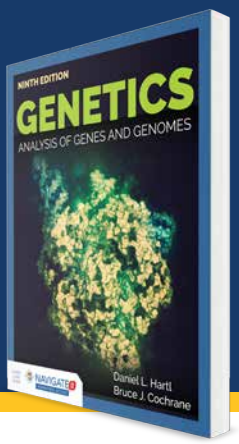

CHAPTER 1
STUDENT STUDY GUIDE TEST BANK

Genetics: Analysis of Genes and Genomes, Ninth Edition

Daniel L. Hartl and Bruce J. Cochrane

Multiple Choice

_____ **1. What happens if organisms of different species mate?**

A) They produce offspring that looks like either the mother or the father.

B) They produce hybrid progeny that die or that are sterile.

C) They produce hybrid progeny that have the strongest traits from each parent.

D) They produce offspring that are genotypically identical to one of the two parents.

_____ **2. Which of the following statements is incorrect? The genetic material must encode:**

A) information that will never be used.

B) information usually not used to direct the functioning of cellular processes.

C) information that is transmissible from generation to generation.

D) information that is highly conserved and unable to mutate.

_____ **3. Frederick Griffith designed an experiment to prove that:**

A) the R strain of *S. pneumoniae* was the deadly type.

B) the S strain of *S. pneumoniae* became transformed.

C) the genetic material can be transferred from a virus to a bacterium.

D) the genetic material can be transferred from one bacterial cell to another.

E) the genetic material is not protein but is instead DNA.

_____ **4. Griffith's 1928 experiment used bacteria of different strains, and:**

A) the S strains of the bacteria formed colonies with rough surfaces.

B) the R strains of the bacteria caused pneumonia.

C) the S strains of the bacteria had capsules that evaded the immune system of the host.

D) the R strains of the bacteria had capsules that evaded the immune system of the host.

_____ **5. In order to prove that DNA but not proteins are transferred to host cells during phage infection, Hershey and Chase used a _____ that incorporated its radioactive elements into the bacteria.**

A) ^{32}P-labeled phage

B) ^{32}S-labeled phage

C) ^{35}P-labeled phage

D) ^{35}S-labeled phage

_____ **6. Just like a polypeptide chain, a DNA strand has a polarity, which means that:**

A) it has a –COOH to –NH_2 directionality.

B) it interacts well with other polar molecules.

C) its strands are antiparallel.

D) it has a 5′ to 3′ directionality.

_____ **7. During DNA replication:**

A) a single DNA molecule gives rise to two identical molecules.

B) a single DNA molecule gives rise to an RNA molecule.

C) a single DNA molecule gives rise to two noncomplementary molecules.

D) two complementary DNA molecules create two noncomplementary DNA molecules.

_____ **8. If the sequence of nucleotides along the DNA strand is thought of as a string of letters on a piece of paper, then the genes could be envisioned as:**

A) the letters by themselves.

B) special characters between the words.

C) distinct words that form sentences.

D) the spacing between the words.

_____ **9. A proper therapy for patients affected by PKU would be:**

A) a blood transfusion.

B) a special diet.

C) a liver transplant.

D) phenylalanine supplements.

_____ **10. _____ identifies mutations that have defects in the same gene by bringing them together into the same cell.**

A) A complementation test

B) A radioactive probe

C) Complementary strands

D) Deletions or additions of nucleotides

_____ **11. Which of the following processes is irreversible?**

A) Information flow from RNA to proteins

B) Information flow from RNA to DNA

C) Information flow from DNA to RNA

D) The direction of DNA polymerase

_____ **12. Why is it believed that RNA was present in cells before DNA?**

A) Because RNA not only contains informational content, but also acts as a go-between molecule between DNA and proteins

B) Because RNA is shorter in size as compared to DNA, and therefore is simple and more motile

C) Because RNA is single-stranded most of the time

D) Because RNA is the genetic material of many viruses

_____ **13. In the case of the PAH mutation, where codon 408 in the PAH polypeptide chain is altered:**

A) tryptophan is substituted for arginine, and the produced enzyme has less than 3 percent of the activity of the normal enzyme.

