

Real Time Pcr Current Technology And Applications

Real-time PCR

This essential manual presents a comprehensive guide to the most up-to-date technologies and applications as well as providing an overview of the theory of this increasingly important technique. Renowned experts in the field describe and discuss the latest PCR platforms, fluorescent chemistries, validation software, data analysis, and internal and external controls. This timely and authoritative volume also discusses a wide range of RT-PCR applications including: clinical diagnostics, biodefense, RNA expression studies, validation of array data, mutation detection, food authenticity and legisl.

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PCR Technology

PCR's simplicity as a molecular technique is, in some ways, responsible for the huge amount of innovation that surrounds it, as researchers continually think of new ways to tweak, adapt, and re-formulate concepts and applications. PCR Technology: Current Innovations, Third Edition is a collection of novel methods, insights, and points of view that provides a critical and timely reference point for anyone wishing to use this technology. Topics in this forward-thinking volume include: The purification and handling of PCR templates The effect of the manufacture and purification of the oligonucleotide on PCR behavior Optimum buffer composition Probe options The design and optimization of qPCR assays Issues surrounding the development and refinement of instrumentation Effective controls to protect against uncertainties due to reaction variability Covering all aspects of

PCR and real-time PCR, the book contains detailed protocols that make it suitable as both a reference and an instruction manual. Each chapter presents detailed guidelines as well as helpful hints and tips supplied by authors who are recognized experts in their fields. In addition to descriptions of current technology and best practices, the book also provides information about new developments in the PCR arena.

Gene Quantification

Geneticists and molecular biologists have been interested in quantifying genes and their products for many years and for various reasons (Bishop, 1974). Early molecular methods were based on molecular hybridization, and were devised shortly after Marmur and Doty (1961) first showed that denaturation of the double helix could be reversed - that the process of molecular reassociation was exquisitely sequence dependent. Gillespie and Spiegelman (1965) developed a way of using the method to titrate the number of copies of a probe within a target sequence in which the target sequence was fixed to a membrane support prior to hybridization with the probe - typically a RNA. Thus, this was a precursor to many of the methods still in use, and indeed under development, today. Early examples of the application of these methods included the measurement of the copy numbers in gene families such as the ribosomal genes and the immunoglobulin family. Amplification of genes in tumors and in response to drug treatment was discovered by this method. In the same period, methods were invented for estimating gene numbers based on the kinetics of the reassociation process - the so-called Cot analysis. This method, which exploits the dependence of the rate of reassociation on the concentration of the two strands, revealed the presence of repeated sequences in the DNA of higher eukaryotes (Britten and Kohne, 1968). An adaptation to RNA, Rot analysis (Melli and Bishop, 1969), was used to measure the abundance of RNAs in a mixed population.

Real-time PCR

This essential manual presents a comprehensive guide to the most appropriate and up-to-date technologies and applications as well as providing an overview of the theory of this important technique. Written by recognized experts in the field this timely and authoritative volume is an essential requirement for all laboratories using PCR. Topics covered include: Real-time PCR instruments and probe chemistries, set-up, controls and validation, quantitative real-time PCR, analysis of mRNA expression, mutation detection, NASBA, application in clinical microbiology and diagnosis of infection.

Rapid Cycle Real-Time PCR — Methods and Applications

Rapid-Cycle Real-Time PCR is a powerful technique for nucleic acid amplification and analysis that often requires less than half an hour to perform. Samples are amplified by rapid-cycle PCR followed by immediate melting curve analysis in the same instrument. Melting curve analysis of PCR products with SYBR Green I often allows product identification without gel electrophoresis. Furthermore, in the presence of fluorescent hybridization probes, melting curves provide \"dynamic dot blots\" for fine sequence analysis, including single nucleotide polymorphisms (SNPs). The method is often cited as the most versatile, efficient method for nucleic acid analysis in research and diagnostics in the fields of genetics and oncology. Molecular diagnostics has never been easier!

