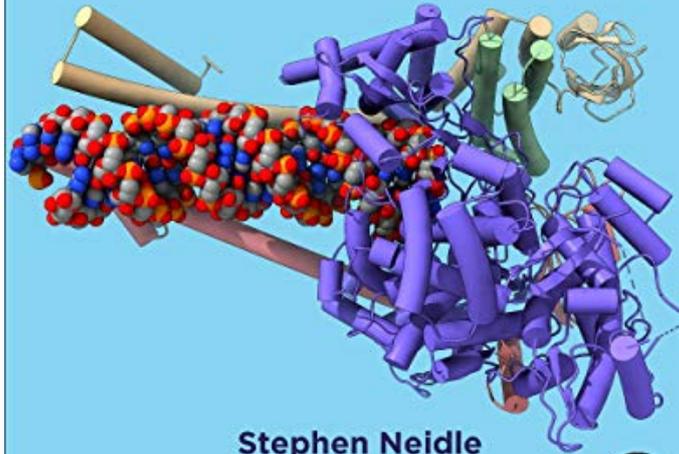


# Principles of Nucleic Acid Structure



Stephen Neidle  
Mark Sanderson



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**Principles of Nucleic Acid Structure**-Stephen Neidle 2010-07-26 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

**Principles of Nucleic Acid Structure**-Wolfram Saenger 2013-12-01 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.

### **Nucleic Acid Structure and Recognition-**

Cancer Research Campaign Biomolecular Structure Unit Stephen Neidle 2002 This book provides a detailed view of the molecular structures of DNA and RNA and how they are recognised by small molecules and proteins. Extensive source material is provided, including information on relevant web sites and computer programmes. The major methods of structural investigation for nucleic acids: X-ray crystallography, NMR, and molecular modelling are reviewed and their scope and limitations (in the context of nucleic acids) discussed. Also covered are the conformational features of nucleic acid building blocks, including a description of how base-pair morphologies

are analysed; the structures of DNA double helices and helical oligonucleotides, emphasising current ideas on sequence-dependent structure; and DNA-DNA interactions, including triplexes and quadruplexes. The principles of RNA folding, ribosome, and ribozyme structure are also surveyed. Both covalent and non-covalent nucleic acid interactions with small molecules are described, with the emphasis on recognition principles and sequence specific gene recognition. The principles of protein - nucleic acid are covered, focussing on regulatory proteins. Nucleic Acid Structure and Recognition will therefore equip readers with a good understanding of all the important aspects of this major field. The Nucleic Acid Database (NDB) crystallographic and NMR structures for the nucleic acid structures described in the book are freely available through the Nucleic Acid Structure and Recognition website.

**Topics in Nucleic Acid Structure-**Stephen Neidle 1987-06-18

## **Physical Principles in Nucleic Acid**

**Chemistry**-David E. Draper 2014-12-15

## **Cell Locomotion in Vitro**-C. A. Middleton

1984-01-01

## **Protein-Nucleic Acid Interactions**-Phoebe A.

Rice 2008-05-22 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 combinatorial 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.

**Molecular Biology of the Cell**-Bruce Alberts  
2004

**Diagnostic Molecular Biology**-Chang-Hui Shen  
2019-04-02 Diagnostic Molecular Biology

describes the fundamentals of molecular biology in a clear, concise manner to aid in the comprehension of this complex subject. Each technique described in this book is explained within its conceptual framework to enhance understanding. The targeted approach covers the principles of molecular biology including the basic knowledge of nucleic acids, proteins, and genomes as well as the basic techniques and instrumentations that are often used in the field of molecular biology with detailed procedures and explanations. This book also covers the applications of the principles and techniques currently employed in the clinical laboratory. • Provides an understanding of which techniques are used in diagnosis at the molecular level • Explains the basic principles of molecular biology and their application in the clinical diagnosis of diseases • Places protocols in context with practical applications

