

OUTLINE

INTRODUCTION

Cells as Macromolecular Assemblies

- 1 Cells Obey the Laws of Physics and Chemistry
- 2 Cells Are Organized into Compartments

PART 1

DNA as a Store of Information

- 3 Genes Are Mutable Units
- 4 DNA Is the Genetic Material
- 5 The Topology of Nucleic Acids
- 6 Isolating the Gene

PART 2

Translation: Expressing Genes as Proteins

- 7 The Assembly Line for Protein Synthesis
- 8 Transfer RNA: the Translational Adaptor
- 9 The Ribosome Translation Factory
- 10 The Messenger RNA Template
- 11 The Apparatus for Protein Localization

PART 3

Transcription: Control of Prokaryotic Genes

- 12 Control at Initiation: RNA Polymerase-Promoter Interactions
- 13 A Panoply of Operons: The Lactose Paradigm and Others
- 14 Post-Transcriptional Feedback and Control
- 15 Control at Termination: Attenuation and Antitermination
- 16 Lytic Cascades and Lysogenic Repression

PART 4

Perpetuation of DNA

- 17 The Replicon: Unit of Replication
- 18 The Apparatus for DNA Replication
- 19 Systems that Safeguard DNA

PART 5

The Packaging of DNA

- 20 About Genomes and Chromosomes

- 21 Organization of Nucleosomes in Chromatin
- 22 The Nature of Active Chromatin

PART 6

Constitution of the Eukaryotic Genome

- 23 The Extraordinary Power of DNA Technology
- 24 A Continuum of Sequences Includes Structural Genes
- 25 The Organization of Interrupted Genes
- 26 Structural Genes Evolve in Families
- 27 Genomes Sequestered in Organelles
- 28 Organization of Simple Sequence DNA

PART 7

Eukaryotic Transcription and RNA Processing

- 29 Building the Transcription Complex
- 30 Mechanisms of RNA Splicing
- 31 Control of RNA Processing

PART 8

The Dynamic Genome: DNA in Flux

- 32 Recombination and Other Topological Manipulations of DNA
- 33 Transposons that Mobilize via DNA
- 34 Retroviruses and Retroposons
- 35 Engineering Changes in the Genome

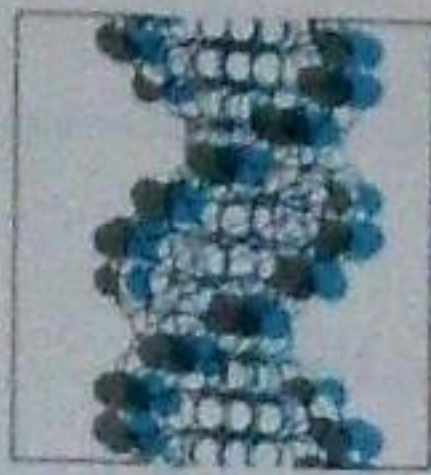
PART 9

Genes in Development

- 36 Generation of Immune Diversity Involves Reorganization of the Genome
- 37 Regulation by Gene Rearrangement
- 38 Gene Regulation in Development: Gradients and Cascades
- 39 Oncogenes: Gene Expression and Cancer

EPILOGUE

Landmark Shifts in Perspectives



CONTENTS

INTRODUCTION	Cells as Macromolecular Assemblies	1
CHAPTER 1		3
Cells Obey the Laws of Physics and Chemistry	Macromolecules Are Assembled by Polymerizing Small Molecules	4
	Proteins Consist of Chains of Amino Acids	5
	Protein Conformation Is Determined by Noncovalent Forces in an Aqueous Environment	9
	Protein Structures Are Extremely Versatile	13
	How Do Proteins Fold into the Correct Conformation?	16
CHAPTER 2		19
Cells Are Organized into Compartments	Cellular Compartments Are Bounded by Membranes	20
	The Cytoplasm Contains Networks of Membranes	25
	Cell Shape Is Determined by the Cytoskeleton	26
	Some Organelles Are Surrounded by an Envelope	29
	The Environment of the Nucleus and its Reorganization	30
	The Role of Chromosomes in Heredity	33