B) tryptophan is substituted for arginine, and the produced enzyme has less than 30 percent of the activity of the normal enzyme.

C) arginine is substituted for tryptophan, and the produced enzyme has less than 3 percent of the activity of the normal enzyme.

D) arginine is substituted for tryptophan, and the produced enzyme has less than 30 percent of the activity of the normal enzyme.

_____ **14. Which of the following is not a principle structural difference between RNA and DNA?**

A) The sugar-phosphate backbone contains ribose rather than deoxyribose.

B) RNA contains the base uracil (U) instead of thymine (T).

C) RNA usually exists as a single strand, although any particular molecule of RNA may contain short regions of complementary base pairs that can come together to form duplexes.

D) The repeating unit of RNA consists of a sugar, a phosphate group, and one of the four bases, whereas in DNA it consists of a sugar, a phosphate group, and one of the five bases.

Short Answer

15. The scientist who discovered DNA in 1869 was _____.

_____

16. There were doubts that DNA was the actual genetic material because it was believed that DNA lacked the chemical _____ needed to encode instructions necessary to build a simple cell or organism.

_____

17. In 1952, Hershey and Chase worked with *E. coli* infected by the virus T2. They demonstrated that the DNA, and not protein, was the genetic material in *E. coli* as well as in T2 _____.

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18. Beadle and Tatum studied metabolic pathways in organisms in which one gene corresponds to _____.

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19. _____ is a macromolecule that contains both informational content and catalytic activity.

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20. The codon found in the _____ specifies the amino acid being added to a newly synthesized polypeptide chain.

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21. One strand of a DNA duplex has the base sequence 5′-TGCACTTTACGCCAT-3′. The base sequence of the complementary strand is _____.

True or False

_____ 22. True or false? The number of chromosomes in each cell may differ among various biological species.

_____ 23. True or false? The amount and kind of chromosomal proteins differ greatly from cell type to cell type.

_____ 24. True or false? Avery, MacLeod, and McCarty showed that the substance causing the transformation of S cells into R cells was DNA.

_____ 25. 2True or false? In 1950, Watson and Crick proposed that the DNA of a dead bacterium can transform a healthy bacterial cell.

_____ 26. True or false? Complementary base pairing is essential for replication.

_____ 27. True or false? Cells are largely made of proteins, which are responsible for most of the cell's metabolic activities.

_____ 28. True or false? Alkaptonuria is a disease caused by errors of metabolism in which abnormal substances are secreted in urine.

_____ 29. True or false? The central dogma refers to the fact that proteins are products of information encoded in RNA using a DNA intermediate.

30. In the following statements about double-stranded DNA, square brackets indicate the number of molecules. For example, [A] means the number of molecules of the base adenine, and [deoxyribose] means the number of molecules of 2′ deoxyribose. Classify each of the statements as true or false.

_____ a. [A] = [G]

_____ b. [A] = [C]

_____ c. [A] = [T]

_____ d. [A] [G] = [T] [C]

_____ e. [deoxyribose] = [phosphate]

Essay

31. Is it correct to say that DNA is always the genetic material? Why?

32. Define the following terms: replication, transcription, translation, mutation, natural selection.

33. What is the main difference between transmission genetics and molecular genetics?

Matching

34. Match the following macromolecules with their descriptions:

_____ 1. Its monomers are amino acids and it can have a tertiary or quaternary structure

_____ 2. It has been discovered to have catalytic characteristics

_____ 3. It has a collection of 4 monomers, and it is double stranded

_____ 4. It can represent a protein

a. DNA

b. Polypeptide chain

c. RNA

d. Proteins

35. Match the appropriate monomers with the corresponding macromolecules:

_____ 1. Amino acid

_____ 2. Glycerol

_____ 3. Nucleotides

_____ 4. Monosaccharides

a. Lipids

b. Polysaccharides

c. DNA

d. Proteins