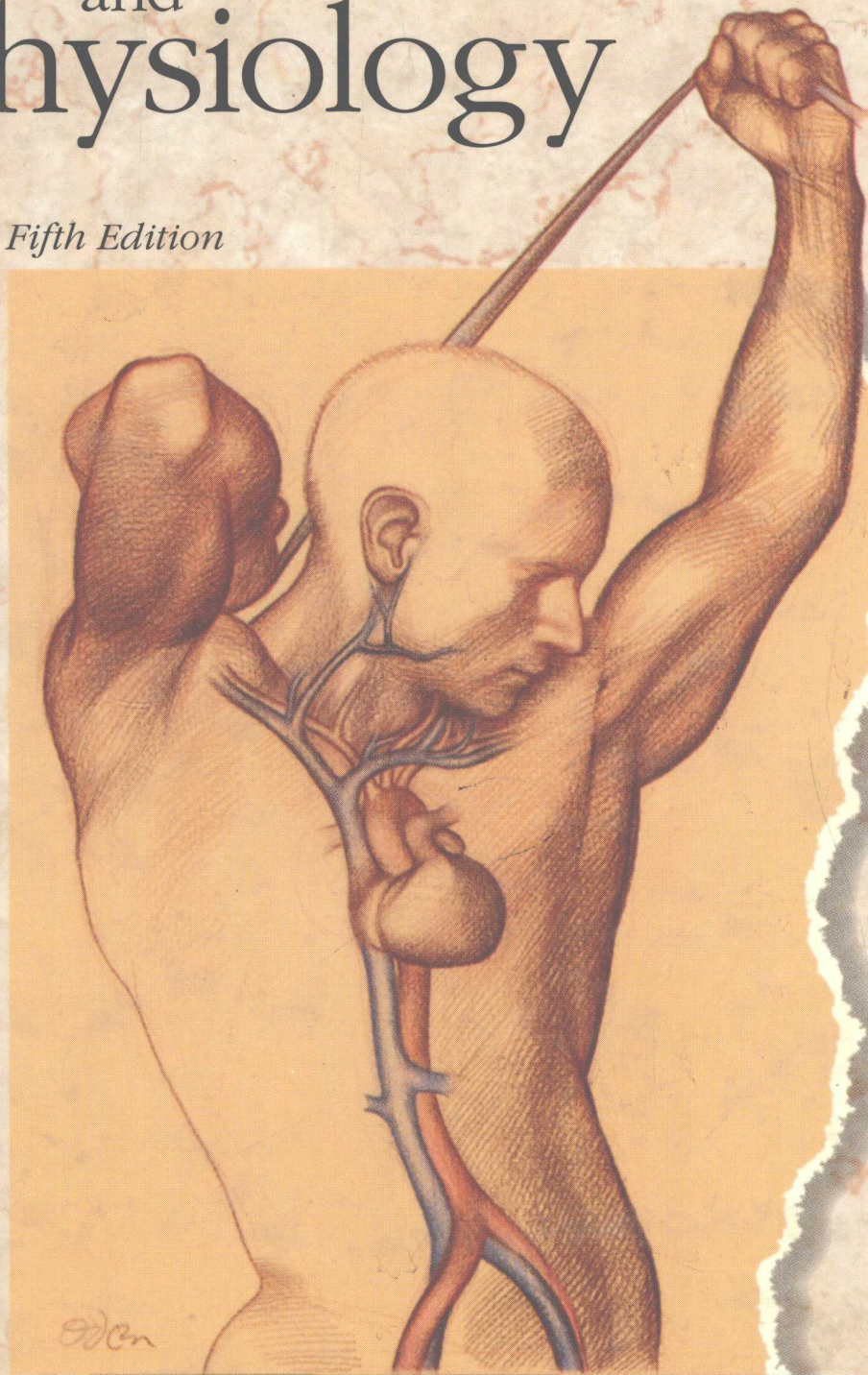


Human Anatomy and Physiology

Fifth Edition



John W. Hole, Jr.

Human Anatomy and Physiology

Fifth Edition

John W. Hole, Jr.



