

Grade 8 Biotechnology Mrs Pitoc

Providing information on the main approaches for the analysis of metabolites, this textbook: Covers basic methodologies in sample preparation and separation techniques, as well as the most recent techniques of mass spectrometry.

Differentiates between primary and secondary metabolites. Includes four chapters discussing successful metabolome studies of different organisms. Highlights the analytical challenges of studying metabolites. Illustrates applications of metabolome analysis through the use of case studies.

This book focuses on the development and applications of functional nucleic acid-based detection methods in the context of food safety. Offering a comprehensive overview of nucleic acids detection method in food safety for professionals and members of the public interested in this area, the book is divided into two parts. Part I addresses the basic principle of nucleic acid detection, while Part II presents novel applications of detection methods in genetically modified organisms, the identification of dead-alive microorganisms, microbial diversity, heavy metal detection, gene toxicity and non-coding RNA identification. As such, it provides readers a wealth of knowledge on the use of nucleic acids as targets and media in food safety. It offers a valuable resource for clinicians and basic scientists in the areas of food science and microbiology, and for all those who are interested in the concrete applications of molecular biological techniques. p>

This book reviews the development, characterization and applications of aptamers in different areas of biotechnology ranging from therapeutics to diagnostics and protein purification. Hailed as chemical antibodies, these single-stranded nucleic acid receptors were predicted to supersede antibodies in traditional assays, such as ELISA, within a short time. While this has yet to happen, readers will find in this book a deep insight into the progress of aptamer technology and a critical discussion about the limitations that need to be overcome in order to find wider acceptance and use outside of the still relatively small aptamer-community. This book covers all aspects of aptamer generation and application for the aptamer-experienced reader and curious novice alike, with the addition of an industry perspective on the future of aptamer-use in biotechnology.

Synthesis and Applications of DNA and RNA discusses the significant contributions in the development of synthetic routes to DNA and RNA. This book contains nine chapters that describe the complexities in the chemistry and biology of DNA and RNA. After briefly dealing with the various stages of development in the chemical synthesis of polynucleotides, this book goes on presenting the DNA synthesis on solid supports and through the phosphoramidite method on silica supports. The discussions then shift to the chemical-enzymatic synthesis of expressed genes; the biochemical aspects of chemical syntheses of oligoribonucleotides; and the methods of rapid DNA and RNA sequence analysis. A chapter specifically tackles the protocols of DNA synthesis using double-stranded plasmid DNA as a template. The final chapter deals with the use of oligonucleotides for the identification and isolation of specific gene sequences. This chapter also covers the use oligonucleotides in the detection of human genetic diseases. Biologists, geneticists, and researchers interested in DNA and RNA synthesis will find this work invaluable.

This volume serves as a valuable handbook for the development of nanomedicines made of polymer nanoparticles because it provides researchers, students, and entrepreneurs with all the material necessary to begin their own projects in this field. Readers will find protocols to prepare polymer nanoparticles using different methods, since these are based on the variety of experiences that experts encounter in the field. In addition, complex topics such as, the optimal characterization of polymer nanoparticles is discussed, as well as practical guidelines on how to formulate polymer nanoparticles into nanomedicines, and how to modify the properties of nanoparticles to give them the different functionalities required to become an efficient nanomedicine for different clinical applications. The book also discusses the translation of technology from research to practice, considering aspects related to industrialization of preparation and aspects of regulatory and clinical development.

