

Advanced Biotechnology and Functional Genomics

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Preface

Biotechnology and functional genomics have emerged as transformative disciplines that are reshaping modern biological research, agriculture, medicine, and industrial applications. Rapid advances in molecular biology, genome sequencing technologies, gene editing tools, and computational biology have provided unprecedented opportunities to understand the structure, function, and regulation of genes and genomes. These developments have enabled scientists to explore complex biological systems with greater precision and efficiency than ever before.

Advanced Biotechnology and Functional Genomics aims to provide a comprehensive overview of the principles, tools, and applications that define these rapidly evolving fields. The subject encompasses a broad spectrum of technologies, including recombinant DNA technology, molecular markers, genomics, transcriptomics, proteomics, metabolomics, bioinformatics, and genome editing approaches such as CRISPR/Cas systems. Together, these technologies facilitate the identification and characterization of genes responsible for important traits, diseases, and biological processes.

The integration of biotechnology with functional genomics has significantly accelerated crop improvement, personalized medicine, drug discovery, disease diagnostics, and environmental sustainability initiatives. Understanding gene function and regulation is essential for developing innovative solutions to global challenges related to food security, human health, and climate change.

This book is intended for undergraduate and postgraduate students, researchers, and professionals seeking a clear understanding of both fundamental concepts and recent advances in these interdisciplinary areas. It is hoped that this text will serve as a valuable resource for learning, research, and innovation in the life sciences.

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CONTENTS

S. NO.		PAGE NO.
1.	Foundations of Advanced Biotechnology and Functional Genomics	1-12
2.	Genome Structure, Organization, and Evolution	13-26
3.	High-Throughput DNA Sequencing Technologies	27-38
4.	Functional Genomics: Concepts, Tools, and Applications	39-50
5.	Transcriptomics and Gene Expression Profiling	51-62
6.	Proteomics and Metabolomics in Functional Genomics	63-74
7.	Genome Editing Technologies: CRISPR-Cas and Beyond	75-84
8.	Epigenetics and Epigenomics in Gene Regulation	85-96
9.	Bioinformatics and Computational Genomics	97-108
10.	Synthetic Biology and Metabolic Engineering	109-120
11.	Functional Genomics in Crop Improvement and Agriculture	121-132
12.	Functional Genomics in Human Health and Precision Medicine	133-144

