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Molecular Biology of the Cell **Replication of Viral and Cellular Genomes** Cell Biology A Comprehensive Treatise V2 **DNA Replication in Eukaryotic Cells** The Replication of Adenovirus Type 5 DNA **Meselson, Stahl, and the Replication of DNA The Role of Mini Zinc-Finger Protein in the Replication of the AIDS Virus Proteins Involved in DNA Replication The Replication of Edenovirus Type 5 DNA** *DNA Replication, Recombination, and Repair* **The Regulation of DNA Replication and Transcription DNA Replication Control in Microbial Cell Factories Genome Duplication** The Replication of the Father Serra Statue **Concepts of Biology Reproducibility and Replicability in Science DNA Replication DNA REPLICATION IN PLANTS** *Initiation of the Replication of Single-stranded DNA by Escherichia Coli DNA Polymerase* Eukaryotic DNA Replication **Factors Controlling the Replication of Human Leucocytes in Vitro** Molecular Themes in DNA Replication *Technique for the Replication of Aerosols* **The DNA Replication-Repair Interface** *A Preferred Origin for the Replication of Lambda DNA* DNA Replication **Investigations about the Replication of Chromatin Cell Cycle Responses to Aberrant Replication Licensing A Cellular Protein Required for the Replication of SV40 DNA** *Determination of the Sequence Requirements for the Replication of Human Papillomavirus Type 18 DNA* Mechanism and Regulation of DNA Replication **Properties of SV40 Large T Antigen Involved in the Replication of SV40 DNA The Replication of DNA in Escherichia Coli Following Irradiation with Ultraviolet Light The Replication of Mouse Mitochondrial DNA The Replication of Adenovirus Type 5 DNA The Replication of Reovirus in Normal and Transformed Cells** Some Early Events in the Replication of T4 Bacteriophage DNA **Molecular Processing of Replication Intermediates in Escherichia Coli After DNA Damage New Methods for the Replication of Oligodeoxynucleotides** *The Replication of Kinetoplast Maxicircle DNA*

Cell Biology, A Comprehensive Treatise, Volume 2: The Structure and Replication of Genetic Material is mainly about the structure and replication of genetic material in both the nucleus and cytoplasmic organelles. This volume is part of the first four volumes that establish a firm foundation regarding issues of cell structure and function. These issues include cell reproduction, differentiation, and cell-to-cell interactions. This book is divided into nine chapters. Each chapter deals extensively with chromosomes – its physical, genetic, and chemical structures. In addition, this book explains the replication of chromosomes in terms of the cell cycle, as well as their coding capacity. It also discusses the functional organization (structure and levels) of the chromosomes. The concluding chapters present the DNA replication molecular principles and enzymatic machinery. Furthermore, this book explains DNA repair and its relationship to various biological endpoints. The authors of this book reasonably explain and emphasize already established facts and concepts in terms that are relatively easy to understand. Undergraduate and graduate students, teachers, researchers, scientists, and others interested or in need of information regarding cell biology will find this book of great use. Concepts of Biology is designed for the single-semester introduction to biology course for non-science majors, which for many students is their only college-level science course. As such, this course represents an important opportunity for students to develop the necessary knowledge, tools, and skills to make informed decisions as they continue with their lives. Rather than being mired down with facts and vocabulary, the typical non-science major student needs information presented in a way that is easy to read and understand. Even more importantly, the content should be meaningful. Students do much better when they understand why biology is relevant to their everyday lives. For these reasons, Concepts of Biology is grounded on an evolutionary basis and includes exciting features that highlight careers in the biological sciences and everyday applications of the concepts at hand.We also strive to show the interconnectedness of topics within this extremely broad discipline. In order to meet the needs of today's instructors and students, we maintain the overall organization and coverage found in most syllabi for this course. A strength of Concepts of Biology is that instructors can customize the book, adapting it to the approach that works best in their classroom. Concepts of Biology also includes an innovative art program that incorporates critical thinking and clicker questions to help students understand--and apply--key concepts. One of the pathways by which the scientific community confirms the validity of a new scientific discovery is by repeating the research that produced it. When a scientific effort fails to independently confirm the computations or