Real-time PCR in Food Science

Bacterial detection and control are vital aspects of food microbiology. Real-time PCR is one of the most significant advances in this area, providing rapid, reliable, and quantitative results. In recent years, real-time PCR has become increasingly important to the agricultural and food industries as a valuable alternative to traditional detection methods. The advantages of quantitative real-time PCR include speed, an excellent detection limit, selectivity, specificity, sensitivity, and the potential for automation. Written by experts in the field, this book is an indispensable manual for scientists in the food industry. The first section provides an introduction to real-time PCR, discusses the use of PCR diagnostics in food science, describes the principles and methods of sample preparation, and covers the verification and control of PCR procedures. The second section covers the use of real-time PCR to detect various pathogens including Salmonella, Listeria, E. coli, Campylobacter, Yersinia, Staphylococcus, Clostridium, viruses, and parasites. Also included is a chapter on the standardization of real-time PCR methods in food microbiology. In the final section, the book covers the use of real-time PCR for the analysis of genetically modified organisms, for food allergens, and for identification of animal or plant species. This will be an invaluable book for anyone involved in food microbiology or the detection of foodborne pathogens, and it is a recommended volume for all microbiology laboratories.

Rapid Cycle Real-Time PCR — Methods and Applications

Rapid Cycle Real-Time PCR is a powerful technique for nucleic acid quantification and analysis that takes less than 30 minutes to complete. Fluorescence is automatically monitored each cycle and the amount of template quantified by advanced analytical methods, such as the second derivative maximum method. Immediately following rapid cycle PCR, melting curve analysis is performed to verify product purity with SYBR Green I

and/or genotype with fluorescently-labeled hybridization probes(HybProbes or SimpleProbes). Rapid cycle real-time PCR is often cited as the most versatile, efficient method for nucleic acid quantification in research and clinical studies. Molecular analysis has never been easier!

Real-Time PCR

With a variety of detection chemistries, an increasing number of platforms, multiple choices for analytical methods and the jargon emerging along with these developments, real-time PCR is facing the risk of becoming an intimidating method, especially for beginners. Real-time PCR provides the basics, explains how they are exploited to run a real-time PCR assay, how the assays are run and where these assays are informative in real life. It addresses the most practical aspects of the techniques with the emphasis on 'how to do it in the laboratory'. Keeping with the spirit of the Advanced Methods Series, most chapters provide an experimental protocol as an example of a specific assay.

Quantitative Real-Time PCR

Quantitative Real-Time PCR: Methods and Protocols focuses on different applications of qPCR ranging from microbiological detections (both viral and bacterial) to pathological applications. Several chapters deal with quality issues which regard the quality of starting material, the knowledge of the minimal information required to both perform an assay and to set the experimental plan, while the others focus on translational medicine applications that are ordered following an approximate logical order of their medical application. The last part of the book gives you an idea of an emerging digital PCR technique that is a unique qPCR approach for measuring nucleic acid, particularly suited for low level detection and to develop non-invasive diagnosis. Written for the Methods in Molecular Biology series, most chapters include introductions to their respective topics, lists of the necessary materials and reagents, step-by-step, laboratory protocols and tips on troubleshooting and avoiding known pitfalls. Practical and authoritative, Quantitative Real-Time PCR: Methods and Protocols aims to aid researchers seeking to devise new qPCR-based approaches related to his or her area of investigation.

Clinical Applications of PCR

In this updated second edition, leading researchers apply molecular diagnostics to the many recent advances that have occurred in polymerase chain reaction(PCR)-based technologies. Highlights include real-time PCR, which allows the technique to be performed in a quantitative manner

with improved sensitivity, robustness, and resilience to carryover contamination, mass spectrometric analysis of nucleic acids, and circulating cell-free nucleic acids in plasma. The authors apply these innovations to a broad spectrum of applications, including gene expression, methylation, trace molecule, gene dosage, and single cell analysis.

RT-PCR Protocols

Until the mid 1980s, the detection and quantification of a specific mRNA was a difficult task, usually only undertaken by a skilled molecular biologist. With the advent of PCR, it became possible to amplify specific mRNA, after first converting the mRNA to cDNA via reverse transcriptase. The arrival of this technique—termed reverse transcription-PCR (RT-PCR)—meant that mRNA suddenly became amenable to rapid and sensitive analysis, without the need for advanced training in molecular biology. This new accessibility of mRNA, which has been facilitated by the rapid accumulation of sequence data for human mRNAs, means that every biomedical researcher can now include measurement of specific mRNA expression as a routine component of his/her research plans. In view of the ubiquity of the use of standard RT-PCR, the main objective of RT-PCR Protocols is essentially to provide novel, useful applications of RT-PCR. These include some useful adaptations and applications that could be relevant to the wider research community who are already familiar with the basic RT-PCR protocol. For example, a variety of different adaptations are described that have been employed to obtain quantitative data from RT-PCR. Quantitative RT-PCR provides the ability to accurately measure changes/imb- ances in specific mRNA expression between normal and diseased tissues.

