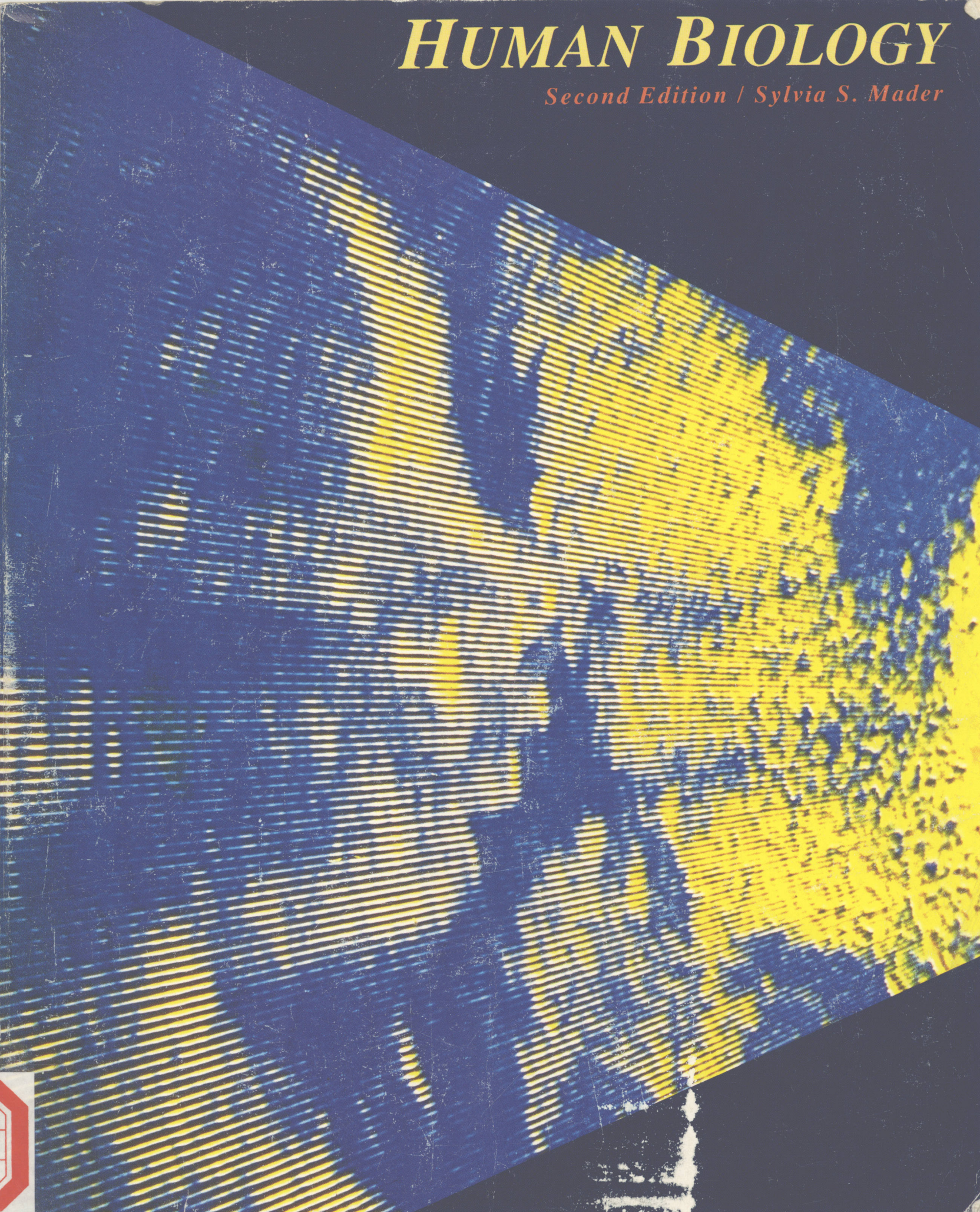


# *HUMAN BIOLOGY*

*Second Edition / Sylvia S. Mader*

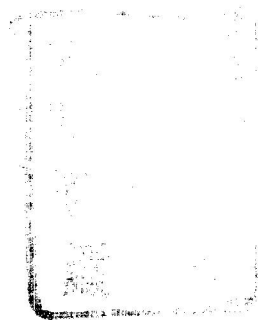




# ***HUMAN BIOLOGY***

*Second Edition*

*Sylvia S. Mader*



**Wm. C. Brown Publishers**

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*For my family*



**H**uman Biology is written primarily for one-semester biology courses that emphasize human physiology and the role that humans play in the biosphere. Although this text draws from my other book, *Inquiry into Life*, the material has been reworked to produce a stronger human approach to biological study. All young people should leave college with a firm grasp of how their bodies normally function and how the human population can become more fully integrated into the biosphere. This knowledge can be applied daily and helps assure our continued survival as individuals and as a species.