Master the art and science of specimen collection, preparation, and evaluation with *Canine & Feline Cytology: A Color Atlas and Interpretation Guide, Second Edition*. This easy-to-use guide covers all body systems and fluids including a special chapter on acquisition and management of cytology specimens. Hundreds of vivid color images of normal tissue alongside abnormal tissue images – plus concise summaries of individual lesions and guidelines for interpretation - will enhance your ability to confidently face any diagnostic challenge. A greatly expanded image collection, with more than 1,200 vivid, full-color photomicrographic illustrations depicting multiple variations of normal and abnormal tissue for fast and accurate diagnosis Clear, concise descriptions of tissue sampling techniques, slide preparation and examination guidelines Helpful hints for avoiding technical pitfalls and improving diagnostic quality of specimens Includes all body systems and fluids as well as pathological changes associated with infectious agents Histologic and histopathologic correlates provided in all organ system chapters. User-friendly format and logical organization facilitates readability and learning. Expert contributors represent the most respected leaders in the field. NEW! Chapter on Fecal Cytology Highlighted boxes featuring Key Points provide helpful tips for best conceptual understanding and diagnostic effectiveness Photomicrographs now include more comparative histology Discussions of broader uses of stains and immunocytochemistry for differential cytologic characterization Expanded chapter on Advanced Diagnostic Techniques includes more methodology and application of current tools, representing advances in both aspiration and exfoliative cytology.

In this 1993 text, Nobel Prize winner Professor Steitz reviews the wide-ranging research in structural studies of DNA-binding proteins and their complexes with DNA. The author clearly and concisely describes the uses of techniques in molecular genetics, DNA synthesis, protein crystallography and nuclear magnetic resonance.

This book centers on gene therapy and gene transfer approaches to prevent or treat chronic virus infections. The main focus is on the Big Three: human immunodeficiency virus (HIV-1), hepatitis B virus (HBV) and hepatitis C virus (HCV). Ample anti-HIV drugs

are currently available in the clinic and the development of an effective combination therapy has dramatically improved the lifespan and quality of life of infected individuals. A similar trend can already be recognized for HBV and HCV: the development of multiple (directly acting) antiviral drugs and plans to control or even cure the infection. However, approaches that help prevent infection, or which provide long-lasting treatment (such as a cure) remain important goals. Immunization through gene transfer vehicles encoding immunogenic viral proteins shows promise in preventing infections with complex, highly variable, viruses such as HIV-1 or HCV. Gene therapy applications for virus infections have been discussed since the early 1990's. Whereas a true cure seems difficult to achieve for HIV-1 due to its intrinsic property to deposit its genome into that of the host, such attempts may be within reach for HCV where spontaneous viral clearance occurs in a small percentage of the infected individuals. The prospect of original gene therapy approaches may provide alternative ways to reach the same endpoint by, for example, silencing of CCR5 expression post-transcriptionally. Many alternative antiviral strategies have been developed based on a variety of novel molecular methods: e.g. ribozymes. Some studies have progressed towards pre-clinical animal models and a few antiviral gene therapies have progressed towards clinical trials. This book provides an overview of this rapidly progressing field, while focusing on the interface of gene therapy and immunology/vaccinology.

In *The Aptamer Handbook*, leading scientists from academia as well as biotech and pharma companies introduce the revolutionary concept of designing RNA and DNA oligonucleotides with novel functions by in vitro selection. These functions comprise high affinity binding (aptamers), catalytic activity (ribozymes and deoxyribozymes) or combinations of binding and catalytic properties (aptazymes). Basic concepts and technologies describing in detail how these functional oligonucleotides can be identified are presented. Numerous examples demonstrate the versatility of in vitro selected oligonucleotides. Special emphasis has been put on a section that shows the broad applicability of aptamers, e. g. in target validation, for analytics, or as new therapeutics. This first overview in the field is of prime interest for a broad audience of scientists both in academia and in industry who wish to expand their knowledge on the potential of new oligonucleotide functions and their applications.

Magnetic Resonance Imaging (MRI) is one of the most important tools in clinical diagnostics and biomedical research. The number of MRI scanners operating around the world is estimated to be approximately 20,000, and the development of contrast agents, currently used in about a third of the 50 million clinical MRI examinations performed every year, has largely contributed to this significant achievement. This completely revised and extended second edition: Includes new chapters on targeted, responsive, PARACEST and nanoparticle MRI contrast agents. Covers the basic chemistries, MR physics and the most important techniques used by chemists in the characterization of MRI agents from every angle from synthesis to safety considerations. Is written for all of those involved in the development and application of contrast agents in MRI. Presented in colour, it provides readers with true representation and easy interpretation of the images. A word from the Authors: Twelve years after the first edition published, we are convinced that the chemistry of MRI agents has a bright future. By assembling all important information on the design principles and functioning of magnetic resonance imaging probes, this book intends to be a useful tool for both experts and newcomers in the field. We hope that it helps inspire further work in order to create more efficient and specific imaging probes that will allow materializing the dream of seeing even deeper and better inside the living organisms. Reviews of the First Edition: "...attempts, for the first time, to review the whole spectrum of involved chemical disciplines in this technique..."—*Journal of the American Chemical Society* "...well balanced in its scope and attention to detail...a valuable addition to the library of MR scientists..."—*NMR in Biomedicine*

