

Brief Contents

- 1** Genetics: The Study of Biological Information 1

PART I

Basic Principles: How Traits Are Transmitted 13

- 2** Mendel's Principles of Heredity 13
3 Extensions to Mendel's Laws 43
4 The Chromosome Theory of Inheritance 79
5 Linkage, Recombination, and the Mapping of Genes on Chromosomes 118

PART II

What Genes Are and What They Do 162

- 6** DNA Structure, Replication, and Recombination 162
7 Anatomy and Function of a Gene: Dissection Through Mutation 199
8 Gene Expression: The Flow of Information from DNA to RNA to Protein 246

PART III

Analysis of Genetic Information 290

- 9** Digital Analysis of DNA 290

- 10** Genomes and Proteomes 334

- 11** Genome-Wide Variation and Trait Analysis 368

PART IV

How Genes Travel on Chromosomes 405

- 12** The Eukaryotic Chromosome 405
13 Chromosomal Rearrangements and Changes in Chromosome Number 429
14 Prokaryotic and Organelle Genetics 477

PART V

How Genes Are Regulated 519

- 15** Gene Regulation in Prokaryotes 519
16 Gene Regulation in Eukaryotes 552
17 Somatic Mutation and the Genetics of Cancer 586
18 Using Genetics to Study Development 617

PART VI

Beyond the Individual Gene and Genome 655

- 19** Variation and Selection in Populations 655
20 Evolution at the Molecular Level 690
21 Systems Biology and the Future of Medicine 715