The application of biological principles to practical human concerns is a relatively new approach for instructional courses in biology. It has gained even wider acceptance because it fulfills a great need. Human beings are frequently called upon to make decisions about their bodies and their environment. Wise decisions require adequate knowledge.

The second edition of *Human Biology* has basically the same style and organization as the previous edition, with minor modification (Parts Four and Five have been reversed). Each chapter presents the topic clearly, simply, and distinctly so that the student will feel capable of achieving an adult level of understanding. Detailed, high-level scientific data and terminology are not included because I believe that true knowledge consists of working concepts rather than technical facility.

Students and instructors alike will find this text stimulating and a pleasure to read and study. Even so, we have not neglected routine matters, and students will appreciate the new end-of-chapter summary and key-term glossary for each chapter. Those who share the current concern about critical thinking will be pleased to know that there are two opportunities for students to develop this ability. The Human Issue boxes ask students to thoughtfully consider and come to a decision regarding complex social issues. Also, end-of-chapter thought questions have been provided. These questions require no more input than is given in the text, but they do ask the student to use this material in a creative manner.

## ORGANIZATION OF THE TEXT

An introductory chapter precedes the twenty-two chapters of *Human Biology*, which are grouped in six parts.

### Introduction: A Human Perspective

The introductory chapter lays a foundation and rationale for the text as a whole. It discusses the biological characteristics of humans, and in this edition more emphasis has been placed on our cultural heritage, an influence that helps set us apart from our closest relatives, the great apes. In keeping with adopters' wishes, the section on the scientific method has been expanded.

### Part One Human Organization

Part One, Chapters 1–3, presents some basic biological principles before reviewing the organization of the human body itself and discussing homeostasis, the general theme for the parts that follow.

In this edition, the chemistry chapter presents the structure and function of nucleic acids in greater detail. Mitotic cell division is no longer covered in the cell chapter; it has been placed in chapter 17 along with meiosis.

## PREFACE

## **Part Two Human Processing and Transporting**

Part Two covers those systems of the human body that could be described as vegetative and tells how they contribute to homeostasis.

In this edition, the nutrition portion of chapter 4 has been completely rewritten. This section now reflects more closely the current research in this area and gives appropriate applications for our daily lives. The other chapters have been reorganized and portions rewritten as was necessary to improve their content.

## **Part Three Human Integration and Coordination**

The control of homeostasis by the nervous and hormonal systems is discussed in Part Three. It also includes the musculoskeletal system and sense organs.

In this edition, the portion of chapter 10, Nervous System, that considers drugs has been completely rewritten. It now stresses drugs of abuse and presents detailed information regarding alcohol, marijuana, heroin, and cocaine. Instructors will find this new section a highly relevant addition to their curriculums. The other chapters have been reorganized and portions rewritten as was needed to improve their content.

## **Part Four Human Reproduction**

Part Four deals with human reproduction and development. In the first edition, this part appeared after Human Inheritance. It appears before Inheritance in this edition because of valuable feedback from instructors who felt strongly about the tighter logic of the current sequence. The chapter on sexually transmitted diseases includes some coverage of microbes in general.

The coverage of AIDS has been updated, of course. Also, the development chapter (chap. 16) contains a greatly expanded section on aging, a topic of greater interest now that a large segment of the U.S. population is over age 65.

## **Part Five Human Inheritance**

The transference of traits from one generation to the next and associated topics are considered in Part Five, Chapters 17–19. Genetics is that area of biology that is undergoing the most change and advancing most rapidly. It is fitting that this text should present the most up-to-date information in a student-orientated manner.

There are two completely new chapters in this part: Genes and Medical Genetics, (chap. 18) and DNA and Biotechnology (chap. 19). In the first of these chapters, great emphasis is placed on current knowledge regarding human genetic disorders. In the second, the way modern-day biotechnology is expected to revamp many areas of human concern is shown.

## **Part Six Human Evolution and Ecology**

This part discusses the evolution of humans (chap. 20) before presenting two ecology chapters with highly practical emphases. Chapter 21 contrasts the functioning of natural ecosystems with the human ecosystem, and chapter 22 reviews the history of the world population and concurrent concerns.



