

## RAVEN CHAPTER 14 GUIDED NOTES: DNA, THE GENETIC MATERIAL

### Raven 9<sup>th</sup> edition

Throughout the early 1900s, a succession of scientists performed experiments to clarify where the genetic information is stored in a cell and to determine specifically which molecule served as the hereditary material. This chapter reviews those experiments and their contributions.

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?

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

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3. What did Frederick Griffith's experiments show?

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4. Define transformation.

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5. What did the experiments of Oswald Avery, Colin MacLeod and Maclyn McCarty show?

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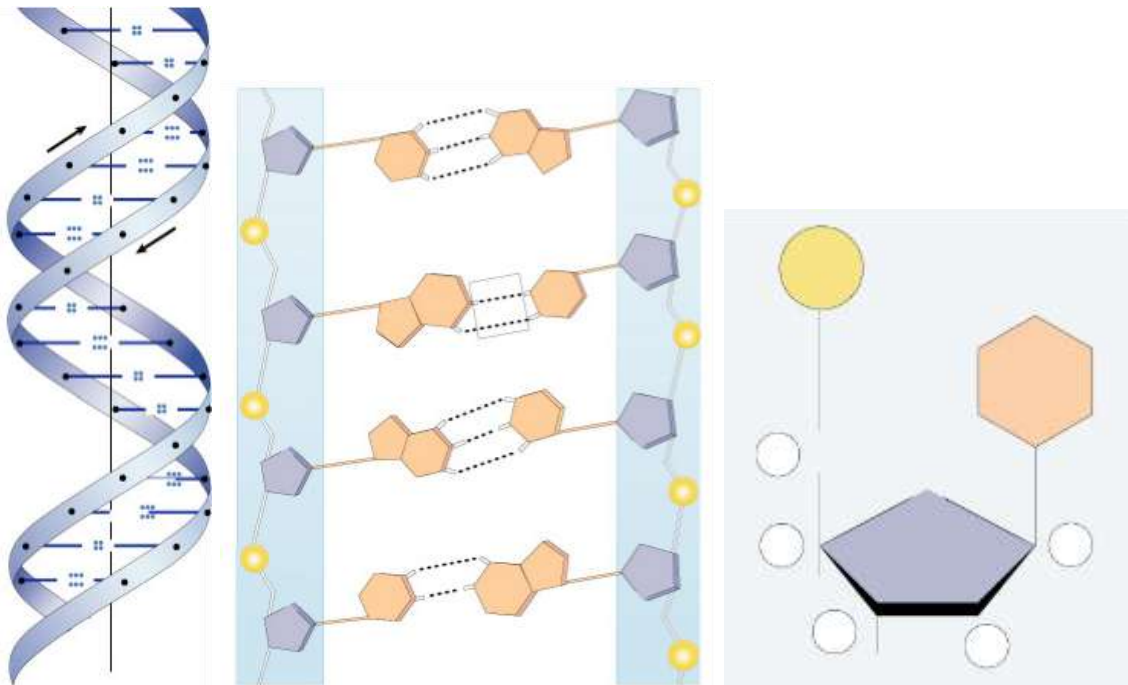
6. What did the experiments of Alfred Hershey and Martha Chase show?

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7. Use the following diagrams to describe the structure of DNA. Include comments about:

- the 3 main elements of a nucleotide
- the two classes of nitrogenous bases and which bases belong in each class
- the bonding within the molecule
- the numbering of carbons within the molecule
- the structural arrangement of the molecule



8. What are Chargaff's rules?

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

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10. Who is credited with the discovery of the structure of DNA? \_\_\_\_\_

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

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12. Explain the antiparallel configuration of the DNA molecule

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13. What is the advantage of the double-stranded (complementarity) aspect of the DNA?

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14. What did the experiments of Matthew Meselson and Franklin Stahl show?

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15. Make a list of the enzymes and “helper” molecules involved in replication and their role.

a. \_\_\_\_\_

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b. \_\_\_\_\_

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c. \_\_\_\_\_

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d. \_\_\_\_\_

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e. \_\_\_\_\_

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f. \_\_\_\_\_

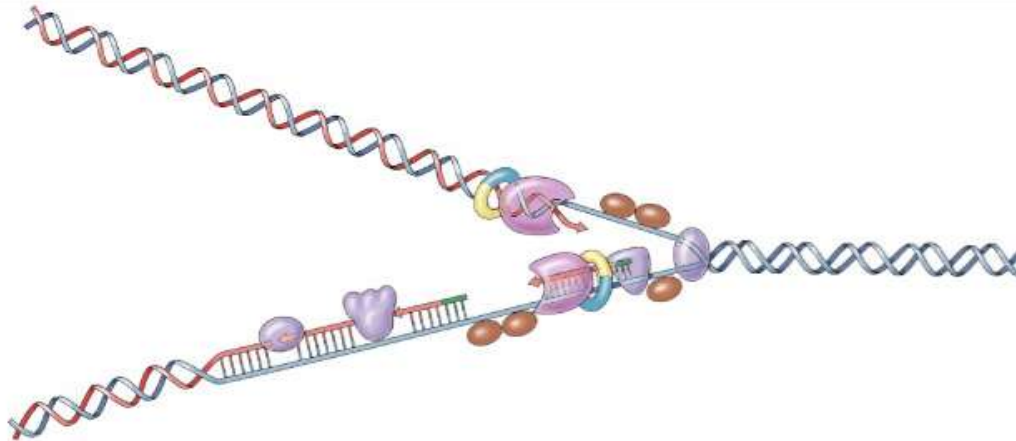
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16. Why does the DNA have to add nucleotides in the 5' to 3' direction?

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



18. Describe the role of the primer in DNA replication.

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19. Explain the difference between the leading and the lagging strand. What are Okazaki fragments?

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20. How do eukaryotes solve the challenge of having to copy a lot more DNA than prokaryotes during cell division?

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21. How did diseases involving metabolic pathways lead to hypotheses about the nature of genes?

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22. Identify some genetic diseases that occur along metabolic pathways.

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23. What did the experiments of George Beadle and Edward Tatum show?

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24. What was Beadle and Tatum's hypothesis regarding enzymes?

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25. How has that hypothesis been modified?

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26. What was Fred Sanger's great scientific achievement? (BTW, this was only Sanger's first of *two* Nobel Prize winning scientific achievements)

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27. What scientific understanding came out of the works of Fred Sanger and Vernon Ingram?

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