

Functional Genomics*Methods and Protocols*

Edited by

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As high-throughput methods become more available and routine, experimentalists and theoreticians must be prepared to take advantage of the analytical power these methods offer. In *Functional Genomics: Methods and Protocols*, leading experimentalists—many pioneers in the field—describe in step-by-step detail robust methods for microarray-based studies and provide expert guidance in optimal data analysis and informatics. Drawing on insights derived from their long experience in biology, neurobiology, cell biology, molecular biology, and statistics, the authors review each of the key methods and analytical techniques used in functional genomics. On the methods side, this includes proven techniques for monitoring subcellular RNA localization en masse, for mapping chromosomes at the resolution of a single gene, and for surveying the steady-state genome-wide distribution of DNA binding proteins in vivo. For those workers dealing with massive data sets, the book discusses the methodological aspects of data analysis and informatics in the design of microarray experiments, the choice test statistic, and the assessment of observational significance, data reduction, and clustering. Additional chapters outline the many available approaches to data visualization and storage so crucial to the successful mining and examination of experimental results.

Timely and cutting-edge, *Functional Genomics: Methods and Protocols* offers novice and advanced investigators in all biological fields a collection of highly practical, readily reproducible methods, data analysis techniques, and experimental design criteria that will ensure safe passage through one of the most demanding and fastest growing fields today.

FEATURES

- Readily reproducible methods for microarray-based studies
- Expert guidance on experimental design, data analysis, and informatics
- Robust methods that can be used without modification by researchers new to genomics
- Manufacture and use of spotted microarrays on glass, plastic, and nylon membranes

CONTENTS

Fabrication of cDNA Microarrays. Nylon cDNA Expression Arrays. Plastic Microarrays: A Novel Array Support Combining the Benefits of Macro- and Microarrays. Preparing Fluorescent Probes for Microarray Studies. *Escherichia coli* Spotted Double-Strand DNA Microarrays: RNA Extraction, Labeling, Hybridization, Quality Control, and Data Management. Isolation of Poly-somal RNA for Microarray Analysis. Parallel Analysis of Gene Copy Number and Expression Using cDNA Microarrays. Genome-wide Mapping of Protein-DNA Interactions by Chromatin Immunoprecipitation and DNA Microarray Hybridization. Statis-

tical Issues in cDNA Microarray Data Analysis. Experimental Design to Make the Most of Microarray Studies. Statistical Methods for Identifying Differentially Expressed Genes in DNA Microarrays. Detecting Stable Clusters Using Principal Component Analysis. Clustering in Life Sciences. A Primer on the Visualization of Microarray Data. Microarray Databases: Storage and Retrieval of Microarray Data. Index.

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