Polymerase Chain Reaction for Biomedical Applications

Do you want to know the details that should be taken into consideration in order to have accurate conventional and real-time PCR results? If so, this book is for you. Polymerase Chain Reaction for Biomedical Applications is a collection of chapters for both novice and experienced scientists and technologists aiming to address obtaining an optimized real-time PCR result, simultaneous processing of a large number of samples and assays, performing PCR and RT-PCR on cell lysate without extraction of DNA or RNA, detecting false-positive PCR results, detecting organisms in viral and microbial diseases and hospital environment, following safety assessments of food products, and using PCR for introduction of mutations. This is a must-have book for any PCR laboratory.

Current Protocols Essential Laboratory Techniques

The latest title from the acclaimed Current Protocols series, Current Protocols Essential Laboratory Techniques, 2e provides the new researcher with the skills and understanding of the fundamental laboratory procedures necessary to run successful experiments, solve problems, and become a productive member of the modern life science laboratory. From covering the basic skills such as measurement, preparation of reagents and use of basic instrumentation to the more advanced techniques such as blotting, chromatography and real-time PCR, this book will serve as a practical reference manual for any life science researcher. Written by a combination of distinguished investigators and outstanding faculty, Current Protocols Essential Laboratory Techniques, 2e is the cornerstone on which the beginning scientist can develop the skills for a successful research career.

DNA Amplification

Whereas most books on DNA amplification focus on PCR-based technologies, this volume presents a wider range of methods to amplify DNA with an emphasis on their diverse applications. The book covers both well-established and newly-developed protocols including ligation-based thermocycling approaches, real-time PCR and other new PCR developments, plus several powerful non-PCR isothermal DNA amplification techniques, for example: real-time strand displacement amplification (SDA), rolling-circle amplification (RCA) and multiple-displacement amplification (MDA). An entire section is devoted to a group of enzymes, both natural and engineered, which are employed for DNA amplification and related purposes. In addition, the use of DNA amplification in the detection of non-DNA analytes is presented.

Rapid Cycle Real-Time PCR — Methods and Applications

Rapid Cycle Real-Time PCR is a powerful analytical tool with broad application for the basic and applied life sciences. Compared with conventional PCR technology, Rapid Cycle Real-Time PCR is faster, has greater specificity, and is more easily adaptable for a variety of diagnostic tests, including qualitative, quantitative and mutation detection assays. This book provides general overviews of this technology for use in the clinical microbiology laboratory as well as specific diagnostic protocols for the detection of viral, bacterial and fungal pathogens and genetically modified organisms in human specimens and foodstuffs. All of these protocols have been developed, verified, and validated by experts in the field and should be of great interest for clinical microbiologists, pathologists, laboratory technologists as well as practicing physicians.

The PCR Revolution

Examines the latest innovations and the overall impact of PCR on areas of molecular research.

Veterinary PCR Diagnostics

"PCR (Polymerase Chain Reaction) technology has become an indispensable component of routine veterinary diagnostics. However, a number of pitfalls and limiting factors affect its sensitivity and specificity of detection. It is imperative that veterinary "

Quantitative Real-time PCR in Applied Microbiology

Real time quantitative PCR (qPCR) technology has revolutionized almost all areas of microbiology, including clinical microbiology, food microbiology, industrial microbiology, environmental microbiology, and microbial biotechnology. Various modifications and improvements have enhanced the overall performance of this highly versatile technology and the qPCR instrumentation and strategies currently available are more sensitive, faster, and more affordable than ever before. Written by experts in the field and aimed specifically at microbiologists, this book describes and explains the most important aspects of current qPCR strategies, instrumentation, and software. Renowned scholars cover the application of qPCR technology in various areas of applied microbiology and comment on future trends. Topics include: instrumentation * fluorescent chemistries * quantification strategies * data analysis software * environmental microbiology * water microbiology * food microbiology * gene expression studies * validation of microbial microarray data * future trends in qPCR technology. This outstanding book will be invaluable for all microbiologists and is recommended for all microbiology laboratories.

