

Contents

Chapter 1	THE CELL: STRUCTURAL ORGANIZATION	1
1-1	Introduction and History of Cell and Molecular Biology	1
1-2	Main Techniques Used to Study Cell Organization	8
1-3	General Organization of Prokaryotic Cells	14
1-4	Mycoplasmas, Viruses, and Viroids	18
1-5	General Organization of Eukaryotic Cells	20
Chapter 2	THE CELL: MOLECULAR ORGANIZATION	37
2-1	Nucleic Acids	38
2-2	Carbohydrates	46
2-3	Lipids	48
2-4	Proteins	51
2-5	Enzymes and Their Regulation	58
Chapter 3	MOLECULAR ORGANIZATION AND FUNCTION OF THE CELL SURFACE	69
3-1	Molecular Organization of the Plasma Membrane	70
3-2	Molecular Models of the Plasma Membrane	73
3-3	Cell Permeability	82
3-4	Cell Membrane Differentiations and Intercellular Communications	92
3-5	Cell Coat and Cell Recognition	99
3-6	Cell Wall of Plant Cells	102
Chapter 4	CYTOSKELETON AND CELL CONTRACTILE SYSTEMS	109
4-1	Microtubules	110
4-2	Microtubular Organelles	113
4-3	Microfilaments	120
4-4	Molecular Biology of Muscle	124

Chapter 5	THE ENDOMEMBRANE SYSTEM: CELL SECRETION AND DIGESTION	137
5-1	The Endoplasmic Reticulum (ER)	141
5-2	The Golgi Complex	146
5-3	Roles of the ER and Golgi Complex in Cell Secretion	153
5-4	Lysosomes	161
5-5	Peroxisomes and Glyoxysomes	165
Chapter 6	ENERGY TRANSDUCING ORGANELLES: MITOCHONDRIA AND CHLOROPLASTS	171
6-1	The Mitochondrion: Structure and Function	172
6-2	The Chloroplast: Structure and Function	188
6-3	Biogenesis of Mitochondria and Chloroplasts	199
Chapter 7	THE NUCLEUS, CHROMATIN, AND THE CHROMOSOMES	205
7-1	The Nuclear Envelope	205
7-2	Chromatin	209
7-3	The Chromosomes	214
7-4	Heterochromatin	218
Chapter 8	THE CELL CYCLE AND DNA REPLICATION	223
8-1	The Cell Cycle	223
8-2	DNA Replication	227
Chapter 9	MITOSIS, MEIOSIS, AND HEREDITY	237
9-1	Mitosis	237
9-2	Meiosis	244
9-3	Heredity and Cytogenetics	257
Chapter 10	HUMAN CYTOGENETICS	271
10-1	The Normal Human Karyotype	271
10-2	Sex Chromosomes and Sex Determination	275
10-3	Abnormalities in the Human Karyotype	280
10-4	Human Chromosomes and the Genetic Map	283

Chapter 11	MOLECULAR BIOLOGY OF THE GENE	291
11-1	The Genetic Code	291
11-2	Genetic Engineering	301
11-3	Transcription and Processing of RNA	305
Chapter 12	THE MACHINERY FOR PROTEIN SYNTHESIS	321
12-1	Ribosomes	321
12-2	The Nucleolus	325
12-3	Transfer RNA	333
12-4	Protein Synthesis	337
Chapter 13	REGULATION OF GENE EXPRESSION	349
13-1	Gene Regulation in Prokaryotes	349
13-2	Gene Regulation in Eukaryotes	355
Chapter 14	CELL DIFFERENTIATION	367
14-1	Nucleocytoplasmic Interactions	368
14-2	Mechanisms of Cell Differentiation	374
Index		383