## ***AIDS TO THE READER***

*Human Biology* includes a number of aids that will help students study biology successfully and enjoyably.

### **Text Introduction**

The introduction discusses the characteristics of humans and presents an overview of the book. It outlines the biological principles that will be important to understanding the text and awakens students to the possibility of using these principles to make bioethical decisions.

### **Part Introductions**

An introduction to each part highlights the central ideas of that part and specifically tells the reader how the topics within each part contribute to biological knowledge.

### **Chapter Concepts**

Each chapter begins with a list of concepts stressed in the chapter. This list introduces the reader to the chapter by organizing its content into a few meaningful sentences. The concepts provide a framework for the content of each chapter.

### **Boldfaced Words**

Terms that are pertinent to the topic being discussed appear in boldfaced print. The first time these terms appear, they are defined in context. In any case, however, all boldfaced terms are defined in the glossary. Each entry in the glossary is accompanied by its phonetic pronunciation.

### **Tables and Illustrations**

Numerous tables and illustrations appear in each chapter and are placed near their related textual discussion. The tables clarify complex ideas and summarize sections of the narrative. Once students have achieved an understanding of the subject matter by examining the chapter concepts and the text, these tables can be used as an important review tool. The photographs and drawings have been carefully chosen and designed to help students visualize structures and processes.

### **Boxed Readings**

Two types of boxed readings are included in the text. Readings chosen from popular magazines illustrate the applications of concepts to modern concerns. These spark interest by illustrating that biology is an important part of everyday life. The second type of reading is designed to expand, in an interesting way, on the core information presented in each chapter. Topics pertaining to human concerns are addressed in these readings.

### **In-Chapter Summaries**

Summary statements are placed strategically within the body of each chapter. These give students periodic reinforcement of the information being presented. Such statements are highlighted for easy identification.

### **Human Issue Boxes**

Human Issue Boxes are included in every chapter throughout the text. These general discussion boxes are designed to stimulate student interest and thought, especially about how the chapter topics can be applied to human concerns. Most of the Issue boxes have been thoroughly revised for this edition and many new ones have been added on topics like AIDS, woodburning stoves, euthanasia, and prenatal screening.

### **Chapter Questions**

Objective questions, study questions, and thought questions are at the close of each chapter. The objective questions allow students to quiz themselves with short fill-in-the-blank objective questions. Answers to these questions appear on the same page. The study questions allow students to test their understanding of the information in the chapter. Thought questions require students to use the information presented in this and previous chapters in a creative manner. The thought questions, along with the Human Issue boxes, provide students with an opportunity to think critically.

### **Chapter Summaries**

Chapter summaries offer a concise review of material in each chapter. Students may read them before beginning the chapter to preview the topics of importance, and they may also use them to refresh their memories after they have a firm grasp of the concepts presented in each chapter.

### **Chapter Glossaries**

New to this edition are the chapter-ending, key-term glossaries. Selected key terms are listed with their phonetic pronunciations, definitions, and page references. All boldfaced terms are still listed alphabetically with their pronunciations, definitions, and page references in the text glossary at the end of the book.

### **Further Readings**

For those students who would like more information about a particular topic or who are seeking references for a research paper, each part ends with a listing of articles and books to help them get started. Usually the entries are *Scientific American* articles and specialty books that expand on the topics covered in the chapter.

### **Cancer Supplement**

Because of the current interest and recent discoveries in cancer research, a special section has been set aside for extensive treatment of this disease. This section includes the characteristics, causes, types, detection and treatment, survival rates, and suggestions for possibly preventing the occurrence of cancer. The cancer supplement is inserted between chapters 16 and 17 of the text.

### **Human Anatomy Acetate Overlays**

New to this edition, following page 220, is a full-color, ten-page insert of Human Anatomy Acetate Overlays. This intriguing and clearly-labeled art provides a quick reference for determining specific location of organs, bones and tissues, and the overall organization of the human body.



## **Appendixes and Glossary**

The appendixes contain optional information for student referral. Appendix I is the expanded Periodic Table of the Elements; Appendix II compares the light and electron microscopes and discusses the metric system.

The text glossary defines the terms most necessary for making the study of biology successful. By using this tool, students can review the definitions of the most frequently used terms.

## **Index**

The text also includes an index in the back matter of the book. By consulting the index it is possible to determine on what page or pages various topics are discussed.

