

Replication of DNA

KEY IDEAS

As you read this section, keep these questions in mind:

- How does DNA replicate, or make a copy of itself?
- What are the roles of proteins in DNA replication?
- How is DNA replication different in prokaryotes and eukaryotes?

READING TOOLBOX

Summarize As you read this section, underline the main ideas. When you finish reading, write an outline of the section using the underlined ideas.

Critical Thinking

1. Apply Concepts A particular DNA molecule contains 10,000 base pairs. How many base pairs will be in each of the two new strands formed during DNA replication?

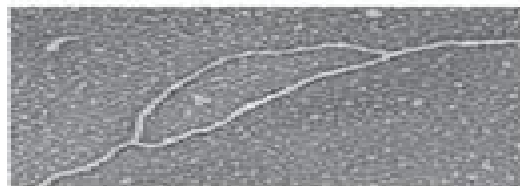
LOOKING CLOSER

2. Identify Label the two replication forks on the figure.

How Is DNA Copied?

When cells divide, each new cell contains an exact copy of the DNA in the original cell. That happens because DNA consists of two strands of complementary base pairs. If the two strands are separated, each strand serves as a pattern to make a new complementary strand. So, a single DNA molecule can be used as a *template*, or pattern, to produce two identical DNA molecules. This process of **DNA replication** involves three steps.

First, the DNA double helix unwinds and forms the Y shapes shown below. These Y shapes are called *replication forks*. At the replication forks, the complementary DNA strands separate from each other.



Y-shaped replication forks form where two strands of DNA separate.

Next, new nucleotides are added at each fork. The nucleotides form new base pairs according to the base-pairing rules. For example, adenine on an original strand will pair with thymine on a new strand. In this way, the original two strands act as templates for two new strands. Two new double helices form as more nucleotides are added.

Finally, the two new DNA molecules split apart. Each molecule consists of one strand of the original DNA and one new strand. The nucleotide sequences in both new DNA molecules are identical to each other and to the original DNA molecule.

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Douglas Marsland



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Holt Biology ,2004 **Cr 9 DNA** Holt Rinehart & Winston,Holt, Rinehart and Winston Staff,2004 *Holt Biology* Rob DeSalle,Holt Rinehart and Winston,2008 Holt Biology Student Edition 2008 **Holt Biology Chapter 20 Resource File: Viruses and Bacteria** Holt Rinehart & Winston,Holt, Rinehart and Winston Staff,2004 *Biology* Holt Rinehart & Winston,Holt, Rinehart and Winston Staff,2004 **Holt Biology: Principles and Explorations** Holt Rinehart & Winston,Holt, Rinehart and Winston Staff,1997-03 **Chapter Resource 10 How Proteins/Made Biology** Holt Rinehart & Winston,Holt, Rinehart and Winston Staff,2004 Holt Biology Holt Rinehart & Winston,2003-08 Holt Biology: Meiosis and sexual reproduction ,2003 Modern Biology Albert Towle,1989 **The Organic Chemistry of Drug Design and Drug Action** Richard B. Silverman,Mark W. Holladay,2014-03-29 The Organic Chemistry of Drug Design and Drug Action Third Edition represents a unique approach to medicinal chemistry based on physical organic chemical principles and reaction mechanisms that rationalize drug action which allows reader to extrapolate those core principles and mechanisms to many related classes of drug molecules This new edition includes updates to all chapters including new examples and references It reflects significant changes in the process of drug design over the last decade and preserves the successful approach of the previous editions while including significant changes in format and coverage This text is designed for undergraduate and graduate students in chemistry studying medicinal chemistry or pharmaceutical chemistry research chemists and biochemists working in pharmaceutical and biotechnology industries Updates to all chapters including new examples and references Chapter 1 Introduction Completely rewritten and expanded as an overview of topics discussed in detail throughout the book Chapter 2 Lead Discovery and Lead Modification Sections on sources of compounds for screening including library collections virtual screening and computational methods as well as hit to lead and scaffold hopping expanded sections on sources of lead compounds fragment based lead discovery and molecular graphics and deemphasized solid phase synthesis and combinatorial chemistry Chapter 3 Receptors Drug receptor interactions cation p and halogen bonding atropisomers case history of the insomnia drug suvorexant Chapter 4 Enzymes Expanded sections on enzyme catalysis in drug discovery and enzyme synthesis Chapter 5 Enzyme Inhibition and Inactivation New case histories for competitive inhibition the epidermal growth factor receptor tyrosine kinase inhibitor erlotinib and Abelson kinase inhibitor imatinib for transition state analogue inhibition the purine nucleoside phosphorylase inhibitors forodesine and DADMe ImmH as well as the mechanism of the multisubstrate analog inhibitor isoniazid for slow tight binding inhibition the dipeptidyl peptidase 4 inhibitor saxagliptin Chapter 7 Drug Resistance and Drug Synergism This new chapter includes topics taken from two chapters in the previous edition with many new examples Chapter 8 Drug Metabolism Discussions of toxicophores and reactive metabolites Chapter 9 Prodrugs and Drug Delivery Systems Discussion of antibody drug conjugates *Holt Biology* Rob DeSalle,2008 *Teacher's Guide to the Modern Biology Program* James Howard Otto,Albert Towle,Elizabeth H.

