

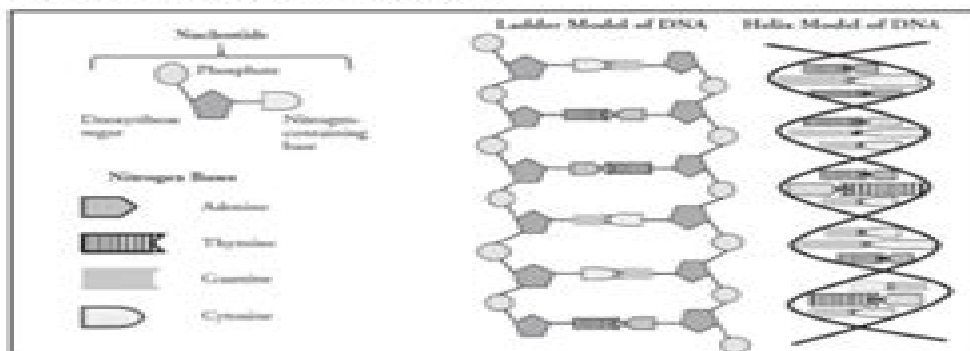
POGIL – DNA Structure and Replication

How is genetic information stored and copied?

Why?

Deoxyribonucleic acid or **DNA** is the molecule of heredity. It contains the genetic blueprint for life. For organisms to grow and repair damaged cells, each cell must be capable of accurately copying itself. So how does the structure of DNA allow it to copy itself so accurately?

Model 1 – The Structure of DNA



1. Refer to the diagram in Model 1.

- What are the three parts of a nucleotide?
- What kind of sugar is found in a nucleotide?
- Which nucleotide component contains nitrogen?
- Name the four nitrogen bases shown in Model 1.

2. DNA is often drawn in a "ladder model." Locate this drawing in Model 1.

- Circle a single nucleotide on each side of the ladder model of DNA.

- What part(s) of the nucleotides make up the rungs of the "ladder"?
- What parts of the nucleotides make up the sides (backbone) of the "ladder"?
- Look at the bottom and top of the "ladder" in Model 1. Are the rungs parallel (the ends of the strands match) or antiparallel (the ends of the strands are opposites)? Describe what antiparallel means.
- Label the 5' and 3' end of each strand in the ladder model of DNA in Model 1.

3. The two strands of DNA are held together with hydrogen bonds between the nitrogen bases. These are weak bonds between polar molecules. Which bases are paired together with hydrogen bonds? How many hydrogen bonds connect the bases of each pair? Draw and label a diagram showing each base pairing.

READ: Erwin Chargaff (1906–2002), an Austrian-American biochemist, investigated the ratio of nucleotide bases found in the DNA from a variety of organisms. From his research, as well as research by Rosalind Franklin and Maurice Wilkins, Watson and Crick developed the complementary base-pair rule during their race to discover the structure of DNA. The complementary base-pair rule states that adenine and thymine form pairs across two strands, and guanine and cytosine form pairs across two strands.

4. Fill in the complementary bases on the strand below according to the base-pair rule.

5' - A T C C A G C G G T C A A - 3'

5. The proportions of the bases are consistent within a species; however, they do vary between species. Using the base-pair rules, complete the following table to show the percentage of each type of base in the three different organisms.

| Organism | Percentage of each type of base | | | |
|----------|---------------------------------|---------|----------|---------|
| | Adenine | Guanine | Cytosine | Thymine |
| Human | | 31 | | 19 |
| Cow | 28 | | 22 | |
| Salmon | 21 | | | |

Pogil Ap Bio Replication

J. Julian Blow



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POGIL Shawn R. Simonson, 2023-07-03 Process Oriented Guided Inquiry Learning POGIL is a pedagogy that is based on research on how people learn and has been shown to lead to better student outcomes in many contexts and in a variety of academic disciplines Beyond facilitating students mastery of a discipline it promotes vital educational outcomes such as communication skills and critical thinking Its active international community of practitioners provides accessible educational development and support for anyone developing related courses Having started as a process developed by a group of chemistry professors focused on helping their students better grasp the concepts of general chemistry The POGIL Project has grown into a dynamic organization of committed instructors who help each other transform classrooms and improve student success develop curricular materials to assist this process conduct research expanding what is known about learning and teaching and provide professional development and collegiality from elementary teachers to college professors As a pedagogy it has been shown to be effective in a variety of content areas and at different educational levels This is an introduction to the process and the community Every POGIL classroom is different and is a reflection of the uniqueness of the particular context the institution department physical space student body and instructor but follows a common structure in which students work cooperatively in self managed small groups of three or four The group work is focused on activities that are carefully designed and scaffolded to enable students to develop important concepts or to deepen and refine their understanding of those ideas or concepts for themselves based entirely on data provided in class not on prior reading of the textbook or other introduction to the topic The learning environment is structured to support the development of process skills such as teamwork effective communication information processing problem solving and critical thinking The instructor s role is to facilitate the development of student concepts and process skills not to simply deliver content to the students The first part of this book introduces the theoretical and philosophical foundations of POGIL pedagogy and summarizes the literature demonstrating its efficacy The second part of the book focusses on implementing POGIL covering the formation and effective management of student teams offering guidance on the selection and writing of POGIL activities as well as on facilitation teaching large classes and assessment The book concludes with examples of implementation in STEM and non STEM disciplines as well as guidance on how to get started Appendices provide additional resources and information about The POGIL Project