results of a previous study, some fear that it may be a symptom of a lack of rigor in science, while others argue that such an observed inconsistency can be an important precursor to new discovery. Concerns about reproducibility and replicability have been expressed in both scientific and popular media. As these concerns came to light, Congress requested that the National Academies of Sciences, Engineering, and Medicine conduct a study to assess the extent of issues related to reproducibility and replicability and to offer recommendations for improving rigor and transparency in scientific research. Reproducibility and Replicability in Science defines reproducibility and replicability and examines the factors that may lead to non-reproducibility and non-replicability in research. Unlike the typical expectation of reproducibility between two computations, expectations about replicability are more nuanced, and in some cases a lack of replicability can aid the process of scientific discovery. This report provides recommendations to researchers, academic institutions, journals, and funders on steps they can take to improve reproducibility and replicability in science. In 1957 two young scientists, Matthew Meselson and Frank Stahl, produced a landmark experiment confirming that DNA replicates as predicted by the double helix structure Watson and Crick had recently proposed. It also gained immediate renown as a “most beautiful” experiment whose beauty was tied to its simplicity. Yet the investigative path that led to the experiment was anything but simple, Frederic L. Holmes shows in this masterful account of Meselson and Stahl’s quest. This book vividly reconstructs the complex route that led to the Meselson-Stahl experiment and provides an inside view of day-to-day scientific research--its unpredictability, excitement, intellectual challenge, and serendipitous windfalls, as well as its frustrations, unexpected diversions away from original plans, and chronic uncertainty. Holmes uses research logs, experimental films, correspondence, and interviews with the participants to record the history of Meselson and Stahl’s research, from their first thinking about the problem through the publication of their dramatic results. Holmes also reviews the scientific community’s reception of the experiment, the experiment’s influence on later investigations, and the reasons for its reputation as an exceptionally beautiful experiment. DNA replication, the process of copying one double stranded DNA molecule to form two identical copies, is highly conserved at the mechanistic level across evolution. Interesting in its own right as a fascinating feat of biochemical regulation and coordination, DNA replication is at the heart of modern advances in molecular biology. An understanding of the process at both the biological and chemical level is essential to developing new techniques in molecular biology. Insights into the process at the molecular level provide opportunities to modulate and intervene in replication. Rapidly dividing cells need to replicate their DNA prior to division, and targeting components of the replication process is a potentially powerful strategy in cancer treatment. Conversely, ageing may be associated with loss of replication activity and restoring it to cells may moderate some of the diseases associated with old age. Replication is, therefore, fundamental to a huge range of molecular biological and biochemical applications, and provides many potential targets for drug design. The fast pace of replication research, particularly in providing new structural insights, has outdated the majority of available texts. This learned, yet accessible, book contains the latest research written by those conducting it. It examines conserved themes providing a biological background for biochemical, chemical and pharmaceutical studies of this huge and exciting field. Rather than simply "itemising" the replication steps and the proteins involved, replication is tackled from a novel perspective. The book

provides logical groupings of processes based upon biochemical similarities. The emphasis on mechanisms and the relationship between structure and function targets the chapters towards biochemists and biological chemists as well as molecular and cell biologists. The book highlights new insights into the replication process, from the assembly of pre-replication complexes, through polymerisation mechanisms, to considering replication in the context of chromatin and chromosomes. It also covers mitochondrial DNA replication, and includes archaeal paradigms, which are proving increasingly relevant to the study of replication in higher eukaryotes. Exciting potential drug targets in DNA replication are discussed, particularly in the context of treating malaria and cancer. Accurate replication of the genome is essential for reproduction in all cells. However, even under normal conditions, the replication machinery may face a variety of impediments that can