

Molecular Biomethods Handbook

Edited by

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In the *Molecular Biomethods Handbook*, Ralph Rapley and John Walker assemble an authoritative team of investigators to illuminate the core bioanalytical techniques used every day in their own laboratories, and laboratories throughout the world. These highly experienced writers fully explain both the theory behind, and the application of, these key techniques, and include extensive references for those seeking detailed laboratory protocols. The techniques covered range from the extraction, separation, detection, and characterization of nucleic acids to gene cloning and library production, mapping, expression, transgenesis, differential display, and DNA profiling, to name a few. Numerous key protein methods, as well as support and related techniques, are also included.

The *Molecular Biomethods Handbook* provides both established scientists and novices who are new to these techniques a deeper understanding of the widest variety of biotechniques—and how to use them successfully. The resulting insights will significantly enhance your ability to investigate and define biological processes at the molecular level.

Features

- **Outlines all the major biotechniques used today**
- **Written by well-established researchers who use the methods on a regular basis**
- **Covers mainstream molecular DNA/RNA and protein techniques**
- **Reviews gene probes, blotting techniques, in vitro protein expression, mutagenesis, and many other core techniques**
- **Offers comprehensive and critical insights into the nature and applications of these techniques**

Contents

Extraction of Total RNA from Tissues and Cultured Cells. Isolation of Total Cellular DNA from Tissues and Cultured Cells. Gel Electrophoresis of DNA. S1 Nuclease Analysis of RNA. Detecting mRNA by Use of the Ribonuclease Protection Assay (RPA). Gene Probes. Nonradioactive Labeling of DNA. Southern Blot Analysis. Northern Blot Analysis. DNA Sequencing. Autoradiography and Fluorography. Mobility Shift Assays. cDNA Libraries. Genomic DNA Libraries. λ as a Cloning Vector. Plasmid-Derived Cloning Vectors. M13 and Phagemid-Based Cloning Vectors. Retroviral Vectors: From Laboratory Tools to Molecular Medicine. Baculovirus Vectors. Gene Transfer and Expression in Tissue Culture Cells of Higher Eukaryotes. Plant Transformation. Restriction Fragment-Length Polymorphisms. Genome Mapping. Yeast Artificial Chromosomes. Polymerase Chain Reaction. In Vitro Transcription. In Vitro Translation. Site-Directed Mutagenesis. Transgenic Techniques. DNA Profiling: Theory and Practice. Radiolabeling of Peptides and Proteins. Protein Electrophoresis. Free Zone Capillary Electrophoresis. Protein Blotting: Principles and

Applications. Ion-Exchange Chromatography. Size-Exclusion Chromatography. Hydrophobic Interaction Chromatography. Affinity Chromatography. Reversed-Phase HPLC. Glycoprotein Analysis. Protein Sequencing. Solid-Phase Peptide Synthesis. Protein Engineering. Monoclonal Antibodies. Phage-Display Libraries. Enzyme-Linked Immunosorbent Assay (ELISA). Epitope Mapping: Identification of Antibody-Binding Sites on Protein Antigens. Immunocytochemistry. Flow Cytometry. Mass Spectrometer. The Technique of *In Situ* Hybridization: Principles and Applications. Index.

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