## ***ADDITIONAL AIDS***

### **Instructor's Manual/Test Item File**

The *Instructor's Manual* is designed by the author and Trudy McKee to assist instructors as they plan and prepare for classes using *Human Biology*. An outline and a general discussion are provided for each chapter; together these give the overall rationale for the chapter. There are many objective test questions and several essay questions on each chapter. A list of suggested films for the various topics and a list of film suppliers are included at the end of the *Instructor's Manual*.

### **Student Study Guide**

To ensure close coordination with the text, the author has written the *Student Study Guide* that accompanies this text. Each text chapter has a corresponding study guide chapter that includes a listing of behavioral objectives, a pretest, study exercises, and a posttest. Answers to study guide questions appear at the end of sections, giving students immediate feedback.

### **Laboratory Manual**

The author has also written the *Laboratory Manual* that accompanies *Human Biology*. With few exceptions, each chapter in the text has an accompanying laboratory exercise in the manual (some chapters have more than one accompanying exercise). In this way, instructors will be better able to emphasize particular portions of the curriculum if they wish. The nineteen laboratory sessions in the manual are designed to further help students appreciate the scientific method and to learn the fundamental concepts of biology and the specific content of each chapter. All exercises have been tested for student interest, preparation time, and feasibility.

### **Laboratory Resource Guide**

More extensive information regarding preparation is found in the *Laboratory Resource Guide*. The guide includes suggested sources for materials and supplies, directions for making up solutions and otherwise setting up the laboratory, expected results for the exercises, and suggested answers to all questions in the *Laboratory Manual*. It is available for free to all adopters of the *Laboratory Manual*.

## Transparencies

This edition is accompanied by 80 transparencies in two and four colors. The transparencies feature text illustrations with oversized labels, facilitating their use in large lecture rooms. They are available for free to all adopters.

## Lecture Enrichment Kit

The Lecture Enrichment Kit is a series of optional lecture notes to accompany the text's transparencies. For each transparency there is a corresponding lecture unit. Each unit contains a summary of all text material pertinent to the process or phenomenon depicted in the transparency. The summary is followed by three to five "extensions," topics not discussed in the text. Extensions are drawn from popular periodicals of general interest, scientific periodicals, or more advanced texts. They vary in detail and degree of rigor, and are available free to all adopters.

## Ancillary Box

An attractive slip-case box for housing the text and its ancillaries is available for free to all adopters of the new edition.

## COMPUTERIZED ANCILLARIES

### wcb QuizPak

A student computer software program is available with *Human Biology*. wcb **QuizPak**, the interactive self-testing, self-scoring quiz program, will help your students review text material from any chapter by testing themselves on an Apple IIe, IIc, or Macintosh, or an IBM PC. Adopters will receive the QuizPak program, question disks, and an easy-to-follow user's guide. QuizPak may be used at a number of workstations simultaneously and requires only one disk drive.

### wcb TestPak

wcb **TestPak** is a computerized system that enables you to make up customized exams quickly and easily. Test questions can be found in the Test Item File, which is printed in your Instructor's Manual or as a separate packet. For each exam you may select up to 250 questions from the file and either print the test yourself or have wcb print it.



## ACKNOWLEDGMENTS

The personnel at Wm. C. Brown Publishers are due many thanks for their help in developing and producing this edition of *Human Biology*. Kevin Kane, biology editor, not only oversaw the development of the manuscript, but also made important production decisions. He was assisted by Carol Mills, developmental editor, who helped on a more daily basis. David Lansdon designed the book with skill, and Carol Smith picked just the right photographs. Diane Clemens was the production editor who coordinated the efforts of many.

There are many new illustrations in this edition of *Human Biology*. Kathleen Hagelston provided most of these; the clarity and beauty of her work are well known to all those familiar with my texts. Also, Tom Waldrop did strikingly beautiful anatomical drawings. In addition, Anne Greene, Laurie O'Keefe, Marjorie C. Leggitt, and Precision Graphics provided artwork that is most appealing and competent.

Finally, I wish to express appreciation to my family for their constant support. My children, Karen and Eric, and my sister, Rhetta, were always ready to offer advice and encouragement.