Quantitative Real-time PCR in Applied Microbiology

This indispensable manual is a compilation of review articles written by experts in the field of PCR technology. It is a recommended purchase for all microbiology and molecular biology laboratories and university libraries.

Polymerase Chain Reaction

PCR is the most powerful technique currently used in molecular biology. It enables the scientist to quickly replicate DNA and RNA on the benchtop. From its discovery in the early 80's, PCR has blossomed into a method that enables everything from ready mutation of DNA/RNA to speedy analysis of tens of thousands of nucleotide sequences daily. PCR Applications examines the latest developments in this field. It is the third book in the series, building on the previous publications PCR Protocols and PCR Strategies. The manual discusses techniques that focus on gene discovery, genomics, and DNA array technology, which are contributing factors to the now-occurring bioinformatics boom. Key Features * Focuses on gene discovery, genomics, and DNA array technology * Covers quantitative PCR techniques, including the use of standards and kinetic analysis includes statistical refinement of primer design parameters * Illustrates techniques used in microscopic tissue samples, such as single cell PCR, whole cell PCR, laser capture microdissection, and in situ PCR Entries provide information on: * Nomenclature * Expression * Sequence analysis * Structure and function * Electrophysiology * Pharmacology * Information retrieval

PCR Applications

Rapid Cycle Real-Time PCR is a powerful analytical tool with broad application for the basic and applied life sciences. Compared with conventional PCR technology, Rapid Cycle Real-Time PCR is faster, has greater specificity, and is more easily adaptable for a variety of diagnostic tests, including qualitative, quantitative and mutation detection assays. This book provides general overviews of this technology for use in the clinical microbiology laboratory as well as specific diagnostic protocols for the detection of viral, bacterial and fungal pathogens and genetically modified organisms in human specimens and foodstuffs. All of these protocols have been developed, verified, and validated by experts in the field and should be of great interest for clinical microbiologists, pathologists, laboratory technologists as well as practicing physicians.

Rapid Cycle Real-Time PCR — Methods and Applications

Molecular Beacons explains working principle of molecular beacons, discusses their design, synthesis, purification and characterization, explores their thermodynamic and kinetic properties, and more importantly, reviews their in vivo and in vitro applications with the emphasis on the design and modification of molecular beacons for in vivo mRNA imaging applications. This book is designed to bring together in a single resource an organized and comprehensive view of molecular beacons and will be a valuable resource for academic, clinical and industrial scientists and graduate students who may consider exploring molecular beacons in their research or practice. Chaoyong James Yang is the Lu Jiaxi Professor of

Chemistry at Xiamen University, China. Weihong Tan is a Distinguished Professor of Chemistry and Biomedical Engineering at Hunan University, China and also a University of Florida Distinguished Professor and V. T. and Louis Jackson Professor of Chemistry at the University of Florida, USA.

Molecular Beacons

This book is intended to present current concepts in molecular biology with the emphasis on the application to animal, plant and human pathology, in various aspects such as etiology, diagnosis, prognosis, treatment and prevention of diseases as well as the use of these methodologies in understanding the pathophysiology of various diseases that affect living beings.

Polymerase Chain Reaction

Real-time PCR has established itself as a sensitive and specific qualitative and quantitative technique that has become important to all areas of microbiology. This invaluable book describes and explains some of the more complex aspects of real-time PCR presenting a background for the novice, a theoretical reference for the experienced user, and useful discussions of future developments. Chapters address the basics of PCR history, oligonucleotide design, target preparation, standardisation, quantification, various applications, and future challenges. The final chapter is presented in the format of a roundtable discussion providing an insightful, topical and interesting discourse with contributions from over 30 authorities and experts on real-time PCR. The editor and authors have produced an excellent book that will be extremely useful for all microbiologists. It is a recommended book for all microbiology laboratories.