Crider,1965 Cell Biology of Physarum and Didymium V1 Henery Aldrich,2012-12-02 Cell Biology of Physarum and Didymium Volume I Organisms Nucleus and Cell Cycle presents important experimental research on Physarum and Didymium for developmental and cellular studies This book is organized into four parts encompassing 12 chapters that summarize the taxonomy biological activities genetics and cell cycle of these organisms The opening part covers two chapters on morphology taxonomy phylogeny biosystematics and evolutionary implications of Physarum and Didymium species This is followed by discussions on the biological aspects of these species These include periodic events of the mitotic cycle in Physarum polycephalum The general characteristics of chemoreception at the membrane level using plasmodium as a model organism as well as the structure and motility of plasmodium are also included The third part of the book focuses on genetic analysis of plasmodium development and the discovery of techniques for the genetic manipulation of P polycephalum Progress in the genetic analysis of other processes is summarized The concluding part examines the morphological evolution of the nucleus during the mitotic cycle together with the results from ultracytochemical and radioautographic studies It also includes a discussion on DNA organization and replication in P polycephalum Finally the synthesis and degradation of RNA in Physarum and the relationship of these biochemical processes to mitotic cycle and differentiation are tackled in the concluding chapter The book will serve as a frequent single reference source to brief cell biologists on the primary research on Physarum and Didymium It will be a good source for graduate students in cell biology and perhaps in other graduate courses *Principles of Modern Biology* Douglas Marsland,1957 *Molecular Biology of the Gene* James D. Watson,1976 The mendelian view of the world Cells obey the laws of chemistry A chemist's look at the bacterial cell The importance of weak chemical interactions coupled reactions and group transfers The concept of template surfaces The arrangement of genes on chromosomes Gene structure and function The replication of DNA The transcription of RNA UPON DNA templates Involvement of RNA in protein synthesis The genetic code Regulation of protein synthesis and function The replication of viruses The essence of being eucaryotic Embryology at the molecular level The control of cell proliferation The problem of antibody synthesis The viral origins of cancer *Modern Biology* James Howard Otto,Albert Towle,1977 *Boyd's Introduction to the Study of Disease* William Boyd,Huntington Sheldon,1988 **Cell Biology of Physarum and Didymium: Organisms, nucleus, and cell cycle** Henry C. Aldrich,John W. Daniel,1982 V 1 Organisms nucleus and cell cycle v 2 Differentiation metabolism and methodology **Introductory Molecular Genetics** JoAnn Edwards-Moulds,1986

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Table of Contents Section The Replication Of Dna Holt Biology Answers

1. Understanding the eBook Section The Replication Of Dna Holt Biology Answers
 - The Rise of Digital Reading Section The Replication Of Dna Holt Biology Answers
 - Advantages of eBooks Over Traditional Books
2. Identifying Section The Replication Of Dna Holt Biology Answers
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Section The Replication Of Dna Holt Biology Answers
 - User-Friendly Interface

4. Exploring eBook Recommendations from Section The Replication Of Dna Holt Biology Answers
 - Personalized Recommendations
 - Section The Replication Of Dna Holt Biology Answers User Reviews and Ratings
 - Section The Replication Of Dna Holt Biology Answers and Bestseller Lists
5. Accessing Section The Replication Of Dna Holt Biology Answers Free and Paid eBooks
 - Section The Replication Of Dna Holt Biology Answers Public Domain eBooks
 - Section The Replication Of Dna Holt Biology Answers eBook Subscription Services
 - Section The Replication Of Dna Holt Biology Answers Budget-Friendly Options
6. Navigating Section The Replication Of Dna Holt Biology Answers eBook Formats
 - ePub, PDF, MOBI, and More
 - Section The Replication Of Dna Holt Biology Answers Compatibility with Devices
 - Section The Replication Of Dna Holt Biology Answers Enhanced eBook Features
7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of Section The Replication Of Dna Holt Biology Answers
 - Highlighting and Note-Taking Section The Replication Of Dna Holt Biology Answers
 - Interactive Elements Section The Replication Of Dna Holt Biology Answers
8. Staying Engaged with Section The Replication Of Dna Holt Biology Answers
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Section The Replication Of Dna Holt Biology Answers
9. Balancing eBooks and Physical Books Section The Replication Of Dna Holt Biology Answers
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Section The Replication Of Dna Holt Biology Answers
10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
11. Cultivating a Reading Routine Section The Replication Of Dna Holt Biology Answers
 - Setting Reading Goals Section The Replication Of Dna Holt Biology Answers
 - Carving Out Dedicated Reading Time

12. Sourcing Reliable Information of Section The Replication Of Dna Holt Biology Answers
 - Fact-Checking eBook Content of Section The Replication Of Dna Holt Biology Answers
 - Distinguishing Credible Sources
13. Promoting Lifelong Learning
 - Utilizing eBooks for Skill Development
 - Exploring Educational eBooks
14. Embracing eBook Trends
 - Integration of Multimedia Elements
 - Interactive and Gamified eBooks

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