**Basic Principles in Nucleic Acid Chemistry**-  
Paul O.P. Ts'o 2012-12-02 Basic Principles in

Nuclear Acid Chemistry, Volume II presents the significant progress in nucleic acid research and its contribution and influence on various aspects of human life. This book contains five chapters and begins with the susceptibility of nucleic acids towards attack by chemical reagents whose reactions with polynucleotides have been studied. This topic is followed by a presentation of experimental techniques used to study the properties of nucleic acids. The following chapter discusses some basic features embodied in the polyribo- and poly-deoxyribonucleotide backbone chains; the possibility of rotation around backbone bonds in the "random" single-stranded form; and the short- and long-range interactions in idealized and real chains. This chapter also looks into the thermodynamic and polyelectrolyte aspects of nucleic acid behavior. A chapter describes the special features of the third class of DNA, namely, closed duplex DNA, in which covalent chain scissions are absent. The last chapter examines the intrinsic properties and the interaction of the dimers and oligomers, with special emphasis on the influence of the

phosphodiester linkages on the conformation and interaction of these short segments of nucleic acids. This book is of great value to workers in biomedical research and to higher level biochemistry instructors.

**Nucleic Acid Structure**-W. Guschlbauer  
2012-12-06 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.

**Essentials of Nucleic Acid Analysis**-Jacquie T. Keer 2008-01-01 An indispensable handbook of the highest standard for those working in the fields of food analysis and forensic applications.

**Biochemistry**-J. Stenesh 2013-06-29 This text is intended for an introductory course in biochemistry. The text concludes with photosynthesis. The last section covers general chemistry. While such a course draws students from various backgrounds, Part IV,

TRANSFER OF GENETIC INFORMATION, also opens with an introductory chapter and then least general chemistry and one semester of organic chemistry explores the expression of genetic information. Replication, transcription, and translation are covered in this or My main goal in writing this book was to provide student. To allow for varying student backgrounds and for possible needed refreshers, a number of topics are included as appendices with a basic body of biochemical knowledge and a thorough exposition of fundamental biochemical concepts. These cover acid-base calculations, principles of genetics, including full definitions of key terms. My aim has been to present this material in a reasonably balanced form by neither deluging central topics with excessive detail. Each chapter includes a summary, a list of selected readings, and a comprehensive study section that consists of an

introductory text struggles with of three types of review questions and a large number of the problem of what to include in the coverage. My guide problems.

**RNA Methodologies**-Robert E. Farrell, Jr.  
2010-07-22 This laboratory guide represents a growing collection of tried, tested and optimized laboratory protocols for the isolation and characterization of eukaryotic RNA, with lesser emphasis on the characterization of prokaryotic transcripts. Collectively the chapters work together to embellish the RNA story, each presenting clear take-home lessons, liberally incorporating flow charts, tables and graphs to facilitate learning and assist in the planning and implementation phases of a project. RNA Methodologies, 3rd edition includes approximately 30% new material, including chapters on the more recent technologies of RNA interference including: RNAi; Microarrays; Bioinformatics. It also includes new sections on: new and improved RT-PCR techniques;

innovative 5' and 3' RACE techniques; subtractive PCR methods; methods for improving cDNA synthesis. \* Author is a well-recognized expert in the field of RNA experimentation and founded Exon-Intron, a well-known biotechnology educational workshop center \* Includes classic and contemporary techniques \* Incorporates flow charts, tables, and graphs to facilitate learning and assist in the planning phases of projects

**Nucleic Acids in Chemistry and Biology**-G. Michael Blackburn 1996 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.

**Nucleic Acid Hybridization**-M.L.M. Anderson  
2020-08-27 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.

**Handbook of Nucleic Acid Purification**-  
Dongyou Liu 2009-01-14 An Indispensable Roadmap for Nucleic Acid Preparation Although Friedrich Miescher described the first isolation of nucleic acid in 1869, it was not until 1953 that

James Watson and Francis Crick successfully deciphered the structural basis of DNA duplex. Needless to say, in the years since, enormous advances have been made in the study of nucleic acids, and these have become a cornerstone for all branches of modern biological sciences. The Handbook of Nucleic Acid Purification provides researchers and students with an all-encompassing volume on nucleic acid extraction strategies. Due to the complexities within prokaryotic and eukaryotic cells, purification of the nucleic acids often forms a vital first step in the study of molecular biology of living organisms as well as in the evolutionary/phylogenetic analysis of ancient specimens. Bringing together contributions from leading researchers, the handbook presents a comprehensive catalog of nucleic acid isolation methods. It includes dedicated sections on strategies for viruses, bacteria, fungi, parasites, insects, mammals, and plants, as well as for ancient samples, with an additional emphasis on sample preparation methods for direct molecular applications. Each chapter in this handbook:

Explores the biological background important to understanding specific organisms and specimens Reviews principles and current techniques for efficient isolation Discusses challenges and future trends relating to improved recovery of nucleic acids Besides providing an updated, reliable reference for anyone with an interest in molecular biology, this book offers a practical guide for clinical, forensic, and research scientists involved in molecular analysis of biological specimens. It also constitutes a convenient resource for students in other areas of biological sciences, and an indispensable roadmap for both new and experienced researchers wishing to acquire or sharpen their skills in nucleic acid preparation.

