

CHAPTER 11.1—11.5: DNA and its Role in Heredity

1. After Morgan and fellow scientists developed the Chromosomal Theory of Inheritance, the search was on for the chemical mechanism of inheritance. What are the two components of the chromosome?

2. From initial logic, which component would be the most likely candidate for the genetic material and why?

3. What did Griffith accomplish with bacteria?

4. What did Avery, MacLeod and McCarty accomplish with bacteria?

5. Define transformation.

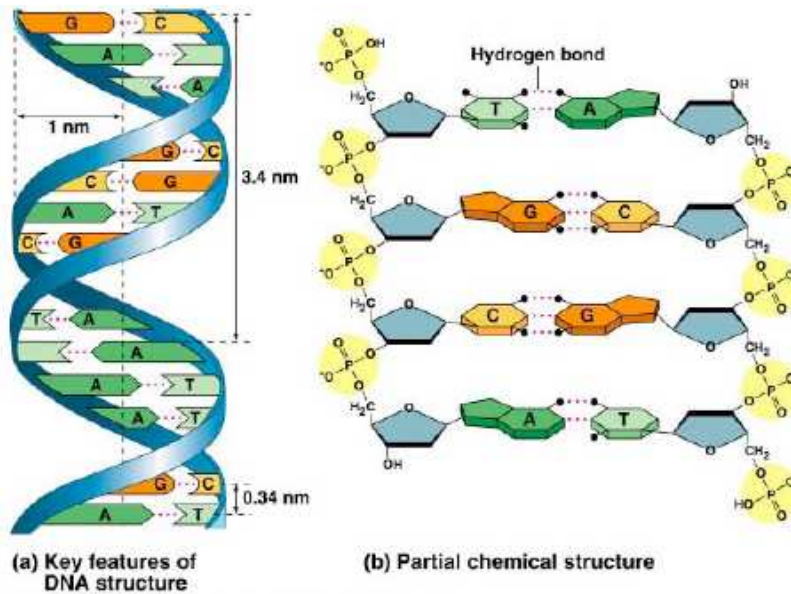
6. What did the experiments done by Alfred Hershey and Martha Chase show?

7. What are Chargaff's rules?

8. If a species has 35% adenine in its DNA, determine the percent of the other three bases.

9. What was the role of Maurice Wilkins and Rosalind Franklin in determining the structure of DNA?

10. Use the diagram to describe the structure of DNA. Include several comments.



11. What is the advantage of the double stranded aspect of the DNA?

12. Describe what the Meselson-Stahl experiment helped to determine.

13. Which model of DNA replication is accepted from the above experiment? Explain what that means.

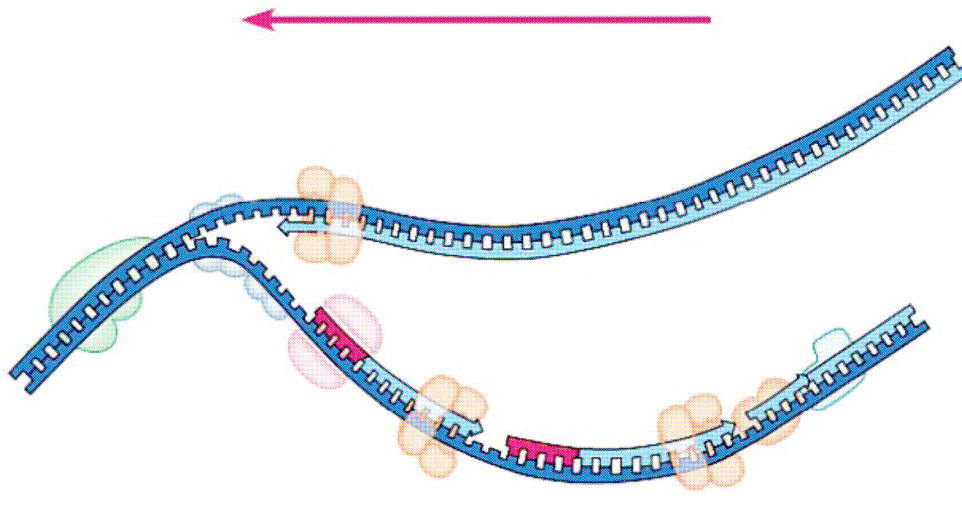
14. What happens at the DNA replication fork?