DNA Replication Judith L. Campbell, 1995-10-11 The critically acclaimed laboratory standard for forty years Methods in Enzymology is one of the most highly respected publications in the field of biochemistry Since 1955 each volume has been eagerly awaited frequently consulted and praised by researchers and reviewers alike More than 250 volumes have been published all of them still in print and much of the material is relevant even today truly an essential publication for researchers in all fields of life sciences Key Features Includes descriptions of functional structural kinetic and genetic methods for analyzing major enzymes of DNA replication Describes strategies for studying interactions of these

proteins during replication Provides comprehensive descriptions of uses of prokaryotic and eukaryotic crude in vitro replication systems and reconstitution of such systems from purified proteins Includes methods for analyzing DNA replication in vivo

DNA Replication Herve Seligmann, 2011-08-01 The study of DNA advanced human knowledge in a way comparable to the major theories in physics surpassed only by discoveries such as fire or the number zero However it also created conceptual shortcuts beliefs and misunderstandings that obscure the natural phenomena hindering its better understanding The deep conviction that no human knowledge is perfect but only perfectible should function as a fair safeguard against scientific dogmatism and enable open discussion With this aim this book will offer to its readers 30 chapters on current trends in the field of DNA replication As several contributions in this book show the study of DNA will continue for a while to be a leading front of scientific activities

Eukaryotic DNA Replication J. Julian Blow, 1996 DNA replication is an area of intense research effort which has recently yielded fascinating new insights into the phenomenon In this book leading researchers review this rapidly advancing field The book begins with reviews of the molecular and genetic components of the replication machinery and builds into a detailed picture of how the replication process is regulated within the cell cycle Topics include the initiation of replication origin recognition the enzymology of the replication fork the use of SV40 to identify key components of the replication machinery and how replication is co ordinated with other cell cycle events in Xenopus cell free extracts and in budding and fission yeasts Eukaryotic DNA Replication is a unique and very timely description of the latest research findings in this key subject area It is essential reading for all researchers and advanced undergraduates interested in the topic

DNA Replication Hisao Masai, Marco Foiani, 2018-01-22 This book reviews the latest trends and future directions of DNA replication research The contents reflect upon the principles that have been established through the genetic and enzymatic studies of bacterial viral and cellular replication during the past decades The book begins with a historical overview of the studies on eukaryotic DNA replication by Professor Thomas Kelly a pioneer of the field The following chapters include genome wide studies of replication origins and initiation factor binding as well as the timing of DNA replications mechanisms of initiation DNA chain elongation and termination of DNA replication the structural basis of functions of protein complexes responsible for execution of DNA replication cell cycle dependent regulation of DNA replication the nature of replication stress and cells strategy to deal with the stress and finally how all these phenomena are interconnected to genome instability and development of various diseases By reviewing the existing concepts ranging from the old principles to the newest ideas the book gives readers an opportunity to learn how the classical replication principles are now being modified and new concepts are being generated to explain how genome DNA replication is achieved with such high adaptability and plasticity With the development of new methods including cryoelectron microscopy analyses of huge protein complexes single molecular analyses of initiation and elongation of DNA replication and total reconstitution of eukaryotic DNA replication with purified factors the field is enjoying one of its most exciting moments and this highly timely

book conveys that excitement to all interested readers **DNA Replication Across Taxa** ,2016-05-27 DNA Replication Across Taxa the latest volume in The Enzymes series summarizes the most important discoveries associated with DNA replication Contains contributions from leading authorities Informs and updates on all the latest developments in the field of enzymes *DNA Replication* Roger Lionel Poulter Adams,1991 In Focus is a series of books specifically written for students facing the problem of keeping up to date with key areas in biology and medicine Each title presents the very latest information in a clear and accessible format These book will particularly complement course work providing an in depth knowledge of the topic Molecular Themes in DNA Replication Lynne Suzanne Cox,2009 Written by leading experts this learned but accessible book highlights the latest work on eukaryotic DNA replication **DNA Replication, Recombination and Repair** ,1995 DNA Replication Melvin L. DePamphilis,2002 **DNA Replication, Recombination, and Repair** Fumio Hanaoka,Kaoru Sugasawa,2016-01-29 This book is a comprehensive review of the detailed molecular mechanisms of and functional crosstalk among the replication recombination and repair of DNA collectively called the 3Rs and the related processes with special consciousness of their biological and clinical consequences The 3Rs are fundamental molecular mechanisms for organisms to maintain and sometimes intentionally alter genetic information DNA replication recombination and repair individually have been important subjects of molecular biology since its emergence but we have recently become aware that the 3Rs are actually much more intimately related to one another than we used to realize Furthermore the 3R research fields have been growing even more interdisciplinary with better understanding of molecular mechanisms underlying other important processes such as chromosome structures and functions cell cycle and checkpoints transcriptional and epigenetic regulation and so on This book comprises 7 parts and 21 chapters Part 1 Chapters 1 3 DNA Replication Part 2 Chapters 4 6 DNA Recombination Part 3 Chapters 7 9 DNA Repair Part 4 Chapters 10 13 Genome Instability and Mutagenesis Part 5 Chapters 14 15 Chromosome Dynamics and Functions Part 6 Chapters 16 18 Cell Cycle and Checkpoints Part 7 Chapters 19 21 Interplay with Transcription and Epigenetic Regulation This volume should attract the great interest of graduate students postdoctoral fellows and senior scientists in broad research fields of basic molecular biology not only the core 3Rs but also the various related fields chromosome cell cycle transcription epigenetics and similar areas Additionally researchers in neurological sciences developmental biology immunology evolutionary biology and many other fields will find this book valuable

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