Many instructors have contributed to this revision of *Human Biology*, and I especially want to thank Robin W. Tyser of the University of Wisconsin-LaCrosse, who revised the previous edition's Human Issue boxes and provided additional Human Issue boxes for this edition. Many other instructors commented on the entire or a portion of the text. The author is extremely thankful to each one, for we have all worked diligently to remain true to our calling and to provide a product that will be the most useful to our students. In particular, it seems proper to acknowledge the help of the following individuals:

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# BRIEF CONTENTS

Preface xiii

Introduction: A Human Perspective 1

---

## PART ONE

### HUMAN ORGANIZATION 11

- 1 Chemistry of Life 12
- 2 Cell Structure and Function 30
- 3 Body Organization 49

---

## PART TWO

### HUMAN PROCESSING AND TRANSPORTING 69

- 4 Digestion and Nutrition 70
- 5 Circulation 99
- 6 Blood 121
- 7 Immunity 139
- 8 Respiration 159
- 9 Excretion 177

---

## PART THREE

### HUMAN INTEGRATION AND COORDINATION 193

- 10 Nervous System 194
- 11 Musculoskeletal System 222
- 12 Senses 246
- 13 Hormones 267

---

## PART FOUR

### HUMAN REPRODUCTION 291

- 14 Reproductive System 292
- 15 Sexually Transmitted Diseases 316
- 16 Development 333

### CANCER SUPPLEMENT C-1

---

## PART FIVE

### HUMAN INHERITANCE 361

- 17 Chromosomes and Chromosomal Inheritance 362
- 18 Genes and Medical Genetics 386
- 19 DNA and Biotechnology 413

---

## PART SIX

### HUMAN EVOLUTION AND ECOLOGY 441

- 20 Evolution 442
- 21 The Environment 466
- 22 Population Concerns 491

Appendix A A-1

Appendix B A-2

Appendix C A-4

Glossary G-1

Credits CR-1

Index I-1







# CONTENTS

*Preface* xiii

*Introduction: A Human Perspective* 1

*... Us and the Apes* 6

*Science* 8

*Scientific Method* 8

*Social Responsibility* 8

## PART ONE

### HUMAN ORGANIZATION 11

### 1 CHEMISTRY OF LIFE 12

*Inorganic Chemistry* 13

*Atoms* 13

*Reactions between Atoms* 14

*Characteristics of Water* 16

*Acids and Bases* 16

*Acid Rain and Colon Cancer Are  
Linked* 18

*Organic Chemistry* 18

*Unit Molecules* 18

*Proteins* 20

*Carbohydrates* 20

*Lipids* 22

*Wheat* 23

*Nucleic Acids* 24

### 2 CELL STRUCTURE AND FUNCTION 30

*Membrane* 33

*Membrane Structure* 33

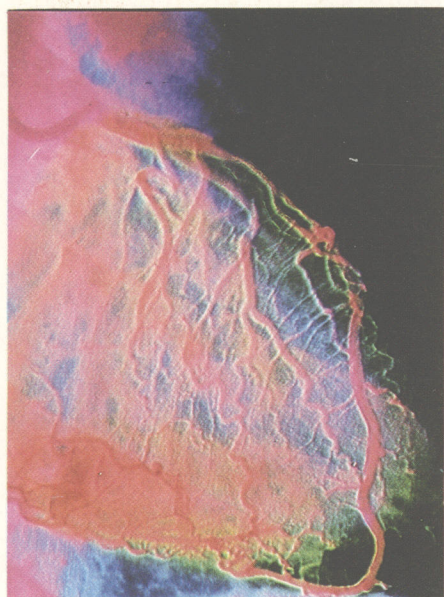
*Membrane Function* 33



Cellular Organelles	36
Nucleus	36
Membranous Canals and Vacuoles	36
Golgi Apparatus	37
Lysosomes	37
Mitochondria	38
Other Organelles	39
Cellular Metabolism	40
Enzymes	40
Cellular Respiration	42
Alcoholic Beverages	44

### 3 BODY ORGANIZATION 49

Tissues	51
Epithelial Tissue	51
Connective Tissue	55
Muscular Tissue	57
Nervous Tissue	58
Organs and Organ Systems	59
Skin	59
Organ Systems	61
Homeostasis	61
That Oh, So Nice, Tan	65



#### PART TWO

#### HUMAN PROCESSING AND TRANSPORTING 69

### 4 DIGESTION AND NUTRITION 70

Digestive System	73
Mouth	73
Pharynx	74
Esophagus	74

Stomach	75
Small Intestine	76
Control of Digestive Gland Secretion	77
Liver	78
Large Intestine	81
Nutrition	83
Proteins	83
Carbohydrates	85
How Does Your Diet Rate for Variety?	86
Fats	87
Vitamins and Minerals	89
Dieting	92
Daily Energy Requirements	92
Fad Diets versus Behavior Modification	94
Eating Disorders	95
"Crash" Diets	96

