

BIOCHEMISTRY

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PREFACE

This book is designed primarily to meet the needs of the first-year medical student. We feel that this aim requires no apology. However, the addition of another textbook of biochemistry to the several already available does require some explanation.

Long experience with students at every stage of their medical education, both undergraduate and postgraduate, has impressed us with the fact that their comprehension of biochemistry is generally poorer than that of the other medical sciences. Although biochemistry currently occupies a focal position in all of the medical sciences, as well as in clinical medicine, this is the one subject in the medical curriculum that the average student is not adequately equipped to grasp readily in the form in which it is usually presented.

The difficulty in this connection stems mainly from the fact that the enormous progress in this field in recent years has been in highly specialized areas, comprehension of which is impeded by barriers of technical nomenclature and inadequate grounding in such basic disciplines as organic and physical chemistry. The student often becomes discouraged, and acquires a feeling of inadequacy which interferes seriously with his desire and ability to comprehend those phases of the subject which he is really in a position to understand.

Attempts to supply these deficiencies in a textbook of biochemistry for medical students often lead to more confusion than enlightenment, for they can usually be considered only superficially. Moreover, if isolated aspects of fundamental chemistry are discussed in detail, they assume an importance that is out of proportion to the place they occupy in the over-all picture of biochemistry, and the student has difficulty in appreciating their true significance for biochemical phenomena. We feel that elucidation of such matters should be left to textbooks on these subjects and to the classroom.

Emphasis has been placed here on dynamic aspects of biochemistry, rather than on fundamental considerations of structure, reactions, and basic chemical principles, except insofar as these have a direct bearing

on the role of the substances in question in mammalian physiology. Admittedly, these distinctions are not always well defined, for many of these relationships are as yet imperfectly understood. We have attempted to provide an adequate description of substances of major biological importance. However, insofar as is feasible, isolated considerations of abstract chemical and physicochemical topics are avoided, and these are introduced into the text and discussed mainly in direct relation to their pertinence to biological phenomena.

The major emphasis throughout is on the integration of biochemical processes and on the mechanisms involved in the regulation and coordination of various aspects of metabolism. The aim is to enable the student to perceive the nature of metabolic interrelations and homeostasis, and thus to place biochemistry in its proper relation to physiology, normal and pathological. It has been our experience that this approach best serves to arouse the student's interest and imagination and to stimulate his desire to grasp the essential features of this subject.

There has been a growing tendency to include in textbooks of biochemistry an increasing volume of material on biochemical abnormalities in disease. Much of this is irrelevant to a consideration of physiological chemistry, and is inadequate for any other purpose. We believe that, whereas every attempt should be made to indicate the possible applications of biochemical facts and principles in his future studies of disease processes, the first-year student is not in a position to appreciate the significance of clinical or pathological biochemistry, except in a very general way. He knows nothing of the causes, nature, or effects of diseases, which, to him, are merely names, without real meaning. Emphasis in this connection should be placed on aberrations of normal mechanisms, rather than on isolated details, appreciation of which requires a background of information concerning disease processes and special organ pathology which he has not yet acquired.

These two major questions, namely, how little material should be included on fundamental aspects of organic and physical chemistry, and how much on biochemical abnormalities in disease, have been answered here rather arbitrarily. The manner in which the former is dealt with has been indicated. The view has been taken that disease states should be introduced into the discussion whenever an understanding of the incident biochemical aberrations aids in an understanding of normal reactions and mechanisms. Diabetes mellitus and disturbances of "acid-base" balance are excellent examples of such conditions.

With few exceptions, the main subject headings are those employed in the majority of current textbooks on this subject. Because we feel that a detailed consideration of dietetics does not fall within the prov-

ince of biochemistry, data on the composition of foods are not presented in detail, and foodstuffs are discussed only with reference to the general nutritional significance of proteins, carbohydrates, and fats.

Each topic is discussed as an entity, with extensive cross references to more detailed discussions of various aspects in other sections. This permits a logical, comprehensive, presentation of each subject, and consecutive reading of any section without the necessity of referring frequently to others, which disrupts the continuity of thought.

