

CONTENTS

INTRODUCTION	The Molecular Logic of Living Organisms	1
PART 1	THE MOLECULAR COMPONENTS OF CELLS	15
CHAPTER 1	Biomolecules and Cells	17
CHAPTER 2	Water	39
CHAPTER 3	Proteins and Their Biological Functions: A Survey	55
CHAPTER 4	Proteins: The Amino Acid Building Blocks	67
CHAPTER 5	Proteins: Covalent Backbone and Amino Acid Sequence	89
CHAPTER 6	Proteins: Conformation	109
CHAPTER 7	Proteins: Behavior in Solution	129
CHAPTER 8	Enzymes: Kinetics and Inhibition	147
CHAPTER 9	Enzymes: Mechanism, Structure, and Regulation	169
CHAPTER 10	Lipids, Lipoproteins, and Membranes	189
CHAPTER 11	Sugars, Storage Polysaccharides, and Cell Walls	217
CHAPTER 12	Nucleotides and Polynucleotides	241

PART	2	CATABOLISM AND THE GENERATION OF PHOSPHATE-BOND ENERGY	265
CHAPTER	13	Metabolic and Energy-Transfer Pathways: A Survey	267
CHAPTER	14	Bioenergetic Principles and the ATP Cycle	289
CHAPTER	15	Glycolysis	313
CHAPTER	16	The Tricarboxylic Acid Cycle and the Phosphogluconate Pathway	337
CHAPTER	17	Electron Transport and Oxidative Phosphorylation	365
CHAPTER	18	Mitochondrial Compartmentation and the Integration of Energy-Yielding Reactions	395
CHAPTER	19	Oxidation of Fatty Acids	417
CHAPTER	20	Oxidative Degradation of Amino Acids	433
CHAPTER	21	Photosynthetic Electron Transport and Phosphorylation	455
PART	3	BIOSYNTHESIS AND THE UTILIZATION OF PHOSPHATE-BOND ENERGY	481
CHAPTER	22	The Biosynthesis of Carbohydrates	485
CHAPTER	23	The Biosynthesis of Lipids	513
CHAPTER	24	The Biosynthesis of Amino Acids; Nitrogen Fixation	539
CHAPTER	25	The Biosynthesis of Mononucleotides	567
CHAPTER	26	Contractile and Motile Systems	583
CHAPTER	27	Active Transport across Membranes	605
PART	4	REPLICATION, TRANSCRIPTION, AND TRANSLATION OF GENETIC INFORMATION	629
CHAPTER	28	DNA and the Structure of Chromosomes	635
CHAPTER	29	Replication and Transcription of DNA	659
CHAPTER	30	Ribosomes and Protein Synthesis	689

Contents

CHAPTER	31	The Genetic Code	713
CHAPTER	32	Regulation of Protein Synthesis: Cell Differentiation	729
CHAPTER	33	The Molecular Basis of Morphogenesis	751
CHAPTER	34	The Origin of Life	769
APPENDIX	A	A Chronology of Biochemistry	795
APPENDIX	B	The Research Literature of Biochemistry	799
APPENDIX	C	Frequently Used Abbreviations and Table of Constants	801
APPENDIX	D	International Atomic Weights	803
APPENDIX	E	Logarithms	804
APPENDIX	F	Solutions to Problems	806
		Acknowledgments	810
		Index	812