prevent it from completing its task. The mechanism by which cells overcome these hurdles is likely to vary depending upon the nature of the obstacle. Both UV irradiation and inactivation of replicative proteins in DnaB can inhibit the progression of the DNA replication machinery. However, the mechanism by which replication recovers following UV irradiation is different from the mechanism of recovery following the inactivation of the replicative proteins. Previous results show that following UV-induced damage in Escherichia coli, the replication fork is maintained and protected from extensive degradation by RecF, RecO, and RecR until replication can resume. By contrast, replication does not recover following inactivation of the replication protein DnaB, and the nascent DNA is extensively degraded irrespective of whether RecF is present. "A subject collection from Cold Spring Harbor perspectives in biology." This book collects the Proceedings of a workshop sponsored by the European Molecular Biology Organization (EMBO) entitled "Pro teins Involved in DNA Replication" which was held September 19 to 23,1983 at Vitznau, near Lucerne, in Switzerland. The aim of this workshop was to review and discuss the status of our knowledge on the intricate array of enzymes and proteins that allow the replication of the DNA. Since the first discovery of a DNA polymerase in Escherichia coli by Arthur Kornberg twenty eight years ago, a great number of enzymes and other proteins were des cribed that are essential for this process: different DNA poly merases, DNA primases, DNA dependent ATPases, helicases, DNA liga ses, DNA topoisomerases, exo- and endonucleases, DNA binding pro teins and others. They are required for the initiation of a round of synthesis at each replication origin, for the progress of the growing fork, for the disentanglement of the replication product, or for assuring the fidelity of the replication process. The number, variety and ways in which these proteins inter act with DNA and with each other to the achievement of replication and to the maintenance of the physiological structure of the chromo somes is the subject of the contributions collected in this volume. The presentations and discussions during this workshop reinforced the view that DNA replication in vivo can only be achieved through the cooperation of a high number of enzymes, proteins and other cofactors. Eric Lloyd, a private investigator from Santa Monica, is called in to help investigate the serial murders of two young Indian women near a small rural town in southern California. The caller is none other than Erle Stanley Gardner, America's most famous mystery writer, who is involved because the murders happened so close to his ranch. Together Lloyd and Gardner aid the county sheriff in attempting to solve the baffling murders, which appear to have no motive. Most mysterious of all, the killer seems to be deliberately drawing attention to the memory of a long-dead pioneer of the area, whose grave is connected to a curse well-known to the local inhabitants. To solve crimes committed in 1954, Gardner and Lloyd find they must understand a crime committed in 1875 -- a crime which victimized the local Indian tribe, and in which the pioneer was involved. Set on the actual ranch of Erle Stanley Gardner, Wolf Valley is a delightful and provocative period murder mystery which will appeal to mystery fans everywhere. A masterpiece of accurate historical research combined with colorful fiction, it offers a fascinating view of the great mystery writer and his lifestyle, set in the actual surroundings where he lived for more than thirty years. It also reveals an astonishing and previously unknown connection between Gardner and one of the most famous works in American literature, the classic 1884 novel Ramona. 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. Genome Duplication provides a comprehensive and readable overview of the underlying principles that govern genome duplication in all forms of life, from the simplest cell to the most complex multicellular organism. Using examples from the three domains of life - bacteria, archaea, and eukarya - Genome Duplication shows how all living organisms store their genome as DNA and how they all use the same evolutionary-conserved mechanism to duplicate it: semi-conservative DNA replication by the replication fork. The text shows how the replication fork determines where organisms begin genome duplication, how they produce a complete copy of their genome each time a cell divides, and how they link genome duplication to cell division. Genome Duplication explains how mistakes in genome duplication are associated with genetic disorders and cancer, and how understanding genome duplication, its regulation, and how the mechanisms differ between different forms of life, is critical to the understanding and treatment of human disease. The Regulation of DNA Replication and Transcription explores basic processes of DNA replication and transcription