15. Make a list of the six enzymes/proteins involved in replication and their role.

- a. _____
- b. _____
- c. _____
- d. _____
- e. _____
- f. _____

16. Why does the DNA have to add nucleotides in the 5' to 3' direction?

17. Label the diagram of DNA replication. Include the directions or replication and the terms.



Name: _____

Note Set 27

18. Describe the "priming of the DNA" before replication.

19. List some of the steps involved in DNA repair.

20. What is the problem that occurs at the ends of the chromosome during replication?

21. What is a telomere and its role in cell division.

22. Why is telomerase an active area in cancer research?

23. Describe the basic process of PCR.

24. How does the shot-gun approach differ from the whole-genome sequencing?

END OF CHAPTER 11 MULTIPLE CHOICE

1. Griffith's studies of *Streptococcus pneumoniae*
 - A) showed that DNA is the genetic material of bacteria.
 - B) showed that DNA is the genetic material of bacteriophages.
 - C) demonstrated the phenomenon of bacterial transformation.
 - D) proved that prokaryotes reproduce sexually.
 - E) proved that protein is not the genetic material.

2. In the Hershey–Chase experiment,
 - A) DNA from parent bacteriophages appeared in progeny bacteriophages.
 - B) most of the phage DNA never entered the bacteria.
 - C) more than three-fourths of the phage protein appeared in progeny phages.
 - D) DNA was labeled with radioactive sulfur.
 - E) DNA formed the coat of the bacteriophages.

3. Which statement about complementary base pairing is not true?
 - A) It plays a role in DNA replication.
 - B) In DNA, T pairs with A.
 - C) Purines pair with purines, and pyrimidines pair with pyrimidines.
 - D) In DNA, C pairs with G.
 - E) The base pairs are of equal length.

4. In semiconservative replication of DNA,
 - A) the original double helix remains intact and a new double helix forms.
 - B) the strands of the double helix separate and act as templates for new strands.
 - C) polymerization is catalyzed by RNA polymerase.
 - D) polymerization is catalyzed by a double-helical enzyme.
 - E) DNA is synthesized from amino acids.

5. Which of the following does not occur during DNA replication?
 - A) Unwinding of the parent double helix
 - B) Formation of short pieces that are connected by DNA ligase
 - C) Complementary base pairing
 - D) Use of a primer
 - E) Polymerization in the 3'-to-5' direction

6. The primer used for DNA replication
- A) is a short strand of RNA added to the 3' end.
 - B) is present only once on the leading strand.
 - C) remains on the DNA after replication.
 - D) ensures that there will be a free 5' end to which nucleotides can be added.
 - E) is added to only one of the two template strands.
7. One strand of DNA has the sequence 5'-ATTCCG-3'. The complementary strand for this is
- A) 5'-TAAGGC-3'
 - B) 5'-ATTCCG-3'
 - C) 5'-ACCTTA-3'
 - D) 5'-CGGAAT-3'
 - E) 5'-GCCTTA-3'
8. The role of DNA ligase in DNA replication is to
- A) add more nucleotides to the growing strand one at a time.
 - B) open up the two DNA strands to expose template strands.
 - C) ligate base to sugar to phosphate in a nucleotide.
 - D) bond Okazaki fragments to one another.
 - E) remove incorrectly paired bases.
9. The polymerase chain reaction
- A) is a method for sequencing DNA.
 - B) is used to transcribe specific genes.
 - C) amplifies specific DNA sequences.
 - D) does not require DNA replication primers.
 - E) uses a DNA polymerase that denatures at 55°C.
10. What is the correct order for the following events in excision repair of DNA?
- (1) Base-paired DNA is made complementary to the template
 - (2) Damaged bases are recognized
 - (3) DNA ligase seals the new strand to existing DNA
 - (4) Part of a single strand is excised
- A) 1234
 - B) 2134
 - C) 2413
 - D) 3421
 - E) 4231