**Nucleic Acids**-Marcelo Larramendy 2016-03-16 This edited book, "Nucleic Acids - From Basic Aspects to Laboratory Tools", contains a series of chapters that highlight the development and status of the various aspects of the nucleic acids related to DNA chemistry and biology and the

molecular application of these small DNA molecules and related synthetic analogues within biological systems. Furthermore, it is hoped that the information in the present book will be of value to those directly engaged in the handling and use of nucleic acids, and that this book will continue to meet the expectations and needs of all who are interested in the different fascinating aspects of molecular biology.

**RNA Purification and Analysis**-Douglas T. Gjerde 2009-07-10 This first book on the market covers the many new and important RNA species discovered over the past five years, explaining current methods for the enrichment, separation and purification of these novel RNAs. Building up from general principles of RNA biochemistry and biophysics, this book addresses the practical aspects relevant to the laboratory researcher throughout, while discussing the performance and potential problems of the methods discussed. An appendix contains a glossary with the important terms and techniques used in RNA

analysis. By explaining the basic and working principles of the methods, the book allows biochemists and molecular biologists to gain much more expertise than by simply repeating a pre-formulated protocol, enabling them to select the procedure and materials best suited to the RNA analysis task at hand. As a result, they will be able to develop new protocols where needed and optimize and fine-tune the general purpose standard protocols that come with the purification equipment and instrumentation.

**Molecular Diagnostics**-William B. Coleman 2013-04-18 Notable practitioners describe how laboratory medicine is practiced today and illuminate how it will function tomorrow as the revolutionary advances afforded by molecular diagnostics become increasingly central to effective analysis. Proceeding from a discussion of elementary nucleic acid technology to a review of the more advanced techniques, the distinguished contributors lay the groundwork for a comprehensive understanding of their

applications throughout clinical medicine. The result is a detailed description of those molecular technologies currently used in diagnostic laboratories, as well as those that seem particularly promising. Detailed discussions of specific clinical applications include those for cancer, hematological malignancies, cardiovascular disease, and neuromuscular, endocrine, and infectious diseases.

**Fundamentals of Molecular Structural Biology**-Subrata Pal 2019-08-13 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.

**Gel Electrophoresis: Nucleic Acids**-Dr Robin Martin 2020-08-26 Through its clear presentation of the basic concepts, *Gel Electrophoresis: Nucleic Acids* breaks new ground by describing the principles of the technique without resorting to complicated protocols and recipes.

**Chemistry of Protein Conjugation and Cross-Linking**-Shan S. Wong 1991-06-18 Chemical

cross-linking reagents have attained great practical use in industry as well as in basic research, and an understanding of their fundamental principles of reaction is paramount to their applications. With broad coverage of the development and application of these reagents, *Chemistry of Protein Conjugation and Cross-Linking* discusses the mechanism of reaction and allows you to put the theory into practice. The book offers an explanation of the underlying mechanism of chemical modification, surveys all the bifunctional reagents used in bioconjugation and cross-linking, and provides a review of practical applications of these reagents in various areas of biochemistry, molecular biology, biotechnology, nucleic acid chemistry, immunochemistry, and diagnostic and biomedical disciplines. It contains numerous examples and illustrations, plus step-by-step explanations to reaction procedures. It is an excellent introduction and a comprehensive reference about chemical modification.

**Chemical Biology of Nucleic Acids**-Volker A. Erdmann 2014-04-22 This volume contains 29 engrossing chapters contributed by worldwide, leading research groups in the field of chemical biology. Topics include pre-biology; the establishment of the genetic code; isomerization of RNA; damage of nucleobases in RNA; the dynamic structure of nucleic acids and their analogs in DNA replication, extra- and intra-cellular transport; molecular crowding by the use of ionic liquids; new technologies enabling the modification of gene expression via editing of therapeutic genes; the use of riboswitches; the modification of mRNA cap regions; new approaches to detect appropriately modified RNAs with EPR spectroscopy and the use of parallel and high-throughput techniques for the analysis of the structure and new functions of nucleic acids. This volume discusses how chemistry can add new frontiers to the field of nucleic acids in molecular medicine, biotechnology and nanotechnology and is not only an invaluable source of information to chemists, biochemists and life scientists but will

also stimulate future research.

