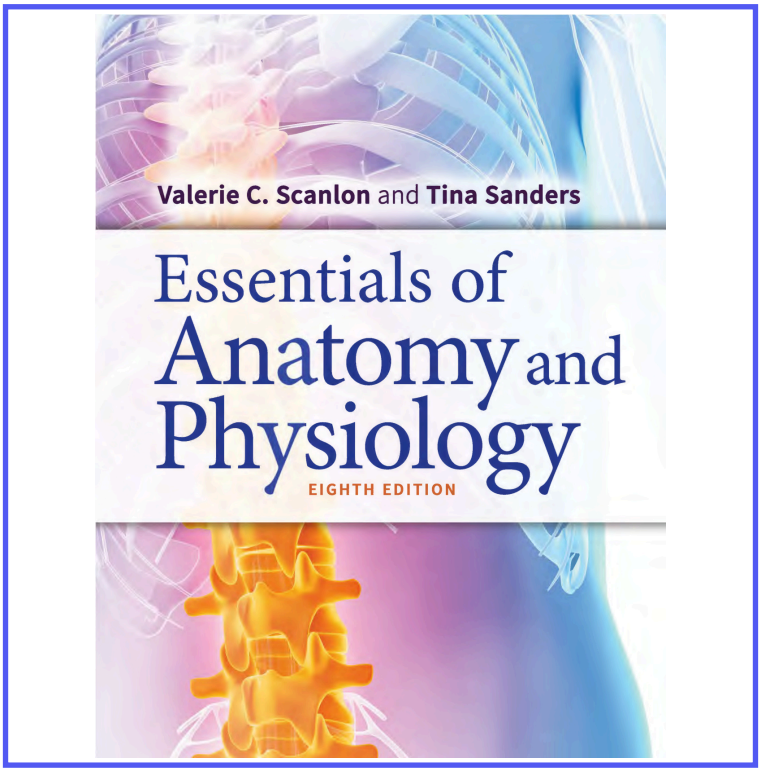


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Preface to the Eighth Edition

We are very pleased to have this final opportunity to express our gratitude to all of you who have used previous editions of *Essentials of Anatomy and Physiology* and are considering adopting our eighth edition. We are pleased as well to welcome new readers, and we thank you for choosing our book.

Anatomy and physiology remain cornerstones of many courses in health and medicine. The eighth edition of *Essentials of Anatomy and Physiology* remains a science textbook for beginning students, focused on presenting basic anatomy and physiology simply yet precisely and clearly, with the text complemented and enhanced by superb illustrations.

An instructional change in this edition, in response to requests, is the addition of a small set of questions for students at the end of each major section in a chapter. We have called these "Takeaways," for we are not "checking up" on what students can recall after only one reading, but rather, in the form of questions, suggesting information for the students to take with them as they read further. Not everything that is important can be covered, but whatever is asked for is significant, and not only in that one chapter, but often in later chapters as well. Within the human body are many different interconnections, some yet to be discovered but others we are aware of, and one purpose of the Takeaways is to begin to show that. The Takeaways and the Illustration Questions also form an ongoing self-quiz that students may find very useful. No time limit is given, and there is no penalty for incorrect answers. The answers to the Takeaways are in Appendix H, and to the Illustration Questions in Appendix G.

Also an instructional change, guidance for use of the textbook's tables is provided for some of those in the first few chapters and some of the later ones as well. Our tables have several purposes: as summaries of text material (also very useful for studying), the presentation of related material (that an instructor may choose to include if time and individual course requirements permit), the delineation of sequences, and as simple lists when a list is better than narrative (as with the vitamins and minerals in Chapter 17). Some students may not be familiar with the reasons for and benefits of different sorts of tables and may be a bit unsure of how to use them, so we have made some suggestions we hope will be helpful.