Wm. C. Brown Publishers



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Human Anatomy and Physiology

For Shirley

Preface

The fifth edition of **Human Anatomy and Physiology** is designed to provide accurate, current information about the structure and function of the human body in an interesting and readable manner. It is especially planned for students pursuing careers in allied health fields, who have minimal backgrounds in physical and biological sciences.

Organization

The text is organized in units, each containing several chapters. These chapters are arranged traditionally, beginning with a discussion of the physical basis of life and proceeding through levels of increasing complexity.

Unit 1 introduces the human body and its major parts. It is concerned with the structure and function of cells and tissues; it introduces membranes as organs and the integumentary system as an organ system.

Unit 2 deals with the skeletal and muscular systems that support and protect body parts and make movements possible.

Unit 3 concerns the nervous and endocrine systems that integrate and coordinate body functions.

Unit 4 discusses the digestive, respiratory, circulatory, lymphatic, and urinary systems. These systems obtain nutrients and oxygen from the external

environment; transport these substances internally; use them as energy sources, structural materials, and essential components in metabolic reactions; and excrete the resulting wastes.

Unit 5 describes the male and female reproductive systems, their functions in producing offspring, and the growth and development of the offspring. The final chapter concerns genetics and explains the determination of individual traits and their passage from parents to offspring.

Special Features of the Fifth Edition

The chapters of the fifth edition of **Human Anatomy and Physiology** have been carefully revised, the illustration program has been improved throughout, and the clinical features of the textbook have been strengthened. Major changes in this edition include the following:

1. Several chapters have received special attention in the revision process. They include those covering the endocrine, cardiovascular, lymphatic, and reproductive systems.
2. All of the clinical boxed asides within the chapter narratives, as well as the longer clinical applications and the clinical application of knowledge questions, have been reviewed by clinical specialists for accuracy and appropriateness.
3. Many figures have been improved or replaced with new artwork, most notably in chapter 9 (the muscular system), and color has been used throughout the book to emphasize particular parts of the illustrations. A large number of new micrographs have been included, and sets of labeled human skull and cadaver photographs have been incorporated among the reference plates.
4. Discussions of many topics have been revised or expanded. Among these are steroids, cell membrane structure, homeostasis of bone tissue, axonal transport, drug actions on neurotransmitters, physiology of rods, pain nerve pathways, regulation of pain impulses, blood gases, lymphokines, control of ovulation, the fertilization process, milk production, and genetic disease.
5. More than fifty new boxed asides have been written. A special effort was made to increase the number of those dealing with topics of clinical interest, such as transdermal patch, collagen diseases, skin substitutes, rule of nine, gluteal gait, triangle of auscultation, intrathecal injection, subdural hematoma, cochlear implant, Valsalva maneuver, malabsorption, hyperoxia,

- plasminogen activator, secondary pacemaker, cyclosporin, major histocompatibility complex, tuberculin test, and lithotripsy.
6. Several new summary charts have been added. These include levels of organization, organ systems, lipids, amino acids of proteins, intercellular junctions, protein synthesis, and components of connective tissues.
 7. At the ends of chapters 6, 12, 14, 16, 18, and 20 are new, fictitious case studies, each of which describes a medical problem and explains how this problem might be treated. Topics include a pigmented lesion, a cataract, gallstones, chronic obstructive pulmonary disease, coronary artery disease, and chronic kidney failure.

Readability

Readability is an important asset of this text. The writing style is intentionally informal and easy to read. Technical vocabulary has been minimized, and summary paragraphs and review questions occur frequently within the narrative. Numerous illustrations, summary charts, and flow diagrams are carefully positioned near the discussions they complement.

Pedagogical Devices

The text includes an unusually large number of pedagogical devices intended to increase readability, to involve students in the learning process, to stimulate their interests in the subject matter, and to help them relate their classroom knowledge to their future clinical experiences. For an annotated listing of these devices, see To the Reader, which follows this preface.