It is our belief that numerous literature references in the text are superfluous, if not indeed undesirable in a book of this nature. We feel that at this educational level the student derives more benefit, and less confusion, from critical reviews than from original contributions in highly specialized fields, which he may not be able to understand fully, and which he is seldom able to evaluate adequately. In the interests of reading continuity, we have omitted virtually all direct references from the text. There is a brief list of selected reading references at the end of each chapter, mainly to monographic discussions and reviews.

The first-year medical student must do a truly enormous amount of reading. He must, therefore, be able to get desired information with a minimum expenditure of time. To this end, no feature of a textbook is more important than its index. We have attempted to index each important item in the text according to the various points of view from which it may be approached in the mind of the student.

A textbook, in which the current status of a subject is surveyed, represents a synthesis of the contributions of all workers in the field. We are particularly indebted to those who have generously permitted reproduction of figures and tabulated data from their original publications. We wish to express our thanks also to the publishers, for their unfailing cooperation at every stage of the preparation of this book.

Philadelphia, Pa.
May, 1954

A. C.
B. S.

CONTENTS

1. CHEMISTRY OF CARBOHYDRATES	1
INTRODUCTION	1
Definition and Biological Significance	1
Types Found in Nature	1
CLASSIFICATION AND CONFIGURATION	2
Classification and Nomenclature	2
Asymmetric Carbon Atoms and Optical Isomerism	3
Cyclic Structures of the Sugars	6
SIMPLE MONOSACCHARIDES OF BIOLOGICAL IMPORTANCE	8
Diose	8
Trioses	8
Pentoses	8
Hexoses	10
ACETAL DERIVATIVES OF THE SIMPLE MONOSACCHARIDES	10
Acetals	10
Glycosides	10
Disaccharides	11
Polymers of the Simple Monosaccharides	13
SUGAR ACIDS, AMINO SUGARS, AND THEIR POLYMERS	16
Aldonic Acids	16
Uronic Acids	16
Saccharic Acids	17
Amino Sugars	17
Polymers of the Sugar Acids and the Amino Sugars	18
SUGAR ALCOHOLS AND CYCLITOLS	20
Sugar Alcohols	20
Cyclitols	21
PHOSPHORIC ESTERS OF THE SUGARS	21
Hexose Phosphates	21
Triose Phosphates	21
Pentose Phosphates	22
QUALITATIVE AND QUANTITATIVE TESTS FOR CARBOHYDRATES	23
Copper Reduction Tests	23
Furfural-Forming Tests	23
Nitric Acid Oxidation	24
Phenylhydrazine	24
Alkali	25
Iodine	25
Fermentation	26
BIBLIOGRAPHY	26

2. CHEMISTRY OF THE LIPIDS	27
INTRODUCTION	27
Definition and Biological Significance	27
Forms Occurring in Nature	27
CLASSIFICATION	28
FATS, WAXES, AND THEIR COMPONENTS	28
Glycerides	28
Waxes	31
PHOSPHOLIPIDS (PHOSPHATIDES)	31
Lecithins	31
Cephalins	32
Lipositols	33
Plasmalogens	33
Phosphatidic Acids and Related Compounds	33
Sphingomyelins	33
GLYCOLIPIDS	34
Cerebrosides	34
Gangliosides	35
Glycolipids of High Molecular Weight	35
STERIODS, STEROLS, AND BILE ACIDS	35
Steroids As a Group	35
Sterols	35
Bile Acids	36
OTHER SUBSTANCES ASSOCIATED WITH LIPIDS IN NATURE	37
Carotenoids and Vitamins A	37
Vitamins K and E	37
LIPOPROTEINS	38
State of Lipids in Nature	38
Examples of Lipoproteins	38
QUALITATIVE AND QUANTITATIVE TESTS FOR LIPIDS	39
Saponification Number	39
Iodine Number	39
Other "Numbers"	40
Acrolein Test	40
Choline Tests	40
Liebermann-Burchard Test	40
Fractionation of Lipids	40
BIBLIOGRAPHY	41
 3. CHEMISTRY OF PROTEINS	42
INTRODUCTION	42
Definition and General Properties	42
Biological Importance	43
CLASSIFICATION OF PROTEINS	44
Bases for Classification	44
Simple Proteins	45
Conjugated Proteins	46
Derived Proteins	47
THE AMINO ACIDS	48
Common Structural Features	48
Structure of the Amino Acids	50
Importance of Amino Acids	50
THE PEPTIDE BOND	50
Amides and Peptides	50
Naturally Occurring Peptides and Pseudopeptides	51
Evidence for Peptide Linkage in Proteins	52
Hydrolysis of the Peptide Linkage	53