in an effort to identify the mechanisms responsible for the release of genetic information and its role in the regulation of cellular events. Concerned with discovering the fundamental concept that might integrate and explain the wide range of existing lines of evidence, the author reports and interprets the results of experiments conducted in an impressive range of biological systems. Focused on complex mechanisms at the biochemical level, these studies allow analysis of the pathways involved when cells, organs and animal systems react to various trigger molecules derived from both living cells and exogenous sources. These include hormones, RNA, RNA fragments, alkaloids, actinomycin D, and phorbol esters, as well as chemical carcinogens and drugs. Comnining the results of these studies with his own extensive work in this field, the author is able to formulate a uniquely integrative biochemical model for the gene expression, demonstrating that both biological and chemically synthesized molecules can trigger the differential release of information from the DNA and thus influence cell transformation. Apart from its academic significance, the model offers high potential assistance in the search for ways to induce or control the expression of certain genes and, moreover, to promote differentiation of given cells in vitro as well as in situ. Through an investigation of the nucleocapsid protein of the AIDS virus, this book illustrates how a small disordered basic viral protein controls virus structure, replication and genetic variability. It also highlights novel concepts indicating that proteins devoid of a defined 3D structure can have many different roles as mediated by a series of molecular interactions with RNA molecules, and, as such, behave as molecular adaptors. This work describes the current knowledge of biochemical mechanisms regulating initiation of DNA replication in Escherichia coli, which focuses on the control of activity of the DnaA protein. Examples of direct linkages between DNA replication and other cellular processes are provided. In addition, similarities of the mechanisms of regulation of DNA replication operating in prokaryotic and eukaryotic cells are identified, and implications for understanding more complex processes, like carcinogenesis are suggested. Studies of recent years provided evidence that regulation of DNA replication in bacteria is more complex than previously anticipated. Multiple layers of control seem to ensure coordination of this process with the increase of cellular mass and the division cycle. Metabolic processes and membrane composition may serve as points where integration of genome replication with growth conditions occurs. It is also likely that coupling of DNA synthesis with cellular metabolism may involve interactions of replication proteins with other macromolecular complexes, responsible for various cellular processes. Thus, the exact set of factors participating in triggering the replication initiation may differ depending on growth conditions. Therefore, understanding the regulation of DNA duplication requires placing this process in the context of the current knowledge on bacterial metabolism, as well as cellular and chromosomal structure. Moreover, in both Escherichia coli and eukaryotic cells, replication initiator proteins were shown to play other roles in addition to driving the assembly of replication complexes, which constitutes another, yet not sufficiently understood, layer of coordinating DNA replication with the cell cycle. National Institutes of Health. Cold Spring Harbor Monograph, Volume 31 Extensive text on the replication of DNA, specifically in eukaryotic

cells, for researchers. 68 contributors, 54 U.S. Biosynthesis of cellular and viral DNA and RNA has been a major topic in molecular biology and biochemistry. The studies by Arthur Kornberg and his colleagues on the in-vitro synthesis of DNA have opened new avenues to understanding the processes controlling the duplication of the genetic information encoded in the DNA and RNA of bacterial and mammalian cells. Viral nucleic acids are replicated in infected cells (bacterial, plant, and animal) by virus coded enzymes with or without the involvement of proteins and enzymes coded by the host cells. The ability of the virus to replicate its genome within a relatively short period in the infected cell makes it an excellent biological tool for studying the molecular events in nucleic acid replication. Indeed, the identification of a number of virus-coded proteins that participate in the biosynthesis of X174 and SV40 DNA has led to the construction of in-vitro systems for the study of nucleic acid biosynthesis. Similarly, studies on the replication of other phage, animal and plant viruses have provided an insight into the nucleic acid sequences from which DNA synthesis is initiated, as well as the proteins and enzymes that regulate the catalyse biosynthetic processes. Investi gation of the molecular processes involved