The creator and executive producer of the HBO series offers an inside view of the show, following key events in the lives of the Fisher family, from the beginning of the series through the end of the upcoming third season.

DNA polymerases are core tools for molecular biology including PCR, whole genome amplification, DNA sequencing and genotyping. Research has focused on discovery of novel DNA polymerases, characterization of DNA polymerase biochemistry and development of new replication assays. These studies have accelerated DNA polymerase engineering for biotechnology. For example, DNA polymerases have been engineered for increased speed and fidelity in PCR while lowering amplification sequence bias. Inhibitor resistant DNA polymerase variants enable PCR directly from tissue (i.e. blood). Design of DNA polymerases that efficiently incorporate modified nucleotide have been critical for development of next generation DNA sequencing, synthetic biology and other labeling and detection technologies. The *Frontiers in Microbiology Research Topic on DNA polymerases in Biotechnology* aims to capture current research on DNA polymerases and their use in emerging technologies.

Metabolic engineering is a rapidly evolving field that is being applied for the optimization of many different industrial processes. In this issue of *Advances in Biochemical Engineering/Biotechnology*, developments in different areas of metabolic engineering are reviewed. The contributions discuss the application of metabolic engineering in the improvement of yield and productivity - illustrated by amino acid production and the production of novel compounds - in the production of polyketides and extension of the substrate range - and in the engineering of *S. cerevisiae* for xylose metabolism, and the improvement of a complex biotransformation process.

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.

This book, edited by two innovative leaders in the field, focuses on the new discipline of translational medicine as it pertains to drug development within the pharmaceutical and biotechnology industry. Translational medicine seeks to translate biological and molecular knowledge of disease and how drugs work into innovative development strategies that reduce the cost and increase the speed of delivering new medicines for patients. This book outlines general strategies, biomarker development, imaging tools, translational human models, and examples of their application to real drug development. The latest thinking is presented by researchers from many of the world's leading drug development companies, including Pfizer, Merck, Eli Lilly, Abbott, and Novartis, as well as academic institutions and public-private partnerships that support translational research. This book is essential for anyone interested in translational medicine from a variety of backgrounds: university institutes, medical schools, pharmaceutical companies, and drug development researchers and decision-makers.

The book discusses the basics of aptamers and the advent of aptamer-based technology in recent times. The book covers the

diverse applications of aptamers, such as in detection of animal and plant pathogens, disease diagnosis and therapeutics, environmental contamination detection etc. Besides these applications, the book also describes the use of these synthetic or modified DNA, as drug delivery vehicles. The different chapters describe how the binding capacity and specificity of aptamers can be exploited in various ways. The book also discusses how these attributes of aptamers can outdo the antibody technology in biomedical and diagnostic solutions. This crisp and concise book gives the readers an insight into the most recent biotechnological applications of aptamers. ?

