

## Nucleic Acid Structure An Introduction Heidelberg Science Library

Harnessing the Power of Viruses explores the application of scientific knowledge about viruses and their lives to solve practical challenges and further advance molecular sciences, medicine and agriculture. The book contains virus-based tools and approaches in the fields of: i) DNA manipulations in vitro and in vivo; ii) Protein expression and characterization; and iii) Virus- Host interactions as a platform for therapy and biocontrol are discussed. It steers away from traditional views of viruses and technology, focusing instead on viral molecules and molecular processes that enable science to better understand life and offer means for addressing complex biological phenomena that positively influence everyday life. The book is written at an intermediate level and is accessible to novices who are willing to acquire a basic level of understanding of key principles in molecular biology, but is also ideal for advanced readers interested in expanding their biological knowledge to include practical applications of molecular tools derived from viruses. Explores virus-based tools and approaches in DNA manipulation, protein expression and characterization and virus-host interactions Provides a dedicated focus on viral molecules and molecular processes that enable science to better understand life and address complex biological phenomena Includes an overview of modern technologies in biology that were developed using viral components/elements and knowledge about viral processes

Nucleic acids are the fundamental building blocks of DNA and RNA and are found in virtually every living cell. Molecular biology is a branch of science that studies the physicochemical properties of molecules in a cell, including nucleic acids, proteins, and enzymes. Increased understanding of nucleic acids and their role in molecular biology will further many of the biological sciences, including genetics, biochemistry, and cell biology. Progress in Nucleic Acid Research and Molecular Biology is intended to bring to light the most recent advances in these overlapping disciplines with a timely compilation of reviews comprising each volume. \* This series provides a forum for discussion of new discoveries, approaches, and ideas \* Contributions from leading scholars and industry experts \* Reference guide for researchers involved in molecular biology and related fields

The Structure and Function of Animal Cell Components: An Introductory Text provides an introduction to the study of animal cells, specifically the structure and function of the cells. To help readers appreciate the discussions, this book first provides an introduction to the physiological and biochemical function of animal cells, which is followed by an introduction to animal cell structure. This text then presents topics on the components of the cells, such as the mitochondria and the nucleus, and processes in the cells, including protein synthesis. This selection will be invaluable to cytologists, anatomists, and pathologists, as well as to readers who have an elementary knowledge of both biochemistry and cytology.

Since the discovery of the DNA double helix in 1953, nucleic acids have formed the central theme of much of contemporary molecular science. Nowhere is this more apparent than in the increasing efforts to determine the DNA sequence of the human genome and the development of new diagnostics of genetic disease. Recent sophistication of nucleic acids synthesis has been key to the establishment of the biotechnology industry and our improving knowledge of nucleic acid structures and interactions is noticeably influencing the design of novel drugs. This second and completely revised edition draws on the expertise of the same international group of authors to set the basics of the nucleic acids in the context of the expanding horizons set by modern structural biology, RNA enzymology, drug discovery and biotechnology. The structure, function and reactions of nucleic acids are central to molecular biology and are crucial for the understanding of complex

biological processes involved. Revised and updated Nucleic Acids in Chemistry and Biology 3rd Edition discusses in detail, both the chemistry and biology of nucleic acids and brings RNA into parity with DNA. Written by leading experts, with extensive teaching experience, this new edition provides some updated and expanded coverage of nucleic acid chemistry, reactions and interactions with proteins and drugs. A brief history of the discovery of nucleic acids is followed by a molecularly based introduction to the structure and biological roles of DNA and RNA. Key chapters are devoted to the chemical synthesis of nucleosides and nucleotides, oligonucleotides and their analogues and to analytical techniques applied to nucleic acids. The text is supported by an extensive list of references, making it a definitive reference source. This authoritative book presents topics in an integrated manner and readable style. It is ideal for graduate and undergraduates students of chemistry and biochemistry, as well as new researchers to the field.