### 5 CIRCULATION 99

Cardiovascular System	100
Blood Vessels	100
Heart	102
Heartbeat	105
Vascular System	107
Features of the Circulatory System	110
Pulse	110
Blood Pressure	110
Velocity of Blood Flow	111
Circulatory Disorders	112
Hypertension	112
Atherosclerosis	113
Coronary Heart Disease	114
Surgical Treatment	116
Varicose Veins and Phlebitis	117
Lymphatic System	117
Lymphatic Vessels	117
Lymphatic Organs	119

### 6 BLOOD 121

Transport	122
Plasma	123
Red Blood Cells (Erythrocytes)	124
Artificial Blood	126
Capillary Exchange Within the Tissues	129
Blood Clotting	131
Infection Fighting	132
White Blood Cells (Leukocytes)	132
Blood Typing	135
ABO Grouping	135
Rh System	136

### 7 IMMUNITY 139

General Defense	140
Barriers to Entry	140
Phagocytic White Blood Cells	141
Protective Chemicals	141
Specific Defense	142
B Cells versus T Cells	142
B Lymphocytes	144
Treatment for AIDS	146
T Lymphocytes	149
Immunological Side Effects and Illnesses	151
Allergies	151
Tissue Rejection	151
Autoimmune Diseases	153
Aging	153
Immunotherapy	154
Active Immunity	154
Passive Immunity	154

### 8 RESPIRATION 159

Breathing	161
Passage of Air	161
Mechanism of Breathing	165
Lung Capacities	168
External and Internal Respiration	169
External Respiration	169
Internal Respiration	171
Respiration and Health	171
Upper Respiratory Infections	172
Lung Disorders	173
Risks of Smoking versus Benefits of Quitting	174

### 9 EXCRETION 177

Excretory Substances	179
Nitrogenous End Products	179
Other Excretory Substances	180
Organs of Excretion	181
Skin	181
Liver	181
Lungs	181
Intestine	181
Kidneys	181
Urinary System	182
Urination	182
Kidneys	183
Urine Formation	185
Pressure Filtration	185
Selective Reabsorption	185
Loop of Henle	187
Tubular Excretion	188
Collecting Duct	188