Promotes ease of understanding with a unique problem-solving method and new clinical application scenarios! With a focus on chemistry and physics content that is directly relevant to the practice of anesthesia, this text delivers—in an engaging, conversational style--the breadth of scientific information required for the combined chemistry and physics course for nurse anesthesia students. Now in its third edition, the text is updated and reorganized to facilitate a greater ease and depth of understanding. It includes additional clinical application scenarios, detailed, step-by-step solutions to problems, and a Solutions Manual demonstrating a unique method for solving chemistry and physics problems and explaining how to use a calculator. The addition of a third author--a practicing nurse anesthetist--provides additional clinical relevance to the scientific information. Also included is a comprehensive listing of need-to-know equations. The third edition retains the many outstanding learning features from earlier editions, including a special focus on gases, the use of illustrations to demonstrate how scientific concepts relate directly to their clinical application in anesthesia, and end-of-chapter summaries and review questions to facilitate self-assessment. Ten on-line videos enhance teaching and learning, and abundant clinical application scenarios help reinforce scientific principles and relate them to day-to-day anesthesia procedures. This clear, easy-to-read text will help even the most chemistry- and physics-phobic students to master the foundations of these sciences and competently apply them in a variety of clinical situations. New to the Third Edition: The addition of a third co-author--a practicing nurse anesthetist—provides additional clinical relevance Revised and updated to foster ease of understanding Detailed, step-by-step solutions to end-of-chapter problems Solutions Manual providing guidance on general problem-solving, calculator use, and a unique step-by-step problem-solving method Additional clinical application scenarios Comprehensive list of all key equations with explanation of symbols New instructor materials include PowerPoint slides. Updated information on the gas laws Key Features: Written in an engaging, conversational style for ease of understanding Focuses solely on chemistry and physics principles relevant to nurse anesthetists Provides end-of-chapter summaries and review questions Includes abundant illustrations highlighting application of theory to practice

Nature has long used nucleic acid aptamers and enzymes for regulatory activities, such as the recently discovered “riboswitches” involved in gene expression. The existence of a large array of natural and artificial functional nucleic acids has generated tremendous enthusiasm and new opportunities for molecular scientists from diverse disciplines to devise new concepts and real applications that take advantage of those nucleic acids for sensing and other analytical applications. This book provides a timely and comprehensive overview of recent advances in the field, from leading experts in biology, chemistry, and engineering. A variety of topics are covered, from fundamentals of functional nucleic acids, to their applications as sensors, to nanotechnologies; as well as integration of functional nucleic acids into practical analytical systems.

The Handbook of Immunological Properties of Engineered Nanomaterials provides a comprehensive overview of the current literature, methodologies, and translational and regulatory considerations in the field of nanoimmunotoxicology. The main subject is the immunological properties of engineered nanomaterials. Focus areas include interactions between engineered nanomaterials and red blood cells, platelets, endothelial cells, professional phagocytes, T cells, B cells, dendritic cells, complement and coagulation systems, and plasma proteins, with discussions on nanoparticle sterility and sterilization. Each chapter presents a broad literature review of the given focus area, describes protocols and resources available to support research in the individual focus areas, highlights challenges, and outlines unanswered questions and future directions. In addition, the Handbook includes an overview of and serves a guide to the physicochemical characterization of engineered nanomaterials essential to conducting meaningful immunological studies of nanoparticles. Regulations related to immunotoxicity testing of materials prior to their translation into the clinic are also reviewed. The Handbook is written by top experts in the field of nanomedicine, nanotechnology, and translational bionanotechnology, representing academia, government, industry, and consulting organizations, and regulatory agencies. The Handbook is designed to serve as a textbook for students, a practical guide for research laboratories, and an informational resource for scientific consultants, reviewers, and policy makers. It is written such that both experts and beginners will find the information highly useful and applicable.

-Integration of Systems Biology with Bioprocess Engineering: L-Threonine Production by Systems Metabolic Engineering of Escherichia Coli, By Sang Yup Lee and Jin Hwan Park; -Analysis and Engineering of Metabolic Pathway Fluxes in Corynebacterium glutamicum, By Christoph Wittmann; -Systems Biology of Industrial Microorganisms, Marta Papini, Margarita Salazar, and Jens Nielsen; -De Novo Metabolic Engineering and the Promise of Synthetic DNA, By Daniel Klein-Marcuschamer, Vikramaditya G. Yadav, Adel Ghaderi, and Gregory N. Stephanopoulos; -Systems Biology of Recombinant Protein Production in Bacillus megaterium, Rebekka Biedendieck, Boyke Bunk, Tobias Fürich, Ezequiel Franco-Lara, Martina Jahn, and Dieter Jahn; -Extending Synthetic Routes for Oligosaccharides by Enzyme, Substrate and Reaction Engineering; By Jürgen Seibel, Hans-Joachim Jördening, and Klaus Buchholz; -Regeneration of Nicotinamide Coenzymes: Principles and Applications for the Synthesis of Chiral Compounds; By Andrea Weckbecker, Harald Gröger, and Werner Hummel;