Real-time PCR in Microbiology

Kary Mullis was awarded a Nobel Prize for inventing the PCR technique more than a decade ago in 1993. Since its \"discovery\

Principles and Technical Aspects of PCR Amplification

Several milestones in biology have been achieved since the first publication of the Handbook of Molecular and Cellular Methods in Biology and Medicine. This is true particularly with respect to genome-level sequencing of higher eukaryotes, the invention of DNA microarray technology, advances in bioinformatics, and the development of RNAi technology

Handbook of Molecular and Cellular Methods in Biology and Medicine

Demand for minimally processed foods has resulted in the development of innovative, non-thermal food preservation methods, such as high-pressure sonication, ozone, and UV treatment. This book presents a summary of these novel food processing techniques. It also covers new methods used to monitor microbial activity, including spectroscopic methods (FT-IR and Raman), molecular and electronic noses, and DNA-based methods.

Novel Food Preservation and Microbial Assessment Techniques

PCR's simplicity as a molecular technique is, in some ways, responsible for the huge amount of innovation that surrounds it, as researchers continually think of new ways to tweak, adapt, and re-formulate concepts and applications. PCR Technology: Current Innovations, Third Edition is a collection of novel methods, insights, and points of view that

PCR Technology

Once a tedious, highly skilled operation, reverse-transcription polymerase chain reaction (RT-PCR) has become a routine and invaluable technique used in most laboratories. In RT-PCR Protocols, Second Edition, expert researchers fully update the technologies presented in the popular previous edition, such as competitive RT-PCR, nested RT-PCR, RT-PCR from single cells, and RT-PCR for cloning. In addition, newer technologies are also explored, including multiplex RT-PCR, RT-LATE-PCR, and the greatly advanced field of real-time quantitative RT-PCR, while recent advances in creating the optimum RT-PCR reaction, e.g. RNA extraction, primer design, and reverse transcription, end the book with their indispensable input. Written in the highly successful Methods in Molecular Biology™ series format, chapters include brief introductions to their respective topics, lists of

the necessary materials and reagents, step-by-step, readily reproducible protocols, and notes sections, highlighting tips on troubleshooting and avoiding known pitfalls. User friendly and up-to-date, RT-PCR Protocols, Second Edition acts as a handy companion to scientists from numerous diverse backgrounds who wish to explore further the marvels of gene expression.

RT-PCR Protocols

The large number of molecular protocols available creates a dilemma for those attempting to adopt the most appropriate for streamlined identification and detection of fungal pathogens of interest. *Molecular Detection of Human Fungal Pathogens* provides a reliable and comprehensive resource relating the molecular detection and identification of major human fungal pathogens. This volume contains expert contributions from international mycologists involved in fungal pathogen research and diagnosis. Following a similar format throughout, each chapter comprises: A brief review of the classification, epidemiology, clinical features, and diagnosis of one or a group of related fungal species An outline of clinical sample collection and preparation procedures A selection of representative stepwise molecular detection protocols A discussion on further research requirements for improving the diagnosis The book offers an indispensable tool for medical, veterinary, and industrial laboratory scientists working in the area of fungal determination. It also constitutes a convenient textbook for undergraduate and graduate students majoring in microbiology and is an essential guide for upcoming and experienced laboratory scientists wishing to acquire and polish their skills in molecular diagnosis of fungal diseases.

Molecular Detection of Human Fungal Pathogens

This second volume focuses on PCR methods and PCR application specificities to the biotechnology and bioengineering field. New and updated chapters detail real-time PCR protocols, synthetic biology applications, pathogen detection, microfluidics, digital, multiplex detection recent advances. 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 key tips on troubleshooting and avoiding known pitfalls. Authoritative and cutting-edge, *PCR: Methods and Protocols*, Second Edition aims to be a useful and practical guide to new researchers and experts looking to expand their knowledge.

PCR

Integration in Bioanalysis: Technologies for Point-of-Care Testing, by Frank F. Bier, Soeren Schumacher Future of Medicine: Models in Predictive Diagnostics and Personalized Medicine, by Babette Regierer, Valeria Zazzu, Ralf Sudbrak, Alexander Kühn and Hans Lehrach A Highly Versatile Microscope Imaging Technology Platform for the Multiplex Real-Time Detection of Biomolecules and Autoimmune Antibodies, by Stefan Rödiger, Peter Schierack, Alexander Böhm, Jörg Nitschke, Ingo Berger, Ulrike Frömmel, Carsten Schmidt, Mirko Ruhland, Ingolf Schimke, Dirk Roggenbuck, Werner Lehmann, Christian Schröder Platform Technologies for Molecular Diagnostics near the Patient's Bedside, by Soeren Schumacher, Christine Lüdecke, Eva Ehrentreich-Förster, Frank F. Bier Microfluidic Technology for Molecular Diagnostics, by Tom Robinson, Petra S. Dittrich Biosensors for Diagnostic Applications, by Friederike J. Gruhl, Bastian E. Rapp, Kerstin Länge Planar Protein Arrays in Microtiter Plates: Development of a New Format Towards Accurate, Automation-Friendly and Affordable (A3) Diagnostics, by Holger Eickhoff, Arif Malik