CONTENTS

ix

ARCHITECTURE OF PROTEINS	55
Electrolytes, pH, and Buffers	55
Amino Acids and Proteins As Charged Particles	59
Proteins As Giant Molecules: Colloidal Properties	67
The Shape of Protein Molecules	72
Internal Structure of Proteins	77
Disruption of the Architecture: Denaturation	81
Qualitative and Quantitative Tests for Amino Acids and Pro- teins. Reactions of Constituent Groups	84
Separation and Determination of Amino Acids	88
Detection and Determination of Protein	92
BIBLIOGRAPHY	93

4. CHEMISTRY OF NUCLEOPROTEINS, NUCLEIC ACIDS, AND NUCLEOTIDES

94

INTRODUCTION	94
Terminology	94
Biological Importance	95
NUCLEOPROTEINS	95
Nucleoprotamines	95
Nucleohistones	96
Higher Nucleoproteins	96
NUCLEIC ACIDS	97
Composition	97
Structure	100
FREE NUCLEOTIDES OF BIOLOGICAL IMPORTANCE	103
Adenylic System	103
Coenzymes	104
Miscellaneous Nucleosides and Nucleotides	104
CHEMICAL TESTS ON NUCLEIC ACIDS AND THEIR COMPONENTS	105
Purines and Pyrimidines	105
Sugars	105
Analytical Separation of RNA and DNA	105
BIBLIOGRAPHY	105

5. CHEMISTRY OF HEMOGLOBIN, PORPHYRINS, AND RELATED COMPOUNDS

107

INTRODUCTION	107
CHEMISTRY OF PORPHYRINS	108
Structures and Nomenclature	108
Physical Properties	110
Chemical Properties	110
CHEMISTRY OF HEMES	110
Coordination of Iron	110
Pseudoperoxidase Reaction	111
CHEMISTRY OF BILE PIGMENTS	112
Structure and Nomenclature	112
Physical Properties	113
Chemical Properties	113
CHEMISTRY OF HEMOGLOBIN	115
General Physical Properties	115
Acid-Base Properties	115
Transport of Gases by Heme Groups of Hemoglobin	115
Carbamino Compound Formation	118

Redox Properties of Hemoglobin	118
Sulfhemoglobin	120
Interconversions of the Major Hemoglobin Derivatives	120
Determination of Hemoglobin	122
OTHER HEMOPROTEINS	123
Myoglobin	123
Cytochromes	123
Catalases and Peroxidases	124
BIBLIOGRAPHY	125
 6. VITAMINS	 126
VITAMINS A	126
Chemistry	128
Occurrence and Food Sources	131
Assay	131
Absorption	132
Storage and Intermediary Metabolism	132
Mobilization and Circulation	133
Excretion	134
Functions	134
Deficiency in Man	138
Vitamin Interrelationships	138
Detection of Deficiency in Man	138
Effects of Excess of Vitamin A	139
Vitamin A Requirement	140
VITAMIN C (ASCORBIC ACID)	141
Chemistry	141
Occurrence and Food Sources	142
Assay	143
Absorption; Distribution; Circulation	144
Metabolism; Excretion	144
Functions	145
Deficiency Manifestations—Scurvy	145
Detection of Deficiency in Man	146
Vitamin and Hormone Interrelationships	147
Effects of Excess Ascorbic Acid	148
Ascorbic Acid Requirement	148
VITAMINS D	148
Chemistry	149
Occurrence and Food Sources	151
Assay	152
Absorption; Storage; Excretion	152
Functions	153
Deficiency Manifestation	153
Demonstration of Vitamin D Deficiency	156
Effects of Excess Vitamin D	156
Requirement	156
VITAMINS E (TOCOPHEROLS)	157
Chemistry	157
Occurrence and Food Sources	158
Assay	159
Absorption; Distribution; Excretion	159
Functions; Deficiency Manifestations	159
Requirement	161
VITAMINS K	161
Chemistry	162
Occurrence and Food Sources	164
Assay	164

