
    REF: The Genetics and Evolution of Behavior: The Genetics of Intelligence

103. Which of the following is the best way to examine how environment alters the degree of relatedness for intelligence?
a. by examining monozygotic and dizygotic twins
b. by examining twins compared to siblings born at different times
c. by examining monozygotic twins reared apart and together
d. by examining intelligence scores across the century

ANS: C DIF: Difficult OBJ: Applied
REF: The Genetics and Evolution of Behavior: The Genetics of Intelligence

104. Which of the following heritability ratios indicates that a phenotypic variability is most attributable to the genome?
a. 0.3
b. 0.9
c. 1.7
d. 0.6

ANS: B DIF: Difficult OBJ: Applied
REF: The Genetics and Evolution of Behavior: The Genetics of Intelligence

105. Why is the environment that was in place when a trait was evolving considered important?
a. The environment in which a trait evolved is predictive of future environments.
b. The trait can only develop if a correct environment is in place at the time.
c. The evolutionary process depends on whether an organism's traits will be useful in future environments.
d. The evolutionary process depends only on whether an organism's traits helped it to survive and reproduce in its current environment, and not its future environment.

ANS: D DIF: Difficult OBJ: Applied
REF: The Genetics and Evolution of Behavior: The Genetics of Intelligence

106. For which of the following behaviors do scientists have a better understanding of the ultimate cause than the proximal cause?
a. intelligence
b. social communication
c. reproduction and mating
d. smiling

ANS: C DIF: Easy OBJ: Factual
REF: The Genetics and Evolution of Behavior: The Evolution of Mating Patterns

107. Monogamy refers to _____.
a. a reproductive relationship in which several members of one sex mate with other members of that sex
b. a reproductive relationship in which several members of one sex mate with one individual of the other sex
c. a reproductive partnership between one male and one female
d. a reproductive partnership between two males or two females

ANS: C DIF: Easy OBJ: Factual
REF: The Genetics and Evolution of Behavior: The Evolution of Mating Patterns

108. Polygamy refers to _____.
    a. a reproductive relationship in which several members of one sex mate with other members of that sex
    b. a reproductive relationship in which several members of one sex mate with one individual of the other sex
    c. a reproductive partnership between one male and one female
    d. a reproductive partnership between two males or two females

    ANS: B DIF: Easy OBJ: Factual
    REF: The Genetics and Evolution of Behavior: The Evolution of Mating Patterns

109. Two males mating with a single female is referred to as _____.
    a. monogamy
    b. polygamy
    c. polyandry
    d. polygyny

    ANS: C DIF: Easy OBJ: Factual
    REF: The Genetics and Evolution of Behavior: The Evolution of Mating Patterns

110. Two females mating with a single male is referred to as _____.
    a. monogamy
    b. polygamy
    c. polyandry
    d. polygyny

    ANS: D DIF: Easy OBJ: Factual
    REF: The Genetics and Evolution of Behavior: The Evolution of Mating Patterns

111. Two males mating with a single female is referred to as _____.
    a. monogamy
    b. polygamy
    c. polyandry
    d. polygyny

    ANS: C DIF: Easy OBJ: Factual
    REF: The Genetics and Evolution of Behavior: The Evolution of Mating Patterns

112. Human males and females _____.
    a. are not selective in their mating choices
    b. show identical highly selective strategies in their mating choices
    c. show differences in how they make selective mating choices
    d. show no evolutionary tendencies toward mating choices

    ANS: C DIF: Easy OBJ: Factual
    REF: The Genetics and Evolution of Behavior: The Evolution of Mating Patterns

113. According to your textbook, men tend to be jealous about _____ loyalty, while women tend to be jealous about _____ loyalty.
    a. sexual; emotional
    b. emotional; sexual
    c. financial; romantic
    d. romantic; financial

    ANS: A DIF: Easy OBJ: Factual
    REF: The Genetics and Evolution of Behavior: The Evolution of Mating Patterns

114. Data indicate that a baby is more likely to look like the _____ father than the _____.
a. biological father; biological mother
b. biological mother; biological father
c. father who raises it; biological father
d. father who raises it; biological mother

ANS: A DIF: Easy OBJ: Factual
REF: The Genetics and Evolution of Behavior: The Evolution of Mating Patterns

115. According to work by Daly and Wilson, which child is least likely to experience abuse or even infanticide at the hands of the male parent?
a. a child biologically related to the father
b. a child biologically related to the mother
c. a child unrelated to the mother or father
d. none of the above; biological relatedness does not predict abuse