Molecular Diagnostics

James D. Watson When, in late March of 1953, Francis Crick and I came to write the first Nature paper describing the double helical structure of the DNA molecule, Francis had wanted to include a lengthy discussion of the genetic implications of a molecule whose structure we had divined from a minimum of experimental data and on theoretical arguments based on physical principles. But I felt that this might be tempting fate, given that we had not yet seen the detailed evidence from King's College. Nevertheless, we reached a compromise and decided to include a sentence that pointed to the biological significance of the molecule's key feature-the complementary pairing of the bases. "It has not escaped our notice," Francis wrote, "that the specific pairing that we have postulated immediately suggests a possible copying mechanism for the genetic material." By May, when we were writing the second Nature paper, I was more confident that the proposed structure was at the very least substantially correct, so that this second paper contains a discussion of molecular self-duplication using templates or molds. We pointed out that, as a consequence of base pairing, a DNA molecule has two chains that are complementary to each other. Each chain could then act "... as a template for the formation on itself of a new companion chain, so that eventually we shall have two pairs of chains, where we only had one before" and, moreover, "...

The Polymerase Chain Reaction

New edition presenting latest developments in ophthalmic diagnostic procedures. Fully revised and many new chapters. Previous edition published

in 2009.

Diagnostic Procedures in Ophthalmology

Viral Diseases of Field and Horticultural Crops details the fundamental and applied aspects of the viral diseases of field and horticultural crops. The book opens with a historical introduction to plant virology, important plant virologists, and landmarks. It continues with systematic coverage of viral diseases, their economic significance, disease symptoms, host range, mode of transmission, diagnostic techniques, geographic distribution, epidemiology, yield losses, and control and management of the disease. Contributions from an international group of virologists with a wide range of academic, research, professional, and specialized backgrounds in plant virology makes Viral Diseases of Field and Horticultural Crops a comprehensive and must-have resource for those engaged in the study and research of plant virology, microbiology, and plant pathology particularly viral diseases and their impact on field and horticultural crops. Provides virus characterization according to the disease pattern and symptoms they cause Covers viral diseases of cereals, oil seeds, legumes, commercial crops, spices and condiments, medicinal and aromatic crops, forage crops, vegetable crops, fruit crops, tree nuts, among others Discusses advances like applications in nanotechnology, molecular techniques for the detection and characterization of plant viruses, and the development of technologies for detecting plant viruses

Rapid Cycle Real-Time PCR

This book examines the current legal status of the international genetic information commons and proposes alternative management strategies.

Viral Diseases of Field and Horticultural Crops

PCR has been successfully utilized in every facet of basic, clinical, and applied studies of the life sciences, and the impact that PCR has had on life science research is already staggering. Coincident with the essentially universal use of PCR has been the creative and explosive development of a wide range of PCR-based techniques and applications. These increasingly numerous protocols have each had the general effect of facilitating and accelerating research. Because PCR technology is relatively easy and inexpensive, PCR applications are well within the reach of every research lab. In this sense, PCR has become the "equalizer" between "small" and "big" labs, since its use makes certain projects, especially those related to molecular cloning, now far more feasible for the small lab with a modest budget. This new volume on PCR Protocols does not attempt the impossible

task of representing all PCR-based protocols. Rather, it presents a range of protocols, both analytical and preparative, that provide a solid base of knowledge on the use of PCR in many common research problems. The first six chapters provide some basic information on how to get started. Chapters 7-19 represent primarily analytical uses of PCR, both for simple DNA and RNA detection, as well as for more complex analyses of nucleic acid (e. g. , DNA footprinting, RNA splice site localization). The remaining chapters represent \"synthetic,\" or preparative, uses of PCR.

Governing Digitally Integrated Genetic Resources, Data, and Literature

PCR Protocols

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