**Organic Chemistry of Nucleic Acids**-N. Kochetkov 2012-12-06 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 poly nucleotides. 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.

**Chemistry of Nucleic Acids**-Harri Lönnberg  
2020-08-10 Life in all its forms is based on nucleic acids which store and transfer genetic information. The book addresses the main aspects of synthesis, hydrolytic stability, solution equilibria of nucleosides and nucleotides as well as base modifications of nucleic acids. The author further describes their structural analogues used as therapeutic drugs, such as antivirals and anticancer agents, and prodrug strategies of nucleotides.

**Biomaterials for Delivery and Targeting of Proteins and Nucleic Acids**-Ram I. Mahato

2004-12-28 Newcomers to the field of biopharmaceuticals require an understanding of the basic principles and underlying methodology involved in developing protein- and nucleic acid-based therapies for genetic and acquired diseases. Biomaterials for Delivery and Targeting of Proteins and Nucleic Acids introduces the principles of polymer science and chemistry, as well as the basic biology required for understanding how biomaterials can be used as drug-delivery vehicles. No book to date combines a discussion of high-tech biomaterials-based delivery of protein and nucleic acid drugs with the pharmaceutical or biocompatibility aspects. Featuring contributions from leading experts from around the world, this text discusses physiochemical parameters used for design, development, and evaluation of biotechnological dosage forms for delivery of proteins, peptides, oligonucleotides, and genes. The authors also

present biological barriers to extravasation and cellular uptake of proteins and nucleic acids. Combining an introduction to biomaterial delivery with the latest developments in the field, this is a valuable reference for both the novice student and the practicing scientist on delivery of biomaterials, on biomedical polymers, and on polymer therapeutics. Understanding these core fundamentals is critical to moving on to more advanced study.

**Textbook of Structural Biology**-Anders Liljas  
2009 A textbook for undergraduate and graduate students in structural biology, chemistry, biochemistry, biology and medicine. It covers various aspects of proteins, nucleic acids and lipids, including the rise and fall of proteins, membranes and gradients, the structural biology of cells, and evolution - the comparative structural biology.

**Molecular Biology of the Gene**-James D.

Watson 1987

**RNA Nanotechnology and Therapeutics-**

Peixuan Guo 2013-07-09 Interest in RNA nanotechnology has increased in recent years as recognition of its potential for applications in nanomedicine has grown. Edited by the world's foremost experts in nanomedicine, this comprehensive, state-of-the-art reference details the latest research developments and challenges in the biophysical and single molecule approaches in RNA nanotechnology. In addition, the text also provides in-depth discussions of RNA structure for nanoparticle construction, RNA computation and modeling, single molecule imaging of RNA, RNA nanoparticle assembly, RNA nanoparticles in therapeutics, RNA chemistry for nanoparticle synthesis, and conjugation and labeling.

**Encyclopedia of Astrobiology**-Ricardo Amils  
2021-01-14 The interdisciplinary field of

Astrobiology constitutes a joint arena where provocative discoveries are coalescing concerning, e.g. the prevalence of exoplanets, the diversity and hardiness of life, and its increasingly likely chances for its emergence. Biologists, astrophysicists, biochemists, geoscientists and space scientists share this exciting mission of revealing the origin and commonality of life in the Universe. The members of the different disciplines are used to their own terminology and technical language. In the interdisciplinary environment many terms either have redundant meanings or are completely unfamiliar to members of other disciplines. The Encyclopedia of Astrobiology serves as the key to a common understanding. Each new or experienced researcher and graduate student in adjacent fields of astrobiology will appreciate this reference work in the quest to understand the big picture. The carefully selected group of active researchers contributing to this work and the expert field editors intend for their contributions, from an internationally comprehensive perspective, to

accelerate the interdisciplinary advance of astrobiology.