Absorption; Metabolism; Excretion	164
Function	165
Deficiency	165
Requirement	166
"VITAMIN F"	166
Chemistry	167
Occurrence	167
Assay	167
Metabolism, Actions, Requirements	167
GUINEA PIG ANTISTIFFNESS FACTOR	169
VITAMINS B (VITAMIN B COMPLEX)	169
<i>Thiamine</i>	170
Chemistry	171
Biosynthesis	171
Metabolism of Thiamine	173
Occurrence and Food Sources	174
Assay	174
Functions	175
Deficiency Manifestations	175
Requirement	177
<i>Riboflavin</i>	177
Chemistry	177
Biosynthesis	179
Metabolism	179
Occurrence and Food Sources	180
Assay	180
Functions	181
Deficiency Manifestations	181
Requirement	182
<i>Niacin (Nicotinic Acid)</i>	182
Chemistry	183
Occurrence and Food Sources	184
Biosynthesis	185
Metabolism	185
Assay	186
Functions	186
Pharmacological Action	187
Deficiency Manifestations	187
Requirement	188
<i>Pyridoxine (Vitamin B₆)</i>	189
Chemistry	189
Occurrence and Food Sources	189
Assay	190
Biosynthesis and Metabolism	191
Functions	191
Deficiency Manifestations	192
Requirement	192
<i>Pantothenic Acid</i>	193
Chemistry	193
Occurrence and Food Sources	193
Assay	193
Biosynthesis and Metabolism	195
Functions	195
Deficiency Manifestations	196
Requirement	196
<i>Biotin</i>	197
Chemistry	197
Occurrence and Food Sources	197
Assay	198
Biosynthesis and Metabolism	198

Functions	199
Deficiency Manifestations	199
Requirement	200
<i>The Folic and Folinic Acid Groups and Vitamins B₁₂</i>	200
FOLIC ACID AND FOLINIC ACID GROUP	200
Chemistry	201
Biosynthesis and Metabolism	203
Occurrence	204
Assay	204
Requirement	205
VITAMINS B ₁₂ (COBALAMINS) (ANTI-PERNICIOUS ANEMIA FACTOR)	205
Chemistry	205
Biosynthesis and Metabolism	205
Occurrence	206
Assay	207
Requirement	207
FUNCTIONS OF FOLIC ACID, FOLINIC ACID, VITAMIN B ₁₂	207
Reactions Involving Folic Acid, Folinic Acid, Vitamin B ₁₂	207
Role in Hemopoiesis	209
MANIFESTATIONS OF DEFICIENCY OF FOLIC ACID, FOLINIC ACID, VITA- MIN B ₁₂	210
<i>Inositol</i>	211
Chemistry	212
Occurrence and Food Sources	213
Biosynthesis and Metabolism	213
Assay	213
Requirement	213
Functions; Actions; Deficiency Manifestations	214
<i>α-Lipoic Acid</i>	215
<i>Postulated Vitamin-B Factors</i>	216
Vitamin B ₁₈	216
Vitamin B ₇	216
Strepogenin	216
Liver Residue Factor (LRF)	216
Choline	216
BIBLIOGRAPHY	216
 7. ENZYMES	219
INTRODUCTION	219
GENERAL MECHANISMS OF ENZYME ACTION	221
Enzyme-Substrate Combination	221
Coenzymes and Prosthetic Groups	222
Specific Ion Activators	223
Zymogens	224
PHYSICAL FACTORS INFLUENCING THE RATE OF ENZYMATIC REACTIONS	224
Temperature	224
pH	224
Concentration of Enzyme	225
Concentration of Substrate	225
Concentration of Cofactors	226
CLASSIFICATION OF ENZYMES	226
Introduction	226
General Classes of Enzymes	227
HYDROLASES	228
Carboxylesterases	228
Sulfatases	228
Phosphatases	229
Simple Glycosidases and Oligosaccharidases	232