Thrombotic and bleeding disorders affect at least 10 million people in the US alone. As a result there has been much more interest and research into this field. The field of haematology is undergoing major advances in thrombosis research, including significant additions to recommended treatment protocols and guidelines. This new handbook will cover all aspects of the practical management of commonly encountered thrombotic and bleeding disorders, with emphasis on clinical diagnosis, treatment and day-to-day management. It will distil the most clinically relevant material from the literature for all those working in the field of haemostasis and thrombosis.

This detailed volume presents a set of protocols useful for researchers in the field of recombinant immunoglobulin and alternative scaffold engineering, aptamer development, and generation of molecularly imprinted polymers (MIPs). Part I includes methods that deal with amino-acid based synthetic antibodies. Brief protocols about the generation of antibody libraries are detailed, as well as techniques for antibody selection, characterization, and validation. This section is completed by a brief description of a bioinformatics platform that supports antibody engineering during research and development. Part II contains basic procedures about the selection and characterization of aptamer molecules, and Part III describes fundamental processes of MIP generation

and application. Written for the highly successful Methods in Molecular Biology series, chapters include introductions to their respective topics, lists of the necessary materials and reagents, step-by-step, readily reproducible laboratory protocols, and tips on troubleshooting and avoiding known pitfalls. Authoritative and practical, Synthetic Antibodies: Methods and Protocols is an ideal guide for scientists seeking to propel the vital study of antibody research.

Progress and Challenges in Precision Medicine presents an insightful overview to the myriad factors of personalized and precision medicine. The availability of the human genome, large amounts of data on individual genetic variations, environmental interactions, influence of lifestyle, and cutting-edge tools and technologies for big-data analysis have led to the age of personalized and precision medicine. Bringing together a global range of experts on precision medicine, this book collects previously scattered information into one concise volume which covers the most important developments so far in precision medicine and also suggests the most likely avenues for future development. The book includes clinical information, informatics, public policy implications, and information on case studies. It is a useful reference and background work for students, researchers, and clinicians working in the biomedical and medical fields, as well as policymakers in the health sciences. Provides an overview of the growing field of precision medicine Contains chapters from geographically diverse experts in their field Explores important aspects of precision medicine, including applications, ethics, and development

Systems Metabolic Engineering: The Creation of Microbial Cell Factories by Rational Metabolic Design and Evolution, by Chikara Furusawa, Takaaki Horinouchi, Takashi Hirasawa, Hiroshi Shimizu Impacts of Quorum Sensing on Microbial Metabolism and Human Health, by Yang-Chun Yong, Jian-Jiang Zhong CHO Glycosylation Mutants as Potential Host Cells to Produce Therapeutic Proteins with Enhanced Efficacy, by Peiqing Zhang, Kah Fai Chan, Ryan Haryadi, Muriel Bardor, Zhiwei Song Cell-Free Biosystems for Biomanufacturing, by Chun You, Y.-H. Percival Zhang Lipid Bilayer Membrane Arrays: Fabrication and Applications, by Xiaojun Han, Guodong Qi, Xingtao Xu, Lei Wang RNA Aptamers: A Review of Recent Trends and Applications, by Kyung-Nam Kang, Yoon-Sik Lee

With contributions by numerous experts

This volume presents a collection of computational and experimental protocols pertaining to the creation, characterization, and utilization of RNA nanostructures. The chapters in this book cover topics such as ion effects in RNA folding; design and crystallography of self-assembling RNA nanostructures; x-aptamer selection and validation; RNAi in HIV-infected cells; and preparation of a conditional RNA switch. Written in the highly successful Methods in Molecular Biology series format, chapters include introductions to their respective topics, lists of the necessary materials and reagents, step-by-step, readily reproducible laboratory protocols, and tips on troubleshooting and avoiding known pitfalls. Cutting-edge and thorough, RNA Nanostructures: Methods and Protocols is a valuable resource for the design and production of RNA nanostructures. Researchers and scientists sharing these detailed protocols is important for sustained progress in the field.