This book is a self-contained introduction to the theory of atomic motion in proteins and nucleic acids. An understanding of such motion is essential because it plays a crucially important role in biological activity. The authors, both of whom are well known for their work in this field, describe in detail the major theoretical methods that are likely to be useful in the computer-aided design of drugs, enzymes and other molecules. A variety of theoretical and experimental studies is described and these are critically analyzed to provide a comprehensive picture of dynamic aspects of biomolecular structure and function. The book will be of interest to graduate students and research workers in structural biochemistry (X-ray diffraction and NMR), theoretical chemistry (liquids and polymers), biophysics, enzymology, molecular biology, pharmaceutical chemistry, genetic engineering and biotechnology.

While structure-function relationships of proteins have been studied for a long time, structural studies of RNA face additional challenges. Nevertheless, with the continuous discovery of novel RNA molecules with key cellular functions and of novel pathways and interaction networks, the need for structural information of RNA is still increasing. This volume provides an introduction into techniques to assess structure and folding of RNA. Each chapter explains the theoretical background of one technique, and illustrates possibilities and limitations in selected application examples.

This MIE volume provides laboratory techniques that aim to predict the structure of a protein which can have tremendous implications ranging from drug design, to cellular pathways and their dynamics, to viral entry into cells. Expert researchers introduce the most advanced technologies and techniques in protein structure and folding Includes techniques on tiling assays

New found interest in the chromosome G-quadruplexes has emerged as an important focus of research in nucleic acids and as a potential target for cancer therapeutics. Existing literature concerning nucleic acids concentrates on aspects of quadruplex structure and historical research. There exists no single comprehensive resource addressing recent advances in therapeutic application and targeting strategies, until now. Quadruplex Nucleic Acids as Therapeutic Targets will be a vital resource for researchers in biochemistry, molecular biology, chemistry, biotechnology, biophysics, medicine, translational science and pharmacology. This timely publication is the first to offer practical application and direct strategies to meet the needs of emerging research.

From probe design to applications in clinical settings, this book provides a diverse set of instructive examples, guided by experts in the field who offer easy-to-follow experimentals. The book first offers an introduction to the basic principles of fluorescence and then describes applications of fluorogenic probes in real-time PCR, which currently is the gold standard for quantitative DNA and

RNA analysis. Coverage extends the potential of realtime as well as advocates simplifications of the probe technologies. It also presents a new simplified molecular beacon design, EasyBeacons, and demonstrates the utility in DNA methylation profiling. This book provides an integrated treatment of the structure and function of nucleic acids, proteins, and glycans, including thorough coverage of relevant computational biochemistry. The text begins with an introduction to the biomacromolecules, followed by discussion of methods of isolation and purification, physicochemical and biochemical properties, and structural characteristics. The next section of the book deals with sequence analysis, analysis of conformation using spectroscopy, chemical synthesis, and computational approaches. The following chapters discuss biomolecular interactions, enzyme action, gene transmission, signal transduction, and biomacromolecular informatics. The author concludes with presenting the latest findings in genomics, proteomics, glycomics, and biomacromolecular evolution. This text is an invaluable resource for research professionals wishing to move into genomics, proteomics, and glycomics research. It is also useful for students in biochemistry, molecular biology, bioengineering, biotechnology, and bioinformatics.

Revised, extended, updated and lavishly illustrated, this 4th Edition of Nucleic Acids in Chemistry and Biology is a long-awaited standard text for teaching and research in nucleic acids science.

Introduction to Molecular Biology focuses on the principles of polymer physics and chemistry and their applications to fundamental phenomena in biological sciences. It examines the structure, synthesis, and function of nucleic acids and proteins, as well as the physicochemical techniques necessary in determining the macromolecular structure, the kinetics and mechanism of enzyme action, the genetics of bacteria and their viruses, and the genetic code. It also considers the importance of precise quantitative analysis in biochemistry and biophysics, the architecture and function of biological macromolecules, and the unique mechanisms that regulate the cell's biological activity. Organized into five chapters, this book begins with an overview of proteins and their functional activity, from contractility and enzymatic catalysis to immunological activity, formation of selectively permeable membranes, and reversible binding and transport. It explains how such functions are related to molecular interactions and therefore fall within the purview of molecular biology. The book then proceeds with a discussion on the chemical structure of proteins and nucleic acids, the physicochemical techniques in measuring molecular size and shape, the mechanism of enzymatic reactions, the functions of DNA and RNA, and the mechanism of phase transition in polynucleotides. This book is intended for both biologists and non-biologists who want to be acquainted with the advances made in molecular biology, molecular genetics, and molecular biophysics during the 1950s and 1960s.

