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RNA Interference and CRISPR Technologies Academic Press A new paradigmatic understanding of evolution, genetic novelty, code-

generating, genome-formatting factors, infectious RNA Networks, viruses and other natural genetic content operators.

Experience and Future Prospects

Springer Nature

Recent progress in high-throughput technologies and genome wide transcriptome studies have lead to a significant scientific milestone of discovering non-coding RNAs (ncRNAs) which spans through a major portion of the genome. These RNAs most often act as riboregulators, and actively participate in the regulation of important cellular functions at the transcriptional and/or post-transcriptional levels rather than simply being an intermediated messenger between DNA and proteins. As the appreciation for the importance of ncRNAs continues to emerge, it is also increasingly clear that these play critical roles in gene regulatory processes during development and differentiation. Further, regulatory RNAs are useful biomarkers for diagnosis of diseases. Hence these RNA regulators are essential to the development of therapeutics. This book on " Regulatory RNAs " offers a comprehensive view on our current understanding of these regulatory RNAs viz. siRNA, miRNA, piRNA, snoRNA, long non-coding RNA, small RNA etc. It addresses both the biogenesis and mechanism of action of regulatory RNAs with a primary focus on their annotation, experimental methodologies (microarray, next-gen sequencing etc.) for their discovery, computational tools for their prediction, and above all, applications of these revolutionary regulatory molecules in understanding biological systems and diseases, including therapeutics. This comprehensive volume is intended for readers with research or teaching interests in ncRNA biology and will provide a major information resource on current research in the fast-moving fields of RNA and gene expression regulation. Cutting-edge and concise, " Regulatory RNAs: Basics, Methods and Applications " promises to support

vital research in the field of regulatory RNAs, ever-continuing to grow rapidly and gain increasing importance in basic and translational biology.

Abiotic Stress-Mediated Sensing and Signaling in Plants: An Omics Perspective CRC Press The book Heat Shock Proteins in Neuroscience provides the most comprehensive review on contemporary knowledge on the role of HSP in signaling pathways relevant to a number of diseases. Using an integrative approach, the contributors provide a synopsis of novel mechanisms, signal transduction pathways. To enhance the ease of reading and comprehension, this book has been subdivided into various section including; Section I, reviews current progress on our understanding of Neurological Aspects of HSP; Section II, focuses on Aspects of HSP in Neurodegenerative Diseases and Disorders, Section III, emphasizes the importance of HSP in Multiple Sclerosis; Section IV, reviews critical Aspects of HSP in Alzheimer's Disease and Section V, gives a comprehensive update of the Development of HSP-Based Therapies for Neurological Disorders. Key basic and clinical research laboratories from major universities, academic medical hospitals, biotechnology and pharmaceutical laboratories around the world have contributed

chapters that review present research activity and importantly project the field into the future. The book is a must read for starters and professionals in the fields of Neurology and Neurosciences, Translational Medicine, Clinical Research, Human Physiology, Biotechnology, Cell & Molecular Medicine, Pharmaceutical Scientists and Researchers involved in Drug Discovery.

Assessing Safety and Managing Risk Springer Nature

While there has been great progress in the development of plant breeding over the last decade, the selection of suitable plants for human consumption began over 13,000 years ago. Since the Neolithic era, the cultivation of plants has progressed in Asia Minor, Asia, Europe, and ancient America, each specific to the locally wild plants as well as the ecological and social conditions. A handy reference for knowing our past, understanding the present, and creating the future, this book provides a comprehensive treatment of the development of crop improvement methods over the centuries. It features an extensive historical treatment of development, including influential individuals in the field, plant cultivation in various regions, techniques used in the Old World, and cropping in ancient America. The advances of scientific plant breeding in the twentieth century is extensively explored, including efficient selection methods, hybrid breeding, induced polyploidy, mutation research, biotechnology, and genetic manipulation. Finally, this book presents information on approaches to the sustainability of breeding and to cope with climatic changes as well as the growing world population.