ANS: A DIF: Easy OBJ: Applied
REF: The Genetics and Evolution of Behavior: The Evolution of Mating Patterns

116. According to work by Daly and Wilson, under which circumstances is a child most likely to experience abuse or even infanticide at the hands of a caregiver?
a. a child residing with his or her biological father
b. a child residing with his or her biological mother and biological father
c. a child residing with a biological mother and an unrelated stepfather or boyfriend
d. none of the above; biological relatedness does not predict abuse

ANS: C DIF: Easy OBJ: Applied
REF: The Genetics and Evolution of Behavior: The Evolution of Mating Patterns

117. According to the researcher David Buss, the best explanation for tendencies in likes and dislikes regarding potential mates in humans is _____.
a. individual differences
b. cultural influences
c. evolutionary influences
d. religious influences

ANS: C DIF: Easy OBJ: Conceptual
REF: The Genetics and Evolution of Behavior: The Evolution of Mating Patterns

118. Sociobiology refers to _____.
a. proving that humans evolved
b. studying and then applying evolutionary logic to human behavior
c. demonstrating that humans are prewired to behave in certain ways because of their genes
d. all of the above

ANS: B DIF: Easy OBJ: Conceptual
REF: The Genetics and Evolution of Behavior: The Evolution of Mating Patterns

119. Evolutionary psychology refers to _____.
a. proving that humans evolved
b. studying and then applying evolutionary logic to human behavior
c. demonstrating that humans are prewired to behave in certain ways because of their genes
d. all of the above

ANS: B DIF: Easy OBJ: Conceptual
REF: The Genetics and Evolution of Behavior: The Evolution of Mating Patterns

120. Data indicate that men are more likely to adopt a child who _____.
a. look like their mate
b. look like them
c. is judged as highly beautiful
d. is male

ANS: B DIF: Medium OBJ: Factual
REF: The Genetics and Evolution of Behavior: The Evolution of Mating Patterns

121. Data suggest that women choose mates who are _____.
a. highly physically attractive
b. have a high social status
c. are slighter younger
d. most like themselves

ANS: B DIF: Medium OBJ: Factual
REF: The Genetics and Evolution of Behavior: The Evolution of Mating Patterns

122. In many animals, courtship involves _____.
a. the female trying to persuade the male to accept her as a mate
b. the male trying to persuade the female to accept her as a mate
c. the female trying to show her physical fitness
d. the male trying to show his beauty

ANS: B DIF: Medium OBJ: Factual
REF: The Genetics and Evolution of Behavior: The Evolution of Mating Patterns

123. Many birds form which kind of sexual relationship?
a. monogamous
b. polygamous
c. polyandry
d. polygyny

ANS: A DIF: Medium OBJ: Factual
REF: The Genetics and Evolution of Behavior: The Evolution of Mating Patterns

124. Many mammals form which kind of sexual relationship?
a. monogamous
b. polygamous
c. polyandry
d. polygyny

ANS: B DIF: Medium OBJ: Factual
REF: The Genetics and Evolution of Behavior: The Evolution of Mating Patterns

125. Why do female mammals choose the mate in most species?
a. Reproduction places a huge burden on the mammalian female.
b. Female mammals are better at choosing than males.
c. Males are careless when it comes to mate selection.
d. All of the above.

ANS: A DIF: Medium OBJ: Factual
REF: The Genetics and Evolution of Behavior: The Evolution of Mating Patterns

126. A male deer has a large set of antlers and runs off other males when in the presence of a receptive female. These traits likely evolved to demonstrate to the female that he is the _____.
a. most physically fit
b. boldest
c. most beautiful
d. most fertile

ANS: A DIF: Medium OBJ: Applied
REF: The Genetics and Evolution of Behavior: The Evolution of Mating Patterns

127. Why might monogamy serve a reproductive advantage for nesting birds?
   a. It presents a reduced risk of sexually transmitted diseases.
   b. Each parent needs its partner's continuing help if the offspring are to survive.
   c. Monogomy increases the chances of knowing which partner's genes are mixed with its own.
   d. All of the above.