This volume provides protocol references covering recent developments in the aptamer field. Within the last decade, aptamers have become more and more popular, and their sophisticated biophysical properties together with their ability to be easily modified and, thus, adapted to various regimens makes them a very promising class of compounds. Divided into three sections, the book covers selection, a series of analytical methods to assess biophysical properties of aptamer-target interactions, as well as various applications of aptamers. Written for the highly successful Methods in Molecular Biology series, chapters include introductions to their respective topics, lists of the necessary materials and reagents, step-by-step, readily reproducible laboratory protocols, and tips on troubleshooting and avoiding known pitfalls. Practical and easy to follow, Nucleic Acid Aptamers: Selection, Characterization, and Application provides a state-of-the-art summary of recent developments in the aptamer field and will be a helpful resource for scientists in the life sciences working with aptamers as tools to elucidate biological systems.

In the past few decades there has been incredible growth in "bionano"-related research, which has been accompanied by numerous publications in this field. Although various compilations address topics related to deoxyribonucleic acid (DNA) and protein, there are few books that focus on determining the structure of ribonucleic acid (RNA) and using RNA as building blocks to construct nanoarchitectures for biomedical and healthcare applications. RNA Nanotechnology is a comprehensive volume that details both the traditional approaches and the latest developments in the field of RNA-related technology. This book targets a wide audience: a broad introduction provides a solid academic background for students, researchers, and scientists who are unfamiliar with the subject, while the in-depth descriptions and discussions are useful for advanced professionals. The book opens with reviews on the basic aspects of RNA biology, computational approaches for predicting RNA structures, and traditional and emerging experimental approaches for probing RNA structures. This section is followed by explorations of the latest research and discoveries in RNA nanotechnology, including the design and construction of RNA-based nanostructures. The final segment of the book includes descriptions and discussions of the potential biological and therapeutic applications of small RNA molecules, such as small/short interfering RNAs (siRNAs), microRNAs (miRNAs), RNA aptamers, and ribozymes.

Long-trusted and respected in the field, Diagnostic Cytology and Hematology of the Dog and Cat, 3rd Edition is a complete resource for developing and enriching the knowledge and skills needed for clinical laboratory diagnostics. Detailed illustrations and descriptions of cytologic and hematologic samples enable you to diagnose both common and uncommon diseases in dogs and cats. This concise source of microscopic evaluation techniques and interpretation guidelines for organ tissue, blood, and other body fluid specimens provides you with a basic understanding of sample collection and specimen preparation. Plus, helpful and easier-to-understand algorithms are generously distributed throughout the text, providing clear, easy-to-follow guidelines for diagnosis and treatment. Detailed instructions for in-house laboratory evaluation, as well as submission and transport of samples for commercial laboratory interpretation, are featured in tips and pitfalls throughout discussions on specimen preparation and diagnosis. Easier-to-follow algorithms, additional tables, and a user-friendly format allow quick and easy access to the most relevant information needed in a cytologic diagnosis. Over 1,000 high-quality illustrations help you identify normal versus abnormal cells, enabling you to make accurate diagnoses. Four new chapters—Cell Types and Criteria of Malignancy, Selected Infectious Agents, Round Cell Tumors, and The Pancreas—present detailed information on these topics and how they relate to disease. Highly-respected expert contributors share their expertise from both academia and commercial diagnostic laboratories to provide the best and most current information available. The Lung and Intrathoracic Structures, The Gastrointestinal

Tract, and Effusions: Abdominal, Thoracic, and Pericardial chapters have been expanded for more complete and up-to-date coverage of these important topics.