acids. The achievements of molecular biology testify to the success of material science in a realm which, until recently, appeared totally enigmatic and mysterious. Further scientific developments should bring to mankind vast developments both in theoretical knowledge and in practical applications, namely, in agriculture, medicine, and technology. The purpose of this book is to explain molecular biophysics to all who might wish to learn about it, to biologists, to physicists, to chemists. This book contains descriptive sections, as well as sections devoted to rigorous mathematical treatment of a number of problems, some of which have been

studied by the author and his collaborators. These sections may be omitted during a first reading. Each chapter has a selected bibliography. This book is far from an exhaustive treatise on molecular biophysics. It deals principally with questions related to the structures and functions of proteins and nucleic acids. M. V. Vol'kenshtein Leningrad, September, 1964

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This unique and practical resource provides the most complete and concise summary of underlying principles and approaches to studying nucleic acid structure, including discussion of x-ray crystallography, NMR, molecular modelling, and databases. Its focus is on a survey of structures especially important for biomedical research and pharmacological applications. To aid novices, Principles of Nucleic Acid Structure includes an introduction to technical lingo used to describe nucleic acid structure and conformations (roll, slide, twist, buckle, etc.). This completely updated edition features expanded coverage of the latest advances relevant to recognition of DNA and RNA by small molecules and proteins. In particular, the reader will find extensive new discussions on: RNA folding, ribosome structure and antibiotic interactions, DNA quadruplexes, DNA and RNA protein complexes, and short interfering RNA (siRNA). This handy guide ends with a complete list of resources, including relevant online databases and software. Completely updated with expanded discussion of topics such as RNA folding, ribosome structure and antibiotic interactions, DNA quadruplexes, DNA and RNA protein complexes, and short interfering RNA (siRNA) Includes a complete list of resources, including relevant online databases and software Defines technical lingo for novices

New textbooks at all levels of chemistry appear with great regularity. Some fields like basic biochemistry, organic reaction mechanisms, and chemical thermodynamics are well represented by many excellent texts, and new or revised editions are published sufficiently often to keep up with progress in research. However, some areas of chemistry, especially many of those taught at the graduate level, suffer from a real lack of up-to-date textbooks. The most serious needs occur in fields that are rapidly changing. Textbooks in these subjects usually have to be written by scientists actually involved in the research which is advancing

the field. It is not often easy to persuade such individuals to set time aside to help spread the knowledge they have accumulated. Our goal, in this series, is to pinpoint areas of chemistry where recent progress has outpaced what is covered in any available textbooks, and then seek out and persuade experts in these fields to produce relatively concise but instructive introductions to their fields. These should serve the needs of one semester or one quarter graduate courses in chemistry and biochemistry. In some cases the availability of texts in active research areas should help stimulate the creation of new courses. CHARLES R. CANTOR  
New York Preface This monograph is based on a review on polynucleotide structures written for a book series in 1976.

Biology has entered an era in which interdisciplinary cooperation is at an all-time high, practical applications follow basic discoveries more quickly than ever before, and new technologies--recombinant DNA, scanning tunneling microscopes, and more--are revolutionizing the way science is conducted. The potential for scientific breakthroughs with significant implications for society has never been greater. Opportunities in Biology reports on the state of the new biology, taking a detailed look at the disciplines of biology; examining the advances made in medicine, agriculture, and other fields; and pointing out promising research opportunities. Authored by an expert panel representing a variety of viewpoints, this volume also offers recommendations on how to meet the infrastructure needs--for funding, effective information systems, and other support--of future biology research. Exploring what has been accomplished and what is on the horizon, Opportunities in Biology is an indispensable resource for students, teachers, and researchers in all subdisciplines of biology as well as for research administrators and those in funding agencies.