Polysaccharidases	233
Exopeptidases	234
Endopeptidases	237
Amidases, Amidinases, Imidazolases	238
Hydrolytic Deaminases	239
ADDING AND REMOVING ENZYMES	241
Dehydrases	241
Desulphydrases	241
Non-oxidative Decarboxylases	243
Isomerases	243
Aldolases	244
TRANSFERRING ENZYMES	244
Transglycosidases	244
Transamidases and Transpeptidases	245
Transaminases	246
Transphosphorylases	247
Transacylases	249
Transfers of 1-Carbon Units	249
Other Transfer Reactions	250
INHIBITION OF ENZYME REACTIONS	251
Types of Inhibitors	251
Sulfhydryl Inhibitors	251
Inhibitors Acting on Coenzyme, Prosthetic Group, or Ion Ac- ticator	252
Inhibition Due to Metabolic Antagonism	252
Enzymes and Drug Action	253
THE INTRACELLULAR LOCALIZATION OF ENZYMES	253
Cytochemical Studies	253
Differential Centrifugation	254
INFLUENCE OF HORMONES ON ENZYMES	254
ENZYMES AND GENETICS	255
BIBLIOGRAPHY	256

8. CHANGES IN FOODSTUFFS IN THE ALIMENTARY TRACT 257

DIGESTION	257
Digestive Enzymes	258
SALIVA	259
Functions of Saliva	259
Salivary Amylase (Ptyalin)	259
GASTRIC JUICE	260
Hydrochloric Acid	260
Pepsin	261
Gastric Lipase	261
Rennin	262
Gastric "Mucus"	262
PANCREATIC JUICE	262
Trypsin	262
Chymotrypsin	263
Carboxypeptidase	263
Pancreatic Amylase (Diastase; Amylopsin)	263
Pancreatic Lipase (Steapsin)	263
Nucleodepolymerases	264
INTESTINAL JUICE (SUCCUS ENTERICUS)	264
Carbohydases	265
Peptidases	265
Nucleophosphatases (Nucleotidases)	265
Nucleosidases (Glucosidases or Phosphorylases)	266
Enterokinase	266

BILE	266
Bile Acids (Bile Salts)	267
Bile Pigments	269
Cholesterol	269
SUMMARY OF DIGESTION	270
Carbohydrates	270
Proteins	270
Nucleoproteins	270
Lipids	270
ABSORPTION	271
ACTION OF BACTERIA IN THE INTESTINES	271
Carbohydrates and Lipids	272
Proteins	272
Miscellaneous	274
FORMATION AND COMPOSITION OF FECES	275
Protein	277
Lipids	277
BIBLIOGRAPHY	277
 9. DETOXICATION MECHANISMS	279
Oxidation	279
Reduction	280
Hydrolysis	280
Conjugation	281
BIBLIOGRAPHY	284
 10. RESPIRATION	285
CHEMICAL CONTROL OF RESPIRATION	287
Influence of CO ₂ Tension and pH	288
Influence of O ₂ Tension	288
TRANSPORT OF OXYGEN	288
Dissociation of Oxyhemoglobin	289
TRANSPORT OF CARBON DIOXIDE	292
CO ₂ in Arterial Blood	293
Entrance of CO ₂ in Tissues	293
BIBLIOGRAPHY	294
 11. WATER BALANCE	295
WATER INTAKE	295
WATER OUTPUT	295
Feces	295
Insensible Perspiration	295
Perspiration	296
Urine	296
Equilibrium Requirements	297
BODY FLUIDS COMPARTMENTS	297
VOLUME OF BODY FLUID COMPARTMENTS	298
Blood and Plasma Volume	298
Total Extracellular Fluid Volume	299
Total Body Water	300
COMPOSITION OF BODY FLUID COMPARTMENTS	300
Milliequivalents	300
Osmolar Concentration	301
EXTRACELLULAR FLUID	302