The bulk of the world's tobacco is produced in low- and middle-income countries. In order to dissuade these countries from implementing policies aimed at curbing tobacco consumption (such as increased taxes, health warnings, advertising bans and smoke-free environments), the tobacco industry claims that tobacco farmers will be negatively affected and that no viable, sustainable alternatives exist. This book, based on original research from three continents, exposes the myths behind these claims.

Recent advances in stem cell biology, nanotechnology and gene therapy have opened new avenues for therapeutics. The availability of molecular therapeutics that rely on the delivery of DNA, RNA or proteins, harnessing enhanced delivery with nanoparticles, and the regenerative potential of stem cells (adult, embryonic or induced pluripotent stem cells) has had a tremendous impact on translational medicine. The chapters in this book cover a range of strategies for molecular and cellular therapies for human disease, their advantages, and central challenges to their widespread application. Potential solutions to these issues are also discussed in detail. Further, the book addresses numerous advances in the field of molecular therapeutics that will be of interest to the general scientific community. Lastly, the book provides specific examples of disease conditions for which these strategies have been transferred to the clinic. As such, it will be extremely useful for all students, researchers and clinicians working in the field of translational medicine and molecular therapeutics.

This book highlights the development of a functional nucleic acid based biosensor detection method in the context of food safety. Although there have been major advances in food processing technology in both developed and developing countries, food safety assurance systems are generally becoming more stringent, in response to growing (both real and perceived) food safety problems. These problems are due in part to foodborne microorganisms, heavy metals, and small chemical molecules (biological toxins, pesticide residues, and veterinary drug residues), etc. In addition, the nucleic acid biomarkers (DNA methylation, microRNA, and circRNA) induced by these risk factors are also closely related to food safety. Accordingly, this book offers a brief guide to targets and strategies in functional nucleic acid based biosensors for food safety detection. Divided into several chapters that focus on various respective targets, it will be a valuable resource for students and researchers in the fields of biosensor detection, food science etc.

Artificial riboswitches and other ligand-responsive gene regulators make it possible to switch protein synthesis ON or OFF with arbitrary ligand molecules. *Artificial Riboswitches: Methods and Protocols* focuses on the state-of-the-art methods developed in recent years for creating artificial riboswitches, therefore this volume could be regarded as a collection of recipes for the gene circuit elements in synthetic biology and metabolic engineering. Chapters cover topics such as screening or rational design methods for obtaining artificial riboswitches that function in either bacterial or eukaryotic translational systems, protocols for evaluating the activities of the resultant riboswitches, as well as protocols for construction of ligand-dependent, trans-acting gene regulators. Written in the successful *Methods in Molecular Biology* series format, chapters include introductions to their respective topics, lists of the necessary materials and reagents, step-by-step, readily reproducible protocols, and notes on troubleshooting and avoiding known pitfalls. Authoritative and easily accessible, *Artificial Riboswitches: Methods and Protocols* seeks to serve not only bioengineers who aim to reprogram cell behaviors and molecular biologists who leverage these regulators for genetic studies, but to all researchers interested in this fascinating field.

The basic principle of electron crystallography is to calculate a 3D density map by combining the amplitudes obtained from electron diffraction patterns with the experimental phases calculated from images of two-dimensional crystals of membrane or soluble proteins. This technology is very well developed and has produced a number of atomic models of membrane proteins in a lipid environment. Focused on comprehensive experimental protocols, *Electron Crystallography of Soluble and Membrane Proteins: Methods and Protocols* covers the entire range of techniques used in electron crystallography, including protein sample preparation, 2D crystallization, and screening in negative stain over electron cryo-microscopy (cryo-EM) and data processing, as well as modeling of conformational changes. Additional chapters provide perspective on past, present, and future challenges as well as complementary methods. Written for the popular *Methods in Molecular Biology*™ series, the work contains the kind of detailed descriptions and implementation advice necessary to ensure successful results. Comprehensive and cutting-edge, *Electron Crystallography of Soluble and Membrane Proteins: Methods and Protocols* serves laboratories new to the methods as well as state-of-the-art facilities pursuing this exciting area of protein science.

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