Sequencing, cloning, transcription - these are but a few key techniques behind the current breathtaking advances in molecular biology and biochemistry. As these methods continuously diversify, biochemists need a sound chemical understanding to keep the pace. Chemists beginning working in the molecular biology lab need an introduction to this field from their point of view. This book serves both: it describes most of the known chemical reactions of nucleosides, nucleotides, and nucleic acids in sufficient detail to provide the desired background, and additionally, the fundamental relations between sequence, structure and functionality of nucleic acids are presented. The first edition of this book, which was published in Russian, has immediately become a recognized standard reference. This second, thoroughly revised and updated edition, now published in English, is likely to achieve a similar position in the international scientific community.

DNA Structure and Function, a timely and comprehensive resource, is intended for any student or scientist interested in DNA structure and its biological implications. The book provides a simple yet comprehensive introduction to nearly all aspects of DNA structure. It also explains current ideas on the biological significance of classic and alternative DNA conformations. Suitable for graduate courses on DNA structure and nucleic acids, the text is also excellent supplemental reading for courses in general biochemistry, molecular biology, and genetics. Explains basic DNA Structure and function clearly and simply Contains up-to-date coverage of cruciforms, Z-DNA, triplex DNA, and other DNA conformations Discusses DNA-protein interactions, chromosomal organization, and biological implications of structure Highlights key experiments and ideas within boxed sections Illustrated with

150 diagrams and figures that convey structural and experimental concepts

The reception of the original volume by students, pedagogues, and reviewers has been most gratifying. It appears to have both satisfied a need and served a useful educational purpose. Hence, some ten years later it has been deemed advisable to bring it up to date, if only in a slightly expanded form. The purpose for writing this book and its level remain the same. Many new polymers have been synthesized in the last decade that have found meaningful and novel uses. Examples of these applications are included in this new edition. Major advances have also been made in biophysics and in molecular biology, as well as in our understanding of natural processes on a molecular level. Foremost among these has been the development of recombinant DNA technology. With it has come the potential for large scale synthesis of hormones and proteins. These new developments have also been incorporated into the present volume. It is my hope that this new edition will still have a widespread appeal to students in all of the natural sciences whatever their major interest. It should also be of use and interest to those starting industrial or academic careers who have not had an extensive background in macromolecular science.

The study of nucleic acids is one of the most rapidly developing fields in modern science. The exceptionally important role of the nucleic acids as a key to the understanding of the nature of life is reflected in the enormous number of published works on the subject, including many outstanding monographs and surveys. The pathways of synthesis and metabolism of nucleic acids and the many and varied biological functions of these biopolymers are examined with the utmost detail in the literature. Nearly as much attention has been paid to the macromolecular chemistry of the nucleic acids: elucidation of the size and shape of their molecules, the study of the physicochemical properties of their solutions, and the appropriate methods to be used in such research. The surveys of the chemistry of nucleic acids which have been published so far deal almost entirely with their synthesis and, in particular, with the synthetic chemistry of monomers (nucleosides and nucleotides); less attention has been paid to the synthesis of polynucleotides. There is yet another highly important aspect of the chemistry of nucleic acids which is still in the formative stage, the study of the reactivity of nucleic acid macromolecules and their components. This can make an important contribution to the determination of the structure of these remarkable biopolymers and to the correct understanding of their biological functions. Discover the fundamentals and intricacies of a subject at the interface of chemistry and biology with this authoritative resource *Chemistry and Biology of Non-canonical Nucleic Acids* delivers a comprehensive treatment of the chemistry and biology of non-canonical nucleic acids, including their history, structures, stabilities, properties, and functions. You'll learn about the role of these vital compounds in transcription, translation, regulation, telomeres, helicases, cancers, neurodegenerative diseases, therapeutic applications, nanotechnology, and more. An ideal resource for graduate students, researchers in physical, organic, analytical, and inorganic chemistry will learn about uncommon nucleic acids, become the common non-canonical nucleic acids that fascinate and engage academics and professionals in private industry. Split into 15 chapters covering a wide range of aspects of non-canonical nucleic acids, the book explains why these compounds exist at the forefront of a new research revolution at the intersection of chemistry and biology. *Chemistry and Biology of Non-canonical Nucleic Acids* also covers a broad range of topics critical to