INTRACELLULAR FLUID	305
EXCHANGES BETWEEN FLUID COMPARTMENTS	306
Gibbs-Donnan Equilibrium	306
Gibbs-Donnan Effect and Osmotic Pressure	308
Plasma: Interstitial Fluid Exchange	309
Interstitial Fluid: Intracellular Fluid Exchange	310
BIBLIOGRAPHY	312

12. "ACID-BASE" (ANION-CATION) BALANCE (NEUTRALITY REGULATION)

PHYSIOLOGICAL BUFFER SYSTEMS	314
Buffer Action of Hemoglobin	315
Buffer Systems for $\text{H}_2\text{CO}_3(\text{CO}_2)$	316
CO_2 Enters Plasma in Tissues	317
CO_2 Enters Erythrocytes	317
Buffer Systems for Fixed Acids	318
Net Effect of Buffer Mechanisms	319
Respiratory Regulation of Acid-Base Balance	320
Renal Regulation of Acid-Base Balance	320
ABNORMALITIES OF "ACID-BASE" (ANION-CATION) BALANCE	324
ACIDOSIS	325
Primary BHCO_3 (Alkali) Deficit	327
Primary H_2CO_3 (CO_2) Excess	329
ALKALOSIS	329
Primary BHCO_3 (Alkali) Excess	329
Primary H_2CO_3 (CO_2) Deficit	330
BIBLIOGRAPHY	331

13. ENERGY METABOLISM

Caloric Value of Foods	332
Heat Production	333
Respiratory Quotient	333
Calorimetry	337
Basal Metabolism	338
Specific Dynamic Action (SDA) of Foods	341
Total Metabolism (Caloric Requirement)	342
BIBLIOGRAPHY	343

14. METHODS OF INVESTIGATING INTERMEDIARY METABOLISM

GENERAL METHODS	345
In Vivo	345
In Vitro	346
Microorganisms	349
ISOTOPE METHODS	349
Introduction	349
Technics	350
BIBLIOGRAPHY	353

15. BIOLOGICAL OXIDATIONS

INTRODUCTION	354
Definition and Nomenclature	354
Significance of Biological Oxidations	355
Fundamental Reaction of Biological Oxidations	355

REDOX POTENTIAL	357
Electron Affinity	357
Redox Potential and Electron Transfer	357
REDOX CHAINS IN NATURE	358
Types of Oxidative Enzyme Systems	358
Coenzymes and Prosthetic Groups of Redox Systems	361
Oxidases	361
Aerobic Dehydrogenases	363
Cytochrome-Linked Anaerobic Dehydrogenases	364
Coenzyme-Linked Anaerobic Dehydrogenases	366
MISCELLANEOUS REDOX SYSTEMS	368
Hydroperoxidases	368
Glutathione and Ascorbic Acid	369
BIBLIOGRAPHY	370
 16. BIOENERGETICS AND HIGH-ENERGY PHOSPHATE	371
INTRODUCTION	371
Fundamental Concepts	371
Ultimate Origin of Energy	371
BIOENERGETIC SYSTEMS	372
Basic Requirements	372
Over-all Scheme of Bioenergetics	373
Energy Levels of Foodstuffs	373
Energy Levels of Hydrolyzable Linkages	374
Transphosphorylations	377
Coupling Mechanisms: Substrate Phosphorylation	378
Coupling Mechanisms: Oxidative Chain Phosphorylation	379
Summary of Generation of High-Energy Phosphate	380
Utilization of High-Energy Phosphate	380
Uncoupling of Phosphorylations	381
BIBLIOGRAPHY	382
 17. CARBOHYDRATE METABOLISM	383
INTRODUCTION	383
SOURCES OF GLUCOSE TO THE ORGANISM	383
Exogenous	383
Endogenous	386
UTILIZATION OF GLUCOSE	386
Storage	386
Oxidation	387
Conversion to Fat	387
Conversion to Other Carbohydrates	387
Conversion to Amino Acids	387
Miscellaneous Pathways	387
THE INTERMEDIARY METABOLISM OF CARBOHYDRATE: INTRODUCTION	388
ANAEROBIC METABOLISM OF GLUCOSE (GLYCOLYSIS)	389
Initial Phosphorylation	389
Synthesis of Glycogen	391
Conversion to Trioses	392
Oxidative Step	392
Formation of Lactate (or Ethanol)	393
Reversibility	394
Other Hexoses	394
Energetics of Fermentation and Glycolysis	395
Intracellular Localization	396
AEROBIC METABOLISM OF CARBOHYDRATE	396
Initial Oxidation of Pyruvic Acid	397