RNA Editing

Academic Press

For more than four

decades, Molecular Biology of the Cell has distilled the vast amount of scientific knowledge to illuminate basic principles, enduring concepts, and cutting-edge research. The Seventh Edition has been extensively revised and updated with the latest research, and has been thoroughly vetted by experts and instructors. The classic companion text, The Problems Book, has been reimagined as the Digital Problems Book in Smartwork, an interactive digital assessment course with a wide selection of questions and automatic-grading functionality. The digital format with embedded animations and dynamic question types makes the Digital Problems Book in Smartwork easier to assign than ever beforeÑfor both in-person and online classes.

Molecular Biology of RNA Academic Press RNAi technology is used for large-scale screens that systematically shut down each gene in the cell, which can help identify the components necessary for a particular cellular process or an event such as cell

division. Exploitation of the pathway is also a promising tool in biotechnology and medicine. Introducing new technology in the study of RNA

Medical Biochemistry Jones & Bartlett Learning Written in easy to follow language, the book presents cutting-edge agriculturally relevant plant biotechnologies and applications in a manner that is accessible to all. This book updates and introduces the scope and method of plant biotechnologies and molecular breeding within the context of environmental analysis and assessment, a diminishing supply of productive arable land, scarce water resources and climate change. New plant breeding techniques including CRISPR-cas system are now tools to meet these challenges both in developed countries and in developing countries. Ethical issues, intellectual property rights, regulation policies in various countries related to agricultural biotechnology are examined. The rapid developments in plant biotechnology

are explained to a large audience with relevant examples. New varieties of crops can be adapted to new climatic conditions in order to reduce pest-associated losses and the adverse abiotic effects

Molecular Biology of the Cell John Wiley & Sons

The second edition of a highly acclaimed handbook and ready reference. Unmatched in its breadth and quality, around 100 specialists from all over the world share their up-to-date expertise and experiences, including hundreds of protocols, complete with explanations, and hitherto unpublished troubleshooting hints. They cover all modern techniques for the handling, analysis and modification of RNAs and their complexes with proteins. Throughout, they bear the practising bench scientist in mind, providing quick and reliable access to a plethora of solutions for practical questions of RNA research, ranging from simple to highly complex. This broad scope allows the treatment of specialized methods side by side with basic biochemical techniques, making

the book a real treasure trove for every researcher experimenting with RNA.

Modulating Gene Expression Springer Science & Business Media

Committed to Excellence in the Landmark Tenth Edition. This edition continues the evolution of Raven & Johnson's Biology. The author team is committed to continually improving the text, keeping the student and learning foremost. We have integrated new pedagogical features to expand the students' learning process and enhance their experience in the ebook. This latest edition of the text maintains the clear, accessible, and engaging writing style of past editions with the solid framework of pedagogy that highlights an emphasis on evolution and scientific inquiry that have made this a leading textbook for students majoring in biology and have been enhanced in this landmark Tenth edition. This emphasis on the organizing power of evolution is combined with an integration of the importance of cellular, molecular biology and genomics to offer our readers a text that is

student friendly and current. Our author team is committed to producing the best possible text for both student and faculty. The lead author, Kenneth Mason, University of Iowa, has taught majors biology at three different major public universities for more than fifteen years. Jonathan Losos, Harvard University, is at the cutting edge of evolutionary biology research, and Susan Singer, Carleton College, has been involved in science education policy issues on a national level. All three authors bring varied instructional and content expertise to the tenth edition of Biology.