   ANS: B DIF: Medium OBJ: Applied
   REF: The Genetics and Evolution of Behavior: The Evolution of Mating Patterns

128. A female mammal carries its young and feeds its young its own milk. Thus, it has a lower need for a nest and for help during the pregnancy or immediately after birth. However, finding the most fit male to father the offspring may serve as a reproductive advantage. Which strategy would be the optimal strategy for this mammal?
   a. monogamy
   b. polygamy
   c. polyandry
   d. polygyny

   ANS: B DIF: Medium OBJ: Applied
   REF: The Genetics and Evolution of Behavior: The Evolution of Mating Patterns

129. Many male mammals are NOT involved in the rearing of the offspring. As a result, they have little investment in parenting, but also little assurance that a particular offspring survives. What would be the optimal mating strategy for these male mammals?
   a. monogamy
   b. polygamy
   c. polyandry
   d. polygyny

   ANS: B DIF: Medium OBJ: Applied
   REF: The Genetics and Evolution of Behavior: The Evolution of Mating Patterns

130. Recent surveys of humans suggest that many humans have a tendency toward _____.
   a. monogamy
   b. polygamy
   c. polyandry
   d. polygyny

   ANS: D DIF: Medium OBJ: Applied
   REF: The Genetics and Evolution of Behavior: The Evolution of Mating Patterns

131. Which of the following reasons may support the tendency for many human males to show a preference for polygyny?
   a. Males have less parental investment than women.
   b. In order to maximize the probability of a surviving offspring, the male should mate with as many females as possible.
   c. Males do not have to carry the fetus and do not have the biological capabilities to feed the offspring.
   d. All of the above.

   ANS: D DIF: Medium OBJ: Applied
   REF: The Genetics and Evolution of Behavior: The Evolution of Mating Patterns

132. Which of the following reasons may support the tendency for many human females to show a preference for having only a few sexual partners?
    a. Females have more parental investment than men.
    b. In order to maximize the probability of a surviving offspring, the female must carefully carry and then care for the offspring.
    c. The risk involved in bearing each offspring is much higher for women.
    d. All of the above.

    ANS: D DIF: Medium OBJ: Applied
    REF: The Genetics and Evolution of Behavior: The Evolution of Mating Patterns

133. Which of the following could be considered a conclusion regarding "cheating" in humans, based on the information presented in the book?
    a. Humans are biologically wired to cheat, and it cannot be prevented.
    b. Humans are biologically wired to be monogamous, and cheating is an abnormal behavior.
    c. Humans may have evolutionary tendencies toward cheating, but cultural norms and learning may increase or decrease these tendencies.
    d. Culture, religion, and learning dictate humans' cheating patterns, not biology.

    ANS: C DIF: Medium OBJ: Applied
    REF: The Genetics and Evolution of Behavior: The Evolution of Mating Patterns

134. Many women would agree that Bill Gates, the found of Microsoft, is not necessarily physically attractive, yet many women report they would marry him. Which of the following evolutionary tendencies may be at play here?
    a. the tendency to prefer muscular and strong men
    b. the tendency to choose mates who have a high social status
    c. the tendency to choose mates who are slighter younger
    d. the tendency to choose mates most like themselves

    ANS: B DIF: Medium OBJ: Applied
    REF: The Genetics and Evolution of Behavior: The Evolution of Mating Patterns

135. Which of the following types of women do studies suggest that many men may be most attracted to?
    a. the rich older woman
    b. the business executive
    c. the highly physically attractive but lower status woman
    d. an older and highly intelligent woman

    ANS: C DIF: Medium OBJ: Applied
    REF: The Genetics and Evolution of Behavior: The Evolution of Mating Patterns

136. Why, from an evolutionary perspective, might women show more jealousy regarding emotional loyalty?
   a. A female needs resources provided by the male to nourish her young, and emotional loyalty is indicative of a partner's commitment.
   b. The female needs the male to create offspring, and emotional connections are critical for female mating.
   c. The female has difficulty forgetting emotional hurts more than sexual transgressions and thus is more likely to attend to emotional issues.
   d. None of the above; the female does not show more jealousy regarding emotional loyalty.

   ANS: A DIF: Medium OBJ: Conceptual
   REF: The Genetics and Evolution of Behavior: The Evolution of Mating Patterns

137. Why, from an evolutionary perspective, might men show more jealousy regarding sexual loyalty?
   a. A male needs resources provided by the female to ensure that his offspring are nourished, and emotional loyalty is indicative of a partner's commitment.
   b. The male needs the female to create offspring, and sexual loyalty is indicative of the offspring being his.
   c. The male has difficulty forgetting sexual hurts more than emotional transgressions and thus is more likely to attend to sexual issues.
   d. None of the above; the male does not show more jealousy regarding sexual loyalty.