*Regulatory Functions of the Kidneys*  
188

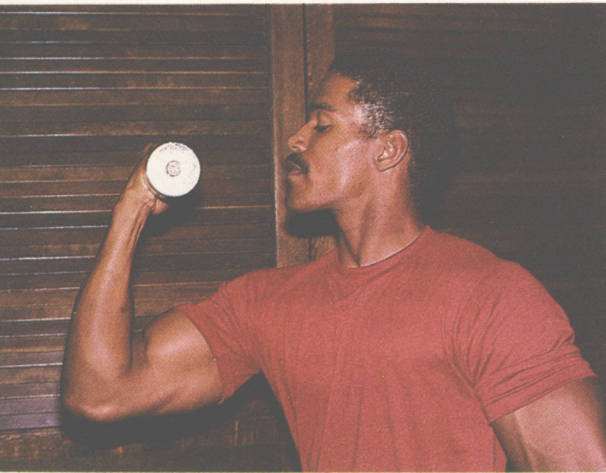
*Blood Volume* 188

*Adjustment of pH* 189

*Ion Balance* 189

*Problems with Kidney Function* 189

*Kidney Replacements* 190



**PART THREE**

**HUMAN INTEGRATION AND  
COORDINATION 193**

**10 NERVOUS SYSTEM 194**

*Neurons* 195

*Structure* 195

*Nerve Impulse* 198

*Transmission across a Synapse* 200

*Neurotransmitter Substances* 200

*One-Way Propagation* 202

*Peripheral Nervous System* 203

*Nerves* 203

*Somatic Nervous System* 203

*Autonomic Nervous System* 207

*Central Nervous System* 209

*Spinal Cord* 209

*Brain* 209

*Drug Abuse* 215

*Drug Action* 215

*Drug Abuse Facts* 215

*Alcohol* 216

*Marijuana* 217

*Cocaine* 218

*Heroin* 219

*Designer Drugs* 219

**11 MUSCULOSKELETAL  
SYSTEM 222**

*Skeleton* 224

*Functions* 224

*Skull* 224

*Vertebral Column* 226

*Appendicular Skeleton* 227

*Long Bones* 228

*Growth and Development* 229

*Joints* 229

*Skeletal Muscles* 231

*Macroscopic Anatomy and*

*Physiology* 231

*Exercise: Changing Perceptions* 232

*Effect of Contraction on Size of  
Muscle* 238

*Microscopic Anatomy and*

*Physiology* 239

**12 SENSES 246**

*General Receptors* 248

*Skin* 248

*Muscles and Joints* 249

*Special Senses* 249

*Chemoreceptors* 249

*Photoreceptor—the Eye* 252

*Mechanoreceptor—the Ear* 259

*Picturing the Effects of Noise* 264

**13 HORMONES 267**

*Pituitary Gland* 271

*Posterior Pituitary* 271

*Anterior Pituitary* 272

*Thyroid Gland* 275

*Activity and Disorders* 276

*Calcitonin* 276

*Adrenal Glands* 277

*Adrenal Medulla* 278

*Adrenal Cortex* 278

*Sex Organs* 280

*The Growing Threat of Steroids* 281

*Parathyroid Glands* 284

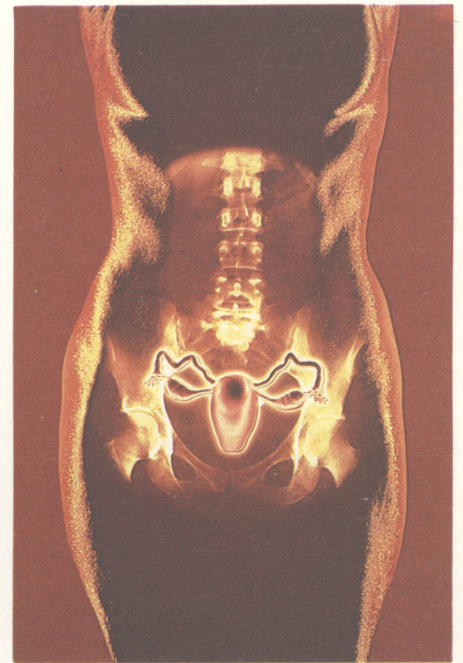
*Pancreas* 285

*Diabetes Mellitus* 285

*Other Hormones* 287

*Local Hormones* 287

*Prostaglandins* 287



**PART FOUR**

**HUMAN REPRODUCTION 291**

**14 REPRODUCTIVE SYSTEM  
292**

*Male Reproductive System* 294

*Testes* 294

*Genital Tract* 296

*Penis* 296

*Hormonal Regulation in the Male*  
297

*Female Reproductive System* 299

*Ovaries* 299

*Genital Tract* 300

*The Reasons for Orgasm* 302

*External Genitalia* 303

*Orgasm* 303

*Hormonal Regulation in the Female* 303

*Hormonal Regulation (Simplified)*  
303

*Hormonal Regulation (Detailed)*  
305

*Pregnancy* 306

*Female Sex Hormones* 307

*Menopause* 307

*Birth Control* 307

*Group I* 308

*Group II* 308

*Group III* 308

*Group IV* 310

*Group V* 310



*Future Means of Birth Control* 311  
*Infertility* 311  
*Endometriosis* 312

## 15 SEXUALLY TRANSMITTED DISEASES 316

*Viral in Origin* 318  
*AIDS* 320  
*AIDS Prevention* 322  
*Genital Herpes* 322  
*Genital Warts* 323  
*Bacterial in Origin* 324  
*Gonorrhea* 326  
*Antibiotics and Antiviral Drugs* 327  
*Chlamydia* 328  
*Syphilis* 328  
*Other Diseases* 330  
*Vaginitis* 330  
*Crabs* 330



## 16 DEVELOPMENT 333

*Developmental Processes* 335  
*Embryonic Development* 335  
*First Week* 335  
*Second Week* 336  
*Third Week* 337  
*Fourth Week* 339  
*Fifth Week* 340  
*Sixth to Eighth Week* 343  
*Birth Defects* 344  
*Fetal Period* 345  
*Third and Fourth Months* 345  
*Fifth to Seventh Months* 347  
*Eighth and Ninth Months* 350  
*Birth* 350  
*Stages* 350  
*Development after Birth* 351  
*Infancy* 351  
*Childhood and Adolescence* 353  
*Adulthood and Aging* 354  
**CANCER SUPPLEMENT C-1**  
*Cancer* C-2  
*Characteristics of Cancer* C-2  
*Causes of Cancer* C-3  
*Types of Cancer* C-6  
*Detection and Treatment* C-8  
*Survival Rates* C-9  
*Avoidance of Cancer* C-9