RNA-Based Regulation in Human Health and Disease CRC Press

A comprehensive look at empirical approaches to molecular discovery, their relationships with rational design, and the future of both Empirical methods of discovery, along with serendipitous and rational design approaches, have played an important role in human history. Searching for Molecular Solutions compares empirical discovery strategies for biologically useful molecules with serendipitous discovery and rational design, while also considering the strengths and limitations of empirical pathways to

molecular discovery. Logically arranged, this text examines the different modes of molecular discovery, empha-sizing the historical and ongoing importance of empirical strategies. Along with a broad overview of the subject matter, Searching for Molecular Solutions explores: The differing modes of molecular discovery Biological precedents for evolutionary approaches Directed evolutionary methods and related areas Enzyme evolution and design Functional nucleic acid discovery Antibodies and other recognition molecules General aspects of molecular recognition Small molecule discovery approaches Rational molecular design The interplay between empirical and rational strategies and their ongoing roles in the future of molecular discovery Searching for Molecular Solutions covers several major areas of modern research, development, and practical applications of molecular sciences. This text offers empirical-rational principles of broad relevance to scientists, professionals, and students interested in general aspectsof molecular discovery, as well as the thought processes behind experimental approaches. Note: CD-ROM/DVD and other supplementary materials are not included as part of eBook file.

CRISPR and RNAi Systems Oxford

University Press Refinement in sequencing technologies and potential of genomic research resulted in meteoric growth of biological information such as sequences of DNA, RNA and protein requiring databases for efficient storage, management and retrieval of the biological information. Also, computational algorithms for analysis of these colossal data became a vital aspect of biological sciences. The work aims to show the process of turning bioscience innovation into companies and products, covering the basic science, the translation of science into technology. Due to rapid developments, there seems to be no basic difference between the pharmaceutical industry and the biotechnological industry. However, approved products in the pipeline and renewed public confidence make it one of the most promising areas of economic growth in the near future. India offers a huge market for the

products as well as cheap manufacturing base for export. The book is a sincere work of compilation of new and recent advances in the topic of concern through various innovative researches and scientific opinion therefrom. The book is dedicated to the readers who will definitely find it interesting and knowledgeable in carrying out their respective researches in different aspects of applied microbiology and biotechnology.

Handbook of RNA Biochemistry John Wiley & Sons

RNA plays a central, and until recently, somewhat underestimated role in the genetics underlying all forms of life on earth. This versatile molecule not only plays a crucial part in the synthesis of proteins from a DNA template, but is also intrinsically involved in the regulation of gene expression, and can even act as a catalyst in the form of a ribozyme. This latter property has led to the hypothesis that RNA - rather than DNA - could have played an essential part in the origin of life itself. This landmark text provides a systematic overview of the exciting and rapidly moving field of RNA biology. Key pioneering experiments, which

provided the underlying evidence for what we now know, are described throughout, while the relevance of the subject to human disease is highlighted via frequent boxes. For the second edition of Molecular Biology of RNA, more introductory material has been incorporated at the beginning of the text, to aid students studying the subject for the first time. Throughout the text, new material has been included - particularly in relation to RNA binding domains, non-coding RNAs, and the connection between RNA biology and epigenetics. Finally, a new closing chapter discusses how exciting new technologies are being used to explore current topical areas of research.

RNA Modification CRC Press

A renaissance of virus research is taking centre stage in biology. Empirical data from the last decade indicate the important roles of viruses, both in the evolution of all life and as symbionts of host organisms. There is increasing evidence that all cellular life is colonized by exogenous and/or endogenous viruses in a non-lytic but persistent lifestyle. Viruses and viral parts form the most numerous genetic matter on this planet.

The Design and Study of Chemically Modified RNA for RNA Interference and RNA Editing Using Structure Guided

Approaches Springer Nature

RNA Interference, Editing, and ModificationMethods and Protocols H [Recurso Electrónico]Springer Science & Business Media

RNA Interference, Editing, and Modification CRC Press

This book covers a range of important topics on crop and animal genetics, breeding and genomics, as well as biodiversity and genetic resources conservation and utilization reflecting three thematic sections of working groups of the Biotechnology Society of Nigeria. The topics range from agricultural biotechnology, including genetically modified organisms and gene-editing for agronomically important traits in tropical crops, to Nigeria's mega biodiversity and genetic resources conservation. This book will engender a deeper understanding of underpinning mechanisms, technologies, processes and science–policy nexus that has placed Nigeria as a leader in biotechnology in Africa. The book will be useful reference material for scientists and researchers working