   ANS: B DIF: Medium OBJ: Conceptual
   REF: The Genetics and Evolution of Behavior: The Evolution of Mating Patterns

138. Which of the following appear to be true based on data surveying likes/dislikes regarding potential mates for men and women?
   a. The likes and dislikes are highly culturally specific.
   b. The likes and dislikes break down along religious values.
   c. The likes and dislikes appear to be cultural universals.
   d. There is no evidence for predispositions in the likes and dislikes of potential partners.

   ANS: C DIF: Medium OBJ: Conceptual
   REF: The Genetics and Evolution of Behavior: The Evolution of Mating Patterns

139. A scientist notes that male rabbits that successfully mated with a particular female have bushier tails than those that were unsuccessful in mating with her. The researcher then alters the size of the tail in the successful males, making it smaller, and gives the unsuccessful males a larger tail. What effect is this likely to have on a receptive female?
   a. The female is likely to choose a male that was the originally successful male because she recognizes him from previous encounters.
   b. The female is likely to avoid both the altered males because they are now artificial.
   c. The female is likely to mate with the male with the largest tail.
   d. There will be no change because female rabbits are not selective in mating.

   ANS: C DIF: Difficult OBJ: Applied
   REF: The Genetics and Evolution of Behavior: The Evolution of Mating Patterns

140. Male mammals should maximize the _____ partner(s) while female members should maximize the _____ partner(s).
    a. number of; quality of a
    b. quality of a; number of
    c. attractiveness of; wealthiness of
    d. muscularity of; attractiveness of

    ANS: A DIF: Difficult OBJ: Conceptual
    REF: The Genetics and Evolution of Behavior: The Evolution of Mating Patterns

141. According to evolutionary psychology, which of the following is the best statement regarding the influence of genes and environment on human behavior?
    a. The genes are the predominant influence on behaviors such as mate selection.
    b. The environment and experience are the predominant influence on behaviors such as mate selection.
    c. Genes, the environment, and experiences all have interdependent influences on behaviors such as mate selection.
    d. Genes may only influence behavior that emerges out of environmental and social experiences to shape behaviors such as mate selection.

    ANS: C DIF: Difficult OBJ: Conceptual
    REF: The Genetics and Evolution of Behavior: The Evolution of Mating Patterns

142. Which of the following is NOT one of the areas of caution regarding applications of evolutionary theory to psychology, as described in your book?
    a. either-or-thinking about genetic influences
    b. believing that evolution makes organisms “better”
    c. believing that genes make a particular behavior occur
    d. all of the above

    ANS: D DIF: Easy OBJ: Factual
    REF: Some Final Thoughts: The Strengths and the Limits of Evolutionary Theorizing

CHAPTER 2: The Genetic and Evolutionary Roots of Behavior

CONCEPT MAP

I. Introduction

A. Best Ideas Have Worst Reputation

i. Global warming is an example of a scientific theory that has been given a bad reputation.

ii. Evolution has also received a poor reputation through misunderstanding and misinterpretation.

B. Evolution and Genetics

i. The theory of evolution has earned infamy over the years.

ii. Some individuals have developed unsavory applications for evolution.

iii. Evolution remains one of the best confirmed and established theories.

iv. Biological factors shape psychological functioning in many important ways.

II. Genetics

A. Genes and DNA

i. Cell Composition—cells are highly diverse but also highly similar

a. Most contain nucleus, chromosomes, and DNA.

B. Genes

i. DNA forms a twisted ladder or double helix.

ii. Four chemical subunits compose DNA—adenine, thymine, cytosine, and guanine, which combine in pairs.

a. Adenine always pairs with thymine; guanine always pairs with cytosine.

iii. A gene is a section of DNA molecule that describes the structure of a protein together with its control sequence.

iv. Humans have 23 pairs of chromosomes, including 2 sex chromosomes (XX or XY typically).

C. Gene Expression

i. A person's genome is composed of the same 46 chromosomes that contain the directions to make up most cells in the body.

ii. Gene expression describes how genes modify the biochemical environment inside the cell and turn specific genes on or off.
iii. Genes interact with other cells and with the environment.
iv. Genotype is the specific sequence of genes on each of its chromosomes.
v. Phenotype is what the organism actually is like.

D. Gene Transmission

i. Genes are biologically inherited.
ii. Egg cells and sperm cells contain only 23 chromosomes.

E. Interaction among Genes

i. Gregory Mendel was one of the first to describe the action of genes.
ii. If the paired genes are identical, the individual is homozygous for that gene; if the paired genes are different, the individual is heterozygous for that gene.
iii. Variations of a specific gene are called alleles of that gene.
iv. Some genetic traits are dominant; others are recessive.
v. Some inherited disorders are dominant gene effects; others are recessive gene effects.
vi. Some genes have incomplete dominance, such as the serotonin transporter gene.
vii. Polygenic inheritance: The majority of an organism's traits are influenced by many genes through a pattern called polygenic inheritance.