in the replication of cellular and mitochondrial genomes has gained momentum from the rapid developments in the analyses of viral nucleic acid biosynthesis. Abstract: Complete and accurate duplication of chromosomal DNA is required for the maintenance of genetic stability. Failure to properly regulate replication could potentially result in the loss or over-duplication of regions of the genome. One important means of preserving replication fidelity is through proper regulation of the 'replication licensing' system. Replication licensing occurs early in the cell cycle and involves the establishment of multi-subunit pre-replication complexes (pre-RCs) at thousands of origins across the genome. As cells transit into S-phase, pre-RCs are activated to unwind DNA and assist in the recruitment of other replication factors necessary for DNA synthesis. Using adenoviral expression and siRNA depletion of replication licensing factors and their regulators, we have examined cellular responses to perturbation of replication licensing. We find that untransformed human cells negatively regulate cell cycle progression through G1 when replication licensing is perturbed. This novel "replication licensing checkpoint" involves a p27 KIP1 - dependent inactivation of G1 cyclin dependent kinases. Bypass of the replication licensing checkpoint led to inefficient DNA replication and an increase in DNA damage markers. Therefore, the replication licensing checkpoint likely protects cells from the negative consequences of premature entry into S phase. In contrast, excessive licensing, from overexpression of licensing factor Cdt1 or depletion of its inhibitor, geminin, can lead to over-replication of the regions of the genome. Re-replication is a potential mechanism for the gene amplification and chromosome instability observed in many cancers. We have studied cellular responses to aberrant licensing factor activity. Our results indicate that the tumor suppressors Rb and p53 play key roles in restricting re-replication in normal cells. Loss or inactivation of p53/Rb can lead to a re-replication permissive state, where cells can accumulate large amounts of re-replicated DNA. Taken together, these studies underscore the concept that strict control over replication licensing is important for preservation of replication fidelity and the maintenance of genetic stability. Replication-Coupled Repair, Volume 661 in the Methods in Enzymology series, highlights new advances in the field, with this new volume presenting interesting chapters on a variety of timely topics, including the Repair of replication-born DNA breaks by sister chromatid recombination, High resolution and high throughput DNA cyclization measurements to interrogate DNA bendability, A programmable detection method for genomic signatures: from disease diagnosis to genome editing, Characterization of the telomerase modulating activities of yeast DNA helicases, Eukaryotic DNA replication with purified budding yeast proteins, Single molecule studies of yeast Rad51 paralogs, Light activation and deactivation of Cas9 for DNA repair studies, and more. Other chapters explore MIDAS: Direct sequencing to map mitotic DNA synthesis and common fragile sites at high precision, Studying the DNA damage response in embryonic systems, GLASS-ChIP to map Mre11 cleavage sites in the human genome, New chemical biology approaches to trap reaction intermediates in living cells, Single-molecule imaging approaches for monitoring replication fork conflicts at genomic DNA G4 structures and R-loops in human cells, Monitoring the replication of structured DNA through heritable epigenetic change, Visualizing replication fork encounters with DNA interstrand crosslinks, and much more. Provides the authority and expertise of leading contributors from an international board of authors Presents the latest release in Methods in Enzymology series Includes the latest information on replication-coupled repair Understanding the mechanism and regulation of eukaryotic DNA replication remains a fundamental area of modern biological research. Replication of the cell s genome is one of the critical, regulated events that occur during cell proliferation and cell cycle progression. This volume presents important advances in this field that were discussed at the Cold Spring Harbor Cancer Cells meeting on Eukaryotic DNA Replication. The papers cover topics as diverse as viral DNA replication, genome amplification, cell cycle and developmental control of DNA replication, replication proteins, and the replication and function of centromeres and telomeres. This volume is a valuable resource for researchers and students. This texts discusses DNA replication in plants including chapters on; functional chromosomal structure, the biochemistry of DNA replication, Control of DNA replication, Replication of plant organelle DNA, replication of DNA viruses in plants, and DNA damage, repair, and mutagenesis. 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.