### PART FIVE

## HUMAN INHERITANCE 361

## 17 CHROMOSOMES AND CHROMOSOMAL INHERITANCE 362

*Chromosomes* 363  
*Karyotype* 363  
*Life Cycle* 365  
*Mitosis* 367  
*Overview* 367  
*Stages* 369  
*Cell Cycle* 370  
*Importance of Mitosis* 371  
*Meiosis* 371  
*Overview* 371  
*Stages* 372  
*Spermatogenesis and Oogenesis* 372  
*Importance of Meiosis* 376  
*Chromosomal Inheritance* 376  
*Normal Inheritance* 376  
*Abnormal Autosomal Chromosome Inheritance* 377  
*Male/Female Cell Differences* 380  
*Detecting Birth Defects* 381  
*Abnormal Sexual Chromosome Inheritance* 382

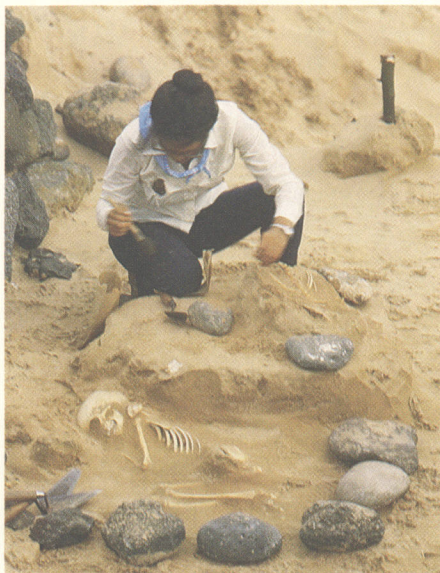
## 18 GENES AND MEDICAL GENETICS 386

*Simple Mendelian Inheritance* 387  
*Inheritance of a Single Trait* 388  
*Inheritance of Multitraits* 391  
*Genetic Disorders* 395  
*Lysosomal Storage Genetic Disorders* 398  
*Beyond Mendel's Laws* 400  
*Polygenic Inheritance* 400  
*Multiple Alleles* 401  
*Incomplete Dominance and Codominance* 402  
*Sex-Linked Inheritance* 403  
*X-Linked Genes* 403  
*Sex-Influenced Traits* 404  
*Mapping the Human Chromosomes* 406  
*Linkage Data* 406  
*Human-Mouse Cell Data* 408  
*Genetic Marker Data* 408  
*DNA Probe Data* 409

## 19 DNA AND BIOTECHNOLOGY 413

*Nucleic Acids within the Cell* 414  
*DNA, the Hereditary Material* 416  
*Genes and Enzymes* 416  
*Protein Synthesis* 419  
*Code of Heredity* 419  
*Transcription* 420  
*Translation* 420  
*Summary of Protein Synthesis* 422  
*Other Features of DNA* 422  
*Structural versus Regulatory Genes* 422  
*Genetic Mutations* 422  
*Split Genes* 424  
*Biotechnology* 424  
*Genetic Engineering of Cells* 426  
*Today's Biotechnological Products* 428  
*Transgenic Organisms* 431  
*Superfish: Coming Soon to a Lake near You* 434  
*The Future* 436





#### PART SIX

### HUMAN EVOLUTION AND ECOLOGY 441

## 20 EVOLUTION 442

- Evidences for Evolution 443
- Fossil Record 443

### New Questions from the Fossil Record 445

- Comparative Anatomy 444
- Comparative Embryology 448
- Vestigial Structures 448
- Comparative Biochemistry 448
- Biogeography 451
- Mechanisms of Evolution 451
  - Variations 451
- Struggle for Existence 452
- Survival of the Fittest 452
- Adaptation 452
- Organic Evolution 453
  - Origin of Life 453
  - Human Evolution 456
  - Humans 461

## 21 THE ENVIRONMENT 466

- The Everglades 469
- Ecosystem Composition 470
  - Food Chains 470
  - Food Webs 472
  - Food Pyramid 473
  - Stability 473
- Chemical Cycles 474
  - Carbon Cycle 475
  - Nitrogen Cycle 476

### Human Ecosystem 477

Country 477

### Energy to Grow Food 479

City 480

Air Pollution 482

Land Pollution 484

Water Pollution 486

## 22 POPULATION CONCERNS 491

### Exponential Population Growth 492

Growth Rate 493

### History of the World Population 495

Developed and Developing Countries 495

### United States Population 498

### What We Must Do to Save Wildlife 500

### Resource Consumption 502

Energy 503

Food 507

### Steady State 509

### Appendix A A-1

### Appendix B A-2

### Appendix C A-4

### Glossary G-1

### Credits CR-1

### Index I-1