III. Evolution by Natural Selection

A. Evolution

i. Ultimate causes address the mechanisms by which a particular trait or behavior has helped members of a population survive and reproduce; proximate causes address the particular trait or behavior that helped an individual survive and reproduce.
ii. Darwin's many educational and personal experiences, including his propensity for collecting and his work on the SS *Beagle* highly influenced the development of his theory.
iii. Darwin noted that animals change and that their bodies and behavior modify over many generations. This is called transmutation or evolution.
iv. The naturalistic fallacy is the idea that anything natural is good. This idea is mistaken.

B. Genes and Evolution

i. There are three main ideas explaining the evolution of genes:

a. There is variation among individuals within a population.

b. Certain variations must survive and reproduce at a higher rate than the others.

c. Traits associated with the more successful trait must be passed from parents to offspring.

ii. How genes interact with the environment hinges on the organism's genome.

iii. Mutations or errors in replicating DNA allow greater variation of inherited traits.

iv. Evidence of genes and evolution may be found by examining many species.

C. Evidence for Evolution

i. Many people—perhaps as many as 40% of the population—do not accept the theory of evolution.

ii. Within the scientific community the theory of evolution is widely accepted.

iii. There is strong scientific evidence to support evolution and evolutionary processes.

IV. Genetics and Evolution of Behavior

A. Darwin believed that evolution applied to both the physical body and behavior.

B. Psychological and behavioral features possess phenotypes and genotypes, just like body structures; this provides flexibility regarding inherited behavioral and psychological traits.

C. Behavioral flexibility is amplified by the process of niche construction, a process in which organisms alter their environments and create their own circumstances through their behavior.

D. Evolution favors flexibility and learning.

E. Biological Roots of Smiling

i. Species-specific behavior is behavior that pertains to one particular species.

ii. Humans have specific ways of communicating; smiling is one of these behaviors.

iii. Smiling is species general. It is observable in virtually all members of our species.

iv. Smiling occurs in other species.

v. Humans and animals express several different smiles.

V. Genetics of Intelligence

A. *Intelligence is the capacity that allows people to acquire new knowledge and use it to draw conclusions, solve problems, and adapt to new circumstances.*
   i. Relatives have similar levels of intelligence.
   ii. Twin studies suggest that intelligence is somewhat inherited.
   iii. Identical twins are monozygotic; fraternal twins are dizygotic.
   iv. Identical twins show more similar intelligence than dizygotic twins.
   v. Environment may influence how inherited intelligence is expressed.

B. *Heritability is the extent to which genetic factors are responsible for differences in individuals.*
   i. The heritability ratio is calculated by dividing genetic variance by total phenotypic variance. Zero heritability suggests that the trait is not inherited. A heritability value of 1.0 suggests that the trait is completely inherited.
   ii. Heritability estimates do not tell us anything about genetic influences on a given individual's traits.

C. *Evolution of Intelligence*
   i. The environment of evolutionary adaptiveness (EEA) is an account of a trait's function and of the environment that was in place as the trait was evolving.
   ii. Some traits have obvious functions; other traits such as intelligence are more difficult to pinpoint.

D. *Evolution of Mating Patterns*
   i. Some species exhibit monogamy, a reproductive partnership between one male and one female. Other species show polygamy, whereby several females mate with one male, or polyandry, whereby several males mate with one female.
   ii. The different mating patterns may be understood in terms of ultimate causation and maximization of reproductive success.
   iii. Some researchers have examined human mating behavior from an evolutionary perspective.

a. The process of natural selection helps drive which choice of mate. Many females have high reproductive costs and often do the choosing.
b. Human mate choice is highly complex, but there appear to be several mate preferences across individuals and cultures.

E. Jealousy may be a behavior that has emerged through evolution. It may play a role in mate selection and parenting.

i. Paternity may play a role in the expression of jealousy.
ii. From an evolutionary perspective, men should be sensitive to the issues of paternity and have a preference for offspring who resemble them.
iii. This sensitivity to paternity may play a role in the treatment of offspring.

VI. Final Thoughts

A. Human behavior, thoughts, and feelings are likely influenced by evolution as well as the current environment.

B. Understanding evolution helps scientists better understand human behavior.

C. Understanding evolutionary processes must be a careful process, and scientists must be careful to avoid overinterpreting or overemphasizing a particular trait or behavior.