understanding these versatile and omnipresent chemicals, including:

- \* A discussion of the dynamic regulation of biosystems by nucleic acids with non-canonical structures
- \* The role played by nucleic acid structures in neurodegenerative diseases and various cancers
- \* An exploration of the future outlook for the chemistry and biology of non-canonical nucleic acids
- \* An introduction to the history of canonical and non-canonical structures of nucleic acids
- \* An analysis of the physicochemical properties of non-canonical nucleic acids

Perfect for biochemists, materials scientists, and bioengineers, *Chemistry and Biology of Non-canonical Nucleic Acids* will also earn a place in the libraries of medicinal and pharmaceutical chemists who wish to improve their understanding of life processes and the role that non-canonical nucleic acids play in them.

This book reviews studies showing that interesting and useful molecular-scale switches and sensors can be made out of nucleic acids, by both artificial and natural means. The first section of the book is devoted to artificial nucleic acid switches and sensors. In second section, three chapters show that nature has been as crafty a molecular-scale engineer as any modern scientist, in the evolution of natural nucleic acid switches and sensors.

This book gives physical chemists a broader view of potential biological applications of their techniques for the study of nucleic acids in the gas phase. It provides organic chemists, biophysicists, and pharmacologists with an introduction to new techniques they can use to find the answers to yet unsolved questions. Laboratory sciences have bloomed with a variety of techniques to decipher the properties of the molecules of life. This volume introduces techniques used to investigate the properties of nucleic acids in the absence of solvent. It highlights the specificities pertaining to the studies of nucleic acids, although some of the techniques can similarly be applied to the study of other biomolecules, like proteins. The first part of the book introduces the techniques, from the transfer of nucleic acids to the gas-phase, to their detailed physico-chemical investigation. Each chapter is devoted to a specific molecular property, and illustrates how various approaches (experimental and theoretical) can be combined for the interpretation. The second part of the book is devoted to applying the gas-phase approaches to solve specific questions related to the biophysics, biochemistry or pharmacology of nucleic acids.

The classic personal account of Watson and Crick's groundbreaking discovery of the structure of DNA, now with an introduction by Sylvia Nasar, author of *A Beautiful Mind*. By identifying the structure of DNA, the molecule of life, Francis Crick and James Watson revolutionized biochemistry and won themselves a Nobel Prize. At the time, Watson was only twenty-four, a young scientist hungry to make his mark. His uncompromisingly honest account of the heady days of their thrilling sprint against other world-class researchers to solve one of science's greatest mysteries gives a dazzlingly clear picture of a world of brilliant scientists with great gifts, very human ambitions, and bitter rivalries. With humility unspoiled by false modesty, Watson relates his and Crick's desperate efforts to beat Linus Pauling to the Holy Grail of life sciences, the identification of the basic building block of life. Never has a scientist been so truthful in capturing in words the flavor of his work. Teaching a course on nucleic acid structure is a hazardous undertaking, especially if one has no continuous teaching obligations. I still have done it on several occasions in various French universities, when colleagues, suffering from administrative overwork and excessive teaching obligations, had asked me to do so. This was generally done with a pile of notes and a dozen slides, and I always regretted that no small, concise, specialized book on nucleic acid structure for students at the senior or beginning graduate level existed. Every year, the lecture