in the fields of food and agricultural biotechnology, bioinformatics, plant and animal genetics, breeding and genomics, genetic resources conservation and enhancement. Emphasizes recent advances in biotechnologies that could ameliorate the high-level global food and nutrition insecurity through plant and animal genetics, breeding, as well as genomics Provides detailed information towards harnessing indigenous bioresources for food and nutrition security and climate change adaptation Introduces new frontiers in the area of genomics, most especially their relevant applications in crop and animal breeding Reviews biotechniques that could enhance plant genetic resources conservation and utilization Discusses current biotechnological approaches to exploit genetic resources including the development of synthetic hexaploid wheat (SHW) for crop adaptation to the increasingly changing global climate Olawole O. Obembe, Ph.D., is a Professor of Plant Biotechnology and UNESCO Chair, Plant Biotechnology, Covenant University

Ota, Nigeria. Emmanuel Olufemi Ekundayo, Ph.D., is Associate Professor of Medical Microbiology and Microbial Genetics, Michael Okpara University of Agriculture, Umudike, Nigeria. Arinze Stanley Okoli, Ph.D., is Associate Professor at Genoek – Centre for Biosafety, Universitetet II, Breivika, Tromsoe, Norway. Abubakar Gidado, Ph.D., is Professor of Biochemistry and Director North-East Zonal Biotechnology Centre of Excellence at the University of Maiduguri, Nigeria. Charles Oluwaseun Adetunji, Ph.D., is Associate Professor of Microbiology and Biotechnology and Director of Intellectual Property and Technology Transfer, Edo State University, Uzairue, Nigeria. Abdulrazak B. Ibrahim, Ph.D., is a Capacity Development Expert at the Forum for Agricultural Research in Africa (FARA) and Associate Professor of Biochemistry, Ahmadu Bello University, Zaria, Nigeria. Benjamin Ewa Ubi, Ph.D., is a Professor of Plant Breeding and Biotechnology and Director, Biotechnology Research and Development Centre, Ebonyi State

University Abakaliki, Nigeria. *Technical Advances and New Therapeutic Opportunities* Bentham Science Publishers Frontiers in Clinical Drug Research – HIV is a book series that brings updated reviews to readers interested in learning about advances in the development of pharmaceutical agents for the treatment of acquired immune deficiency syndrome (AIDS) and other disorders associated with human immunodeficiency virus (HIV) infection. The scope of the book series covers a range of topics including the medicinal chemistry and pharmacology of natural and synthetic drugs employed in the treatment of AIDS (including HAART) and resulting complications, and the virology and immunological study of HIV and related viruses. Frontiers in Clinical Drug Research – HIV is a valuable resource for pharmaceutical scientists, clinicians and postgraduate students seeking updated and critically important information for developing clinical trials and devising research plans in HIV/AIDS research. The fifth volume of this series features 5 chapters that cover

these topics: - Clinical Eradication of Latent HIV Reservoirs: Where Are We Now? - HIV-1 Genotypic Drug Resistance Testing and Next-Generation Sequencing - Current and Promising Multiclass Drug Regimens and Long-Acting Formulation Drugs in HIV Therapy - Role of Nanotechnology in HIV Diagnosis and Prognosis - Preventive and Therapeutic Features of Combination Therapy for HIV.

Searching for Molecular Solutions Springer Nature

RNA processing plays a critical role in realizing the full potential of a given genome. One means of achieving protein diversity is through RNA editing. A diverse array of editing events has been characterized, affecting gene expression in organisms from viruses and single cell parasites to humans and plants. The variety of editing mechanisms has required the development of many different experimental approaches, many of which are likely to be broadly applicable, particularly given the interplay between editing and other cellular processes, including transcription, splicing, and RNA silencing. RNA Editing not only covers most of the principal methods employed in the field, but also offers

innovative solutions to the significant challenges posed by these experimental systems. Presents newly developed methods Covers topics ranging from biochemistry to bioinformatics Includes innovative solutions to potential problems

