

CONTENTS

<i>Preface</i>	xiii
1. The Scope of Biochemistry	1
 Part One / The Major Constituents of Cells	
2. The Carbohydrates I	13
Monosaccharides	13
3. The Carbohydrates II	42
Oligosaccharides	42
Polysaccharides	45
4. The Lipids	59
5. The Proteins I	89
Amino Acids	90
Peptides	108
6. The Proteins II	116
Physical and Chemical Properties	118
Purity and Purification	134
7. The Proteins III	138
Amino Acid Sequences and Conformation	138
8. The Proteins IV	166
Hemoproteins and Porphyrins	166
9. Nucleic Acids and Nucleoproteins	180
	vii

Part Two / Catalysis

10. Enzymes I	209
Nature and Classification	209
11. Enzymes II	223
Kinetics	224
Inhibition	236
Metabolic Inhibitors	240
Control of Enzymic Activity	242
12. Enzymes III	248
Specificity of Enzymes	248
Nature of Active Enzymic Sites	253
Mechanism of Enzymic Action	259

Part Three / Metabolism

13. Introduction to Metabolism	279
General Energy Considerations	280
Regulatory Mechanisms	283
Aspects of Cell Structure and Function	290
Experimental Approaches to the Study of Metabolism	304
14. Biological Oxidations I	311
Oxidation-Reduction Reactions	313
High-Energy Phosphate Compounds	324
15. Biological Oxidations II	333
Citric Acid Cycle	337
The Mitochondrion	351
Electron Transport	355
Oxidative Phosphorylation	360
16. Biological Oxidations III	373
Oxidative Enzymes, Coenzymes, and Carriers	373
17. Carbohydrate Metabolism I	412
Digestion	412
Absorption	414
Glycolysis	423
Anaplerosis	442
Gluconeogenesis	445
The Phosphogluconate Oxidative Pathway	454

18. Carbohydrate Metabolism II	465
Glycogen Metabolism and Its Control	466
Hexose Interconversions	486
Oligosaccharide and Heteropolysaccharide Synthesis	497
Plant and Bacterial Cell Walls	504
19. Carbohydrate Metabolism III	514
Photosynthesis	514
20. Lipid Metabolism I	542
Digestion and Absorption	542
Blood Lipids and Lipemia	546
Body Lipids	548
Oxidation of Fatty Acids	550
Synthesis of Fatty Acids	558
Fatty Acid Interconversions	565
Synthesis of Triacylglycerols	568
Regulation of Lipid Metabolism	570
21. Lipid Metabolism II	579
Phosphoglycerides	579
Sphingolipids	586
Sterol Metabolism and Its Control	590
Disturbances of Lipid Metabolism	599
22. Amino Acid Metabolism I. Plants and Microorganisms	604
Fixation of Nitrogen, Ammonia, and Sulfur	604
Synthesis of Amino Acids	608
23. Amino Acid Metabolism II. Mammals	629
Digestion of Protein	630
Absorption of Amino Acids	632
Essential Amino Acids	635
Hepatic Amino Acid Metabolism	636
Over-All Aspects of Amino Acid Metabolism	651
24. Amino Acid Metabolism III	656
Synthesis of Amides and Oligopeptides	656
Transamidination	660
Transmethylation	661
Porphyrin Synthesis	664
Amino Acid Decarboxylation	669
Polyamine Synthesis	673
25. Amino Acid Metabolism IV	677
Glycogenic and Ketogenic Amino Acids	677
Metabolic Fates of Individual Amino Acids	678

26. Metabolism of Purines, Pyrimidines, and Nucleotides	705
27. Genetic Aspects of Metabolism I	734
Nature of the Gene	734
DNA Synthesis	737
Relation of DNA Sequence to Protein Sequence and Structure	745
28. Genetic Aspects of Metabolism II	750
The Gene and Protein Synthesis	750
Other Aspects of RNA Synthesis	756
The Genetic Code	760
Protein Synthesis and Its Control	769
29. Genetic Aspects of Metabolism III	781
Genetic Variation of Protein Structure	781
Evolution of Proteins	786
Hereditary Disorders of Metabolism	792

Part Four / Body Fluids and Specialized Tissues

30. Blood	801
Composition of Blood Plasma	801
Plasma Proteins	803
Blood Clotting	820
31. Hemoglobin and the Chemistry of Respiration	834
Role of Hemoglobin in the Respiratory Cycle	834
Comparative Biochemistry of the Respiratory Proteins	849
32. The Erythrocyte and Iron Metabolism. Leukocyte Composition and Metabolism	853
33. Regulation of Electrolyte, Water, and Acid-Base Balance	879
Fluid Compartments and Composition	879
Control of Extracellular Fluid	883
Metabolism of Cellular Electrolytes	901
34. Specialized Extracellular Fluids	905
35. Renal Function and the Composition of Urine	928
36. Muscle	949
37. Nervous Tissue	959
38. Connective Tissue	978

39. Bone: Calcium and Phosphate Metabolism	995
40. The Eye	1007

Part Five / Biochemistry of the Endocrine Glands

41. General Considerations of the Endocrine Glands	1021
42. The Thyroid	1030
43. The Parathyroids	1042
Parathormone and Calcitonin	1042
44. The Gonads	1050
Androgens	1050
Prostaglandins	1057
Estrogens	1062
45. The Adrenals	1072
Epinephrine and Norepinephrine	1072
Adrenal Cortical Hormones	1078
46. The Pancreas	1094
Insulin	1094
Glucagon	1101
47. The Hypophysis	1105
The Neurohypophysis	1106
Regulatory Role of the Adenohypophysis	1112
Control of Secretion of the Adenohypophysis	1112
Thyrotropin	1112
Adrenocorticotropin	1117
Gonadotropins	1120
Somatotropin	1125
The Sexual Cycle	1129

Part Six / Nutrition

48. The Major Nutrients	1135
49. The Water-Soluble Vitamins	1152
50. The Lipid-Soluble Vitamins	1184
<i>Index</i>	1203