Supplementary Materials

Supplementary materials designed to help the instructor plan class work and presentations and to aid students in their learning activities are also available:

1. *Instructor's Resource Manual and Test Item File* by John W. Hole, Jr., and Karen A. Koos contains chapter overviews, instructional techniques, suggested schedules, discussions of chapter elements, answers to clinical application of knowledge questions, lists of related films, and directories of suppliers of audiovisual and laboratory materials. It also contains test items for each chapter of the text, which are designed to evaluate student understanding of the subject matter presented.
2. *A Student Study Guide to Accompany Human Anatomy and Physiology* by Nancy A. Sickles Corbett, Rancocoas Hospital, Willingboro, NJ, contains chapter overviews, chapter objectives, focus questions, mastery tests, study activities, and answer keys corresponding to the chapters of the text.
3. *Transparencies* include a set of 100 acetate transparencies designed to complement classroom lectures or to be used for short quizzes.
4. *Color Slides* include a set of light micrographs of tissues, organs, and other body features described in the textbook to complement classroom instruction.
5. *Laboratory Manual to Accompany Human Anatomy and Physiology* by John W. Hole, Jr., is designed specifically to accompany the fifth edition of *Human Anatomy and Physiology*.
6. *Dissection Video* demonstrates for students the procurement, maintenance, and utilization of cadavers, as well as prosection of abdominal and thoracic cavities and arm and leg extremities. The video was prepared by Terry Martin and Hassan Rastegar of Kishwaukee College.

To the Reader

This textbook includes a variety of aids to the reader that should make your study of human anatomy and physiology more effective and enjoyable. These aids are included to help you master the basic concepts of human anatomy and physiology that are needed before progressing to more difficult material.

Unit Introductions

Each unit opens with a brief description of the general content of the unit and a list of chapters included within the unit (see page 3 for an example). This introduction provides an overview of the chapters and tells how the unit relates to the other aspects of human anatomy and physiology.

Chapter Introductions

Each chapter introduction previews the chapter's contents and relates that chapter to the others within the unit (see page 5).

After reading an introduction, browse through the chapter, paying particular attention to topic headings and illustrations so that you get a feeling for the kinds of ideas that are included in the chapter.

Chapter Outlines

The chapter outline includes all the major topic headings and subheadings within the body of the chapter (see page 6). It provides an overview of the chapter's contents and helps you locate sections dealing with particular topics.

Chapter Objectives

Before you begin to study a chapter, carefully read the chapter objectives (see page 6). These indicate what you should be able to do after mastering the information within the narrative. The review activities at the end of each chapter (see page 29) are phrased as detailed objectives, and it is helpful to read them also before beginning your study. Both sets of objectives are guides that indicate important sections of the narrative.

Key Terms

The list of terms and their phonetic pronunciations given at the beginning of each chapter helps build your science vocabulary. The words included in these lists are used within the chapter and are likely to be found in subsequent chapters as well (see page 7). An explanation of phonetic pronunciation is provided on page G-1 of the glossary.

Aids to Understanding Words

Aids to understanding words at the beginning of each chapter also help build your vocabulary. This section includes a list of word roots, stems, prefixes, and suffixes that help you discover word meanings. Each root and an example word that uses the root are defined (see page 7).

Knowing the roots from these lists will help you discover and remember scientific word meanings.

Review Questions within the Narrative

Review questions occur at the ends of major sections within each chapter (see page 8). When you reach such questions, try to answer them. If you succeed, then you probably understand the previous discussion and are ready to proceed. If you have difficulty, reread that section before proceeding.

Illustrations and Charts

Numerous illustrations and charts occur in each chapter and are placed near their related textual discussion. They are designed to help you visualize structures and processes, to clarify complex ideas, to summarize sections of the narrative, or to present pertinent data.

As mentioned previously, it is a good idea to skim through the chapter before you begin reading, paying particular attention to these figures. Then, as you read for detail, carefully look at each figure and use it to gain a better understanding of the material presented.

Sometimes the figure legends contain questions that will help you apply your knowledge to the object or process the figure illustrates. The ability to apply information to new situations is of prime importance. These questions concerning the illustrations will provide practice in this skill.

There are also sets of special reference plates that you may want to refer to from time to time. One set (see page 31) is designed to illustrate the structure and location of the major internal organs of the body. Another set (see

page 237) depicts the structural detail of the human skull, and still others (see page 335 and page 927) will help you locate major features on the body surface and visualize organs exposed by the dissection of a cadaver.

Boxed Information

Short paragraphs set off in boxes of colored type occur throughout each chapter (see page 10). These boxed asides often contain information that will help you apply the ideas presented in the narrative to clinical situations. Others contain information about changes that occur in the body's structure and function as a person passes through the various phases of the human life cycle. These will help you understand how certain body conditions change as a person grows older.