CONTENTS

xvii

Tricarboxylic Acid Cycle	397
Energetics of Aerobic Oxidation of Carbohydrate	401
Intracellular Localization	402
Pasteur Effect	402
PENTOSE METABOLISM	403
METABOLISM OF SUBSTITUTED AND DERIVED CARBOHYDRATES	405
Alcohols and Cyclitols	405
Amino Sugars and Acidic Carbohydrates	405
ROLE OF LIVER IN CARBOHYDRATE METABOLISM	406
Glycogenesis and Glycogenolysis	406
Gluconeogenesis	407
Assimilation of CO ₂	407
MUSCLE IN CARBOHYDRATE METABOLISM	408
Glycogenesis	408
Glycolysis	409
Muscle Contraction	409
CARBOHYDRATE METABOLISM IN OTHER TISSUES	415
POSTABSORPTIVE BLOOD SUGAR CONCENTRATION	415
Glucose in Body Fluids Other than Blood	416
Sugars Other than Glucose in Body Fluids	417
REGULATION OF BLOOD GLUCOSE CONCENTRATION	418
Rate of Supply of Glucose to Blood	419
Rate of Removal of Glucose from Blood	420
Fundamental Regulatory Mechanism	420
ENDOCRINE INFLUENCES IN CARBOHYDRATE METABOLISM	422
Insulin	423
Adrenal Cortical Hormones	423
Anterior Pituitary Factors	423
Epinephrine	424
Thyroid Hormone	424
Hyperglycemic Factor of Pancreas	424
BLOOD SUGAR AFTER GLUCOSE ADMINISTRATION	424
Factors Influencing Absorptive Blood Sugar Response	425
Phenomena Associated with Absorptive Response	428
EXCRETION OF SUGAR IN URINE (MELITURIA)	428
Mechanism of Glycosuria (Glucosuria)	429
Other Sugars in Urine	429
EXPERIMENTAL DIABETES MELLITUS	430
Total Pancreatectomy	430
Subtotal Pancreatectomy	431
Alloxan Administration	432
Administration of Adrenocortical Hormones	432
Anterior Pituitary Extracts	432
Thyroid Administration	433
Carbohydrate Metabolism in Hypophysectomized-Depancrea- tized Animals	433
NON-DIABETIC GLYCOSURIA	433
Hyperglycemic Glycosuria	434
Renal Glycosuria	434
INTERRELATION OF CARBOHYDRATE, PROTEIN, AND FATTY ACID METABOLISM	434
BIBLIOGRAPHY	436
 18. THE METABOLISM OF LIPIDS	 438
DIGESTION AND ABSORPTION	439
QUALITATIVE DISTRIBUTION OF LIPIDS	441
Normal Tissue Distribution	441
Intracellular Distribution	442
Abnormal Deposits of Lipids	442
GENERAL SURVEY OF LIPID METABOLISM	442