notes became more and more voluminous, with some key reprints intermingled. Everything changed when, in the spring of 1973, I received an invitation to teach such a course, under the UNESCO-OAS-Molecular Biology Program at the Universidad de Chile in Santiago during October 1973. I had accepted rather enthusiastically, but soon discovered that it would be necessary to produce a photocopied syllabus for the students. This was the first premanuscript of this book. For nonscientific reasons, the course was first canceled and then postponed until December 1973. Nearly a year later, the course, in slightly amended form, was presented at the Lomonosov State University in Moscow. This is a comprehensive and up-to-date account of the structures and physical chemistry properties of nucleic acids, with special emphasis on biological function. The book has been carefully organized to meet the needs of molecular biologists, physical biochemists and physical chemists with only a basic understanding of physical chemistry and molecular biology. Nucleic Acids will serve as a textbook in physical biochemistry and biophysical chemistry classes, as well as a supplemental text in courses on nucleic acid biochemistry or molecular biology, and as a personal reference for students and researchers in these fields.

Nucleic Acid Structure An Introduction Springer Science & Business Media

First published in 1998. This book is targeted at the beginner who has little or no knowledge of the principles or practice of hybridization. This text concentrates on solution and filter hybridization with a final chapter on current developments which includes DNA chips and advances in probe design.

The Biochemistry of Plants: A Comprehensive Treatise, Volume 6: Proteins and Nucleic Acids provides information pertinent to the nucleic acids and the regulation of the expression of this information. This book presents the processes by which the nucleic acids are finally expressed as proteins. Organized into 14 chapters, this volume begins with an overview of the overall structure of eukaryotic genomes, with emphasis on higher-plant DNA. This text then examines the enzymes involved in the cleavage and degradation of DNA. Other chapters provide a critical assessment of eukaryotic nucleic acid polymerases. This book discusses as well some examples from plant mitochondrial systems. The final chapter deals with two special areas of plant biology where the expression of the nucleic acids is seen in striking relief, the formation of plant tumors, and the growth and expression of plant viruses. This book is a valuable resource for plant biochemists, molecular biologists, senior graduate students, and research workers.

This is a postgraduate text on the structure of nucleic acids and the functional role played by structure in the recognition of nucleic acids by proteins, drugs and carcinogens.

The first of its kind, Introduction to Biophysical Methods for Protein and Nucleic Acid Research serves as a text for the experienced researcher and student requiring an introduction to the field. Each chapter presents a description of the physical basis of the method, the type of information that may be obtained with the method, how data should be analyzed and interpreted and, where appropriate, practical tips about procedures and equipment. Key Features \* Modern Use of Mass Spectroscopy \* NMR Spectroscopy \* Molecular Modeling and Graphics \* Macintosh and DOS/Windows 3.x disks

The structural biology of protein-nucleic acid interactions is in some ways a mature field and in others in its infancy. High-resolution structures of protein-DNA complexes have been studied since the mid 1980s and a vast array of such structures has now been determined, but surprising and novel structures still appear quite frequently. High-resolution structures of protein-RNA complexes were relatively rare until the last decade. Propelled by advances in technology as well as the realization of RNA's importance to