### **Extracellular Nucleic Acids**-Yo Kikuchi

2010-07-23 Extracellular nucleic acids have recently emerged as important players in the fields of biology and the medical sciences. In the last several years, extracellular nucleic acids have been shown to be involved in not only microbial evolution as genetic elements but also to have structural roles in bacterial communities, such as biofilms. Circulating DNA and RNA have been found in human blood and expected to be useful as non-invasive markers for the diagnosis of several diseases. In addition, extracellular nucleic acids have attracted attention as active modulators of the immune system of higher organisms, including humans. This book covers nearly all of the newly developing fields related to extracellular nucleic acids, including those of basic biology, ecology and the medical sciences, and provides readers with the latest knowledge on them.

### **Molecular Modeling of Nucleic Acids-**

Santalucia Leontis 1998 Covering numerous topics in modeling nucleic acids, this volume looks at the role of various spectroscopic methods, simulations of molecular dynamics using particle mesh methods, and dynamic and genetic algorithms for predicting RNA secondary structure. It also covers the thermodynamics of nucleic acid folding and three-dimensional structure prediction based on sequence information.

### **Fundamentals of Protein Structure and**

**Function-**Engelbert Buxbaum 2015-11-27 This book serves as an introduction to protein structure and function. Starting with their makeup from simple building blocks, called amino acids, the 3-dimensional structure of proteins is explained. This leads to a discussion how misfolding of proteins causes diseases like cancer, various encephalopathies, or diabetes.

Enzymology and modern concepts of enzyme kinetics are then introduced, taking into account the physiological, pharmacological and medical significance of this often neglected topic. This is followed by thorough coverage of hæmoglobin and myoglobin, immunoproteins, motor proteins and movement, cell-cell interactions, molecular chaperones and chaperonins, transport of proteins to various cell compartments and solute transport across biological membranes. Proteins in the laboratory are also covered, including a detailed description of the purification and determination of proteins, as well as their characterisation for size and shape, structure and molecular interactions. The book emphasises the link between protein structure, physiological function and medical significance. This book can be used for graduate and advanced undergraduate classes covering protein structure and function and as an introductory text for researchers in protein biochemistry, molecular and cell biology, chemistry, biophysics, biomedicine and related courses. About the author: Dr. Buxbaum is a biochemist with

interest in enzymology and protein science. He has been working on the biochemistry of membrane transport proteins for nearly thirty years and has taught courses in biochemistry and biomedicine at several universities.

### **Basic Principles of Analytical**

**Ultracentrifugation**-Peter Schuck 2016-01-05 Analytical ultracentrifugation (AUC) can supply rich information on the mass, shape, size distribution, solvation, and composition of macromolecules and nanoscopic particles. It also provides a detailed view of their reversible single- or multi-component interactions over a wide range of affinities. Yet this powerful technique has been hard to master in mainstream molecular sciences due to a lack of comprehensive books on the subject. Filling this gap in the literature of biophysical methodology, *Basic Principles of Analytical Ultracentrifugation* explains the fundamentals in the theory and practice of AUC. The book provides you with up-to-date experimental information to confidently

practice AUC. You will understand the basic concepts, full potential, and possible pitfalls of AUC as well as appreciate the current relevance of past work in the field. The book first introduces the basic principles and technical setup of an AUC experiment and briefly describes the optical systems used for detection. It then explores the ultracentrifugation experiment from a macromolecular standpoint, offering a detailed physical picture of the sedimentation process and relevant macromolecular parameters. The authors present important practical aspects for conducting an experiment, including sample preparation, data acquisition and data structure, and the execution of the centrifugal experiment. They also cover instrument calibration and quality control experiments.

### **A Mathematical Primer of Molecular Phylogenetics**

-Xuhua Xia 2020-04-13 This volume, *A Mathematical Primer of Molecular Phylogenetics*, offers a unique perspective on a number of phylogenetic issues that have not been

covered in detail in previous publications. The volume provides sufficient mathematical background for young mathematicians and computational scientists, as well as mathematically inclined biology students, to make a smooth entry into the expanding field of molecular phylogenetics. The book will also provide sufficient details for researchers in phylogenetics to understand the workings of existing software packages used. The volume offers comprehensive but detailed numerical illustrations to render difficult mathematical and computational concepts in molecular phylogenetics accessible to a variety of readers with different academic background. The text includes examples of solved problems after each chapter, which will be particularly helpful for fourth-year undergraduates, postgraduates, and postdoctoral students in biology, mathematics and computer sciences. Researchers in molecular biology and evolution will find it very informative as well.