Clinical, Practical, and Laboratory Applications

Other, longer asides are entitled Clinical, Practical, or Laboratory Applications. They discuss pathological disorders, laboratory techniques, and pertinent information of more general interest (see page xvii for a list of these topics).

Clinical Terms

At the ends of most chapters are lists of related terms that are sometimes used in clinical situations, along with phonetic pronunciations for those terms (see page 27). Although these lists and the word definitions are often brief, they will be a useful addition to your understanding of medical terminology.

Chapter Summaries

A summary in outline form at the end of each chapter will help you review the major ideas presented in the narrative (see page 27). Scan this section a few days after you have read the chapter. If you find portions that seem unfamiliar, reread the related sections of the narrative.

Clinical Application of Knowledge

The questions at the end of each chapter (see page 29) will help you gain experience in applying information to a few clinical situations. Discuss your answers with other students or with an instructor. (Suggested answers to these questions are available to the instructor in the Instructor's Manual.)

Review Activities

The review activities at the end of each chapter (see page 29) will check your understanding of the major ideas presented in the narrative. After studying the chapter, read the review activities; if you can perform the tasks suggested, you have accomplished the goals of the chapter. If not, reread the sections of the narrative that need clarification.

Clinical Case Studies

Fictitious clinical case studies occur at the ends of chapters 6, 12, 14, 16, 18, and 20. Each study describes a medical problem and explains how the problem might be treated. The purpose

of the case study is to help you relate some of the ideas presented in the previous chapter to a clinical situation and, at the same time, to add to your understanding of medical terminology. Questions are included at the end of each study to stimulate thought about the problems and procedures described.

Appendixes, Glossary, and Index

The appendixes contain a variety of useful information. They include the following:

1. Periodic Table of Elements (see page A-3).
2. Lists of various units of measurements and their equivalents together with a description of how to convert one unit into another (see page A-4).
3. Lists of clinical laboratory tests commonly performed on human blood and urine. These lists include test names, normal adult values, and brief descriptions of their clinical significance (see page A-6).

The glossary defines the more important textual terms and provides their phonetic pronunciations (see page G-1). It also contains an explanation of phonetic pronunciation on page G-1.

The index is complete and comprehensive.

Acknowledgments

Once again, I want to express my gratitude to the users of earlier editions of **Human Anatomy and Physiology**, who supplied numerous helpful suggestions for improving this textbook. Many of the changes that were made in the fifth edition were responses to their input. I also want to acknowledge the valuable contributions of the reviewers for the fifth edition, who read portions of, or the entire manuscript, as it was being prepared, and who provided detailed criticisms and ideas for improving it. They include:

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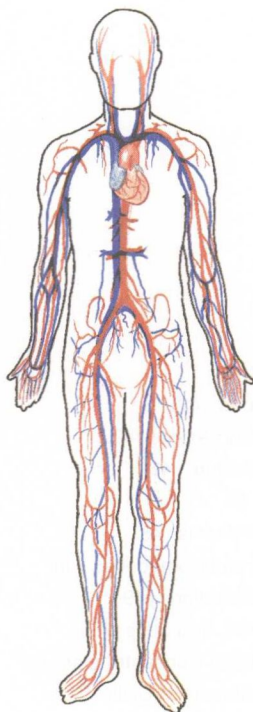
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Finally, I want to express my heartfelt thanks to my wife, Shirley, our children—Michael, Karen, and Larry—our daughter-in-law, Andrea, and our granddaughter, Lilia Mae, whose great patience and loving support made it possible for me to complete this project.

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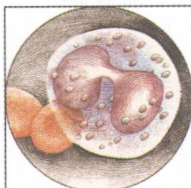
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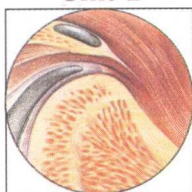
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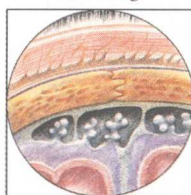
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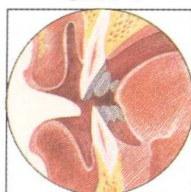
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