RNA Interference, Editing, and Modification

Springer Science & Business Media

Nucleic acids have been studied extensively due to their numerous functional roles in biological systems. Biological processes associated with the post transcriptional modification of RNA, namely RNA interference (RNAi) and RNA editing, have shown therapeutic potential due to their ability to alter mRNAs. RNA interference is a process which results in the cleavage of mRNA transcripts using a guide RNA template to find its target sequence and prevent translational expression. RNA editing causes the recoding of mRNA transcripts, altering protein function. The following dissertation discusses

experiments which guide the chemical modification of RNA substrates of RNAi and RNA editing to bypass hurdles associated with their development as therapeutics. The Beal lab studies nucleobase modifications of short interfering RNAs (siRNAs), which are used in RNAi to target mRNA sequences of interest. Chapters 2 and 3 of this thesis will discuss nucleobase modifications to bypass the innate immune response of the cell and prevent off-target knockdown of undesired mRNA sequences. Using the crystal structures of an innate immune signaling protein, Toll-like Receptor 8 (TLR8), and of the catalytic endonuclease of RNAi, Argonaute 2 (Ago2), new chemical modifications for siRNAs were synthesized which can bypass TLR8 recognition and allow selective target mRNA cleavage by Ago2. Crystal structures of TLR8 bound to a small molecule and RNA derived agonists allowed the rational design

of major and minor groove nucleobase modifications for siRNAs to bypass TLR8 recognition. To study the off-target knockdown of mRNA transcripts by Ago2, ethynyl modified riboses and nucleobases within key positions of the siRNA sequence were synthesized. Crystal structures of guide RNA loaded hAgo2 bound to an off-target mimic were vital for the study of these new triazoles. This resulted in the development of new siRNAs which were able to select for the knockdown of their targeted sequence over known off-target sequences. Chapter 4 of this dissertation discusses preliminary work in the use of small molecule molecular docking software to find nucleobase modifications to enhance RNA/protein interactions. New RNAs which can bind to guide strand loaded Ago2 were synthesized using this screening method and were found to bind more tightly than three of the four canonical RNA bases. This screening method

was also applied to the RNA editing protein adenosine deaminase acting on RNA 2 (ADAR2). The recently solved crystal structure of ADAR2's catalytic domain bound to its RNA substrate displayed a potential binding pocket to which modified, non-edited RNAs could bind. This work discusses the preliminary results of these modified non-edited RNAs, and how they influence the deamination reaction of ADAR2. This chapter also discusses the use of the transition state inhibitor 8-aza-nebularine from the solved crystal structure, as a ligand to accomplish a molecular docking screen to search for potential inhibitors of ADAR2.

Nanobiotechnology Approaches to Plant Breeding and Protection RNA Interference, Editing, and ModificationMethods and Protocols H [Recurso Electrónico] RNA and DNA Editing assembles a team of leading experts who present the latest discoveries in the field alongside the latest models and methodology. In addition, the authors

set forth the many open questions and suggest routes for further investigation. Overall, the book serves as a practical guide for professionals in the field who need to understand the interrelationship of RNA and DNA editing with other chemical and biological processes.

Genome Invading RNA Networks Springer Science & Business Media

RNA interference (RNAi) is a widely used technology for gene silencing and has become a key tool in a myriad of research and lead discoveries. In recent years, the mechanism of RNAi agents has been well investigated, and the technique has been optimized for better effectiveness and safety. On the other hand, the clustered regularly interspaced short palindromic repeats (CRISPR)-associated Cas9/gRNA system is a recent, novel, targeted genome-editing technique derived from the bacterial immune system. Recent advances in gene-editing research and technologies have enabled the CRISPR Cas9 system to become a popular tool for sequence-specific gene editing to correct and modify

eukaryotic systems. disorders. In this book, we will focus on the mechanisms, applications, regulations (their pros and cons), and various ways in which RNAi-based methods and CRIPSR-Cas9 technology have stimulated the modulation of gene expression, thereby making them a promising therapeutic tool to treat and prevent complex diseases and