### **Applications of RNA-Seq and Omics**

**Strategies**-Fabio Marchi 2017-09-13 The large potential of RNA sequencing and other "omics" techniques has contributed to the production of a huge amount of data pursuing to answer many different questions that surround the science's great unknowns. This book presents an overview about powerful and cost-efficient methods for a comprehensive analysis of RNA-Seq data, introducing and revising advanced concepts in data analysis using the most current algorithms. A holistic view about the entire context where transcriptome is inserted is also discussed here encompassing biological areas with remarkable technological advances in the study of systems biology, from microorganisms to precision medicine.

**Introduction to Protein Structure**-Carl Ivar Branden 2012-03-26 The VitalBook e-book of Introduction to Protein Structure, Second Edition is inly available in the US and Canada at the present time. To purchase or rent please visit

<http://store.vitalsource.com/show/9780815323051>  
Introduction to Protein Structure provides an account of the principles of protein structure, with examples of key proteins in their bio

**Molecular Diagnostics**-E. van Pelt-Verkuil  
2019-06-03 The books Molecular Diagnostics Part 1 and 2 provide a comprehensive and practical overview of the state-of-the-art molecular biological diagnostic strategies that are being used in a wide variety of disciplines. The editors and experts in their respective fields have combined their knowledge to write these two books. Many years of experience in the development, application and quality control of molecular diagnostic methods is reflected herewith. Molecular Diagnostics Part 1 is dedicated to the theoretical backgrounds of the technologies often applied in molecular diagnostics, in which nucleic acid amplification methods (such as real-time PCR), sequencing and bioinformatics are the basic tools. The assay design and -development, combined with items of

trouble-shooting are described in detail. As a foundation of reliable molecular diagnostic assays, the quality control required for validation, implementation and performance of molecular diagnostic assays is thoroughly discussed. This book also provides extensive information for those working with molecular techniques in a wide variety of research applications using conventional and real-time PCR technology, Sanger and high throughput sequencing techniques, and bioinformatics. Molecular Diagnostics Part 2 highlights the applications of the molecular diagnostic methods in the various diagnostic laboratories, comprising: - Clinical microbiology - Clinical chemistry - Clinical genetics - Clinical pathology - Molecular hematopathology - Veterinary health - Plant health - Food safety Both full-colour and well-illustrated books are particularly valuable for students, clinicians, scientists and other professionals who are interested in (designing) molecular diagnostic methods and for those who wish to broaden their knowledge on the current molecular biological revolution. The information

in the books highlights the trend of the integration of multiple (clinical) disciplines into one universal molecular laboratory.

**Quadruplex Nucleic Acids**-Jonathan B. Chaires 2014-07-08 Gaining Insights into the Small Molecule Targeting of the G-Quadruplex in the c-MYC Promoter Using NMR and an Allele-Specific Transcriptional Assay, by Christine E. Kaiser, Vijay Gokhale, Danzhou Yang and Laurence H. Hurley.- Higher-Order Quadruplex Structures, by Luigi Petraccone.- Investigation of Quadruplex Structure Under Physiological Conditions Using In-Cell NMR, by Robert Hänsel, Silvie Foldynová-Trantírková, Volker Dötsch and Lukás Trantírek.- Circular Dichroism of Quadruplex Structures, by Antonio Randazzo, Gian Piero Spada and Mateus Webba da Silva.- Molecular Crowding and Hydration Regulating of G-Quadruplex

Formation, by Daisuke Miyoshi, Takeshi Fujimoto and Naoki Sugimoto.- Visualizing the Quadruplex: From Fluorescent Ligands to Light-Up Probes, by Eric Largy, Anton Granzhan, Florian Hamon, Daniela Verga and Marie-Paule Teulade-Fichou.- Calculation of Hydrodynamic Properties for G-Quadruplex Nucleic Acid Structures from in silico Bead Models, by Huy T. Le, Robert Buscaglia, William L. Dean, Jonathan B. Chaires and John O. Trent.- Energetics of Ligand Binding to G-Quadruplexes, Concetta Giancola and Bruno Pagano.- Tetramolecular Quadruplex Stability and Assembly, by Phong Lan Thao Tran, Anne De Cian, Julien Gros, Rui Moriyama and Jean-Louis Mergny.