biology, the number of example structures has ballooned in recent years. New insights are now being gained from comparative studies only recently made possible due to the size of the database, as well as from careful biochemical and biophysical studies. As a result of the explosion of research in this area, it is no longer possible to write a comprehensive review. Instead, current review articles tend to focus on particular subtopics of interest. This makes it difficult for newcomers to the field to attain a solid understanding of the basics. One goal of this book is therefore to provide in-depth discussions of the fundamental principles of protein-nucleic acid interactions as well as to illustrate those fundamentals with up-to-date and fascinating examples for those who already possess some familiarity with the field. The book also aims to bridge the gap between the DNA- and the RNA- views of nucleic acid - protein recognition, which are often treated as separate fields. However, this is a false dichotomy because protein - DNA and protein - RNA interactions share many general principles. This book therefore includes relevant examples from both sides, and frames discussions of the fundamentals in terms that are relevant to both. The monograph approaches the study of protein-nucleic acid interactions in two distinctive ways. First, DNA-protein and RNA-protein interactions are presented together. Second, the first half of the book develops the principles of protein-nucleic acid recognition, whereas the second half applies these to more specialized topics. Both halves are illustrated with important real life examples. The first half of the book develops fundamental principles necessary to understand function. An introductory chapter by the editors reviews the basics of nucleic acid structure. Jen-Jacobsen and Jacobsen discuss how solvent interactions play an important role in recognition, illustrated with extensive thermodynamic data on restriction enzymes. Marmorstein and Hong introduce the zoology of the DNA binding domains found in transcription factors, and describe the combinational recognition strategies used by many multiprotein eukaryotic complexes. Two chapters discuss indirect readout of DNA sequence in detail: Berman and Lawson explain the basic principles and illustrate them with in-depth studies of CAP, while in their chapter on DNA bending and compaction Johnson, Stella and Heiss highlight the intrinsic connections between DNA bending and indirect readout. Horvath lays out the fundamentals of protein recognition of single stranded DNA and single stranded RNA, and describes how they apply in a detailed analysis of telomere end binding proteins. Nucleic acids adopt more complex structures - Lilley describes the conformational properties of helical junctions, and how proteins recognize and cleave them. Because RNA readily folds due to the stabilizing role of its 2'-hydroxyl groups, Li discusses how proteins recognize different RNA folds, which include duplex RNA. With the fundamentals laid out, discussion turns to more specialized examples taken from important aspects of nucleic acid metabolism. Schroeder discusses how proteins chaperone RNA by rearranging its structure into a functional form. Berger and Dong discuss how topoisomerases alter the topology of DNA and relieve the superhelical tension introduced by other processes such as replication and transcription. Dyda and Hickman show how DNA transposases mediate genetic mobility and Van Duyne discusses how site-specific recombinases "cut" and "paste" DNA. Horton presents a comprehensive review of the structural families and chemical mechanisms of DNA nucleases, whereas Li in her discussion of RNA-protein recognition also covers RNA nucleases. Lastly, FerrÚ-D'AmarÚ shows how proteins recognize and modify RNA transcripts at specific sites. The book also emphasises the impact of structural biology on

understanding how proteins interact with nucleic acids and it is intended for advanced students and established scientists wishing to broaden their horizons.

An indispensable handbook of the highest standard for those working in the fields of food analysis and forensic applications. *Fundamentals of Molecular Structural Biology* reviews the mathematical and physical foundations of molecular structural biology. Based on these fundamental concepts, it then describes molecular structure and explains basic genetic mechanisms. Given the increasingly interdisciplinary nature of research, early career researchers and those shifting into an adjacent field often require a "fundamentals" book to get them up-to-speed on the foundations of a particular field. This book fills that niche. Provides a current and easily digestible resource on molecular structural biology, discussing both foundations and the latest advances. Addresses critical issues surrounding macromolecular structures, such as structure-based drug discovery, single-particle analysis, computational molecular biology/molecular dynamic simulation, cell signaling and immune response, macromolecular assemblies, and systems biology. Presents discussions that ultimately lead the reader toward a more detailed understanding of the basis and origin of disease.

*Basic Principles in Nucleic Acid Chemistry, Volume I* provides information pertinent to the fundamental aspects of nucleic acids. This book discusses the development of the basic principles in nucleic acid research that will serve as a foundation for further advancement in nucleic acid research. Organized into six chapters, this volume begins with an overview of the history of the scientific study of nucleic acid as a genetic material. This text then examines the utility of the analogs of the naturally occurring nucleic acid components as biochemical tools and as therapeutic agents. Other chapters consider mass spectrometry that deals with the production and chemistry of ions in the vapor phase. This book discusses as well the various aspects of the excited states of the nucleic acids. The final chapter deals with the systematic study of the physiochemical properties of the monomeric units of nucleic acid. This book is a valuable resource for molecular biologists, scientists, and research workers.

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