As with every new edition, the text has been updated in many ways to remain as contemporary as possible. These include a more comprehensive introduction to the human being as microbiome in Chapter 1 and brief discussions of our major localized microbiomes (cutaneous, upper respiratory, oral and intestinal, and vaginal in Chapters 5, 15, 16, and 20, respectively), a little more about food (ice cream, chocolate, and coffee) in Chapter 2 on basic chemistry, a description of the gene editing tool CRISPR/Cas9 in Chapter 3, beige fat cells in Chapter 4, the introduction to autoimmune diseases in Chapter 5, a more complete discussion of exercise in Chapter 7, new summary tables in Chapter 9 for the eye and ear, the physiology of "ice-cream headache" and the mishearing of music lyrics also in Chapter 9, the most recent blood pressure guidelines in Chapter 13, herd immunity in Chapter 14, and the Zika virus in Chapters 21 and 22.

All of the For Further Thought sections end with at least one illustration question, and several more pictures have been added (Chapters 4, 6, 8, and 13). In most instances, when the students have labeled the picture and answered the questions, the whole then becomes an integral part of the chapter. We hope you will consider assigning these questions, and that students will find them enjoyable and helpful.

Colleagues, please keep in mind that the Instructor's Guide contains a full list of even the small additions or revisions in the "New to This Edition" section for each chapter of the textbook, as well as detailed answers to all of the Review Questions and For Further Thought questions.

As always, your comments and suggestions will be most welcome, and they may be sent to us in care of the publisher: F. A. Davis Company, 1915 Arch Street, Philadelphia, PA 19103.

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To the Instructor

The start of the 21st century has already brought many advances in the science and art of medicine and health care; many of these were made possible by research and discoveries in the basic sciences. Teachers of introductory anatomy and physiology may wish to include some of these discoveries yet will want to maintain their emphasis on the normal structure and function of the human body. Those are the goals of this textbook: to add a little of the new to the foundation of long-standing knowledge and to make all of this material readily accessible to students with diverse backgrounds and varying levels of educational preparation.

No prior knowledge of biology or chemistry is assumed, and even fundamental terms are defined thoroughly. Essential aspects of anatomy are presented clearly and reinforced with excellent illustrations. Essential aspects of physiology are discussed simply yet with accuracy and precision. The illustrations complement the text material and foster comprehension on the part of the student. As you will see, these are images in which detail is readily apparent and all important parts have been labeled. Illustrations of physiology lead the student step-by-step. Wherever appropriate, the legends refer students to the text for further description or explanation. Each illustration also has a question for the student; the Illustration Questions in each chapter, along with the Takeaways at the end of each major section, form an ongoing self-test. (The answers are given in Appendices G and H.)

The text has three unifying themes: the relationship between physiology and anatomy, the interrelations among the organ systems, and the relation of each organ system to homeostasis. Although each type of cell, tissue, organ, or organ system is discussed simply and thoroughly in itself, applicable connections are made to other aspects of the body or to the functioning of the body as a whole. Our goal is to provide your students with the essentials of anatomy and physiology, and in doing so, to help give them a solid foundation for their future work and an appreciation for the incredible living organism that is the human body.

The sequence of chapters is a very traditional one. Cross-references are used to remind students of what they have learned from previous chapters. Nevertheless, the textbook is very flexible, and, following the introductory four chapters, the organ systems may be covered in almost any order, depending on the needs of your course.

Each chapter is organized from the simple to the more complex, with the anatomy followed by the physiology. The Instructor's Guide presents modifications of the topic sequences that may be used, again depending on the needs of your course. Certain more advanced topics may be omitted from each chapter without losing the meaning or flow of the rest of the material, and these are indicated, for each chapter, in the Instructor's Guide.

Aspects of pathophysiology or clinical applications are set apart from the text in boxed inserts. Each box presents one topic related to the basic anatomy and physiology discussed in the text and is referenced at the appropriate point in the text. This material is intended to be an integral part of the chapter but is set apart for ease of reference and to enable you to include or omit as many of these topics as you wish. The use of these boxes also enables students to read the text material without interruption and then to focus on specific aspects of pathophysiology. A comprehensive list of the boxes appears inside the book's back cover, and another list at the beginning of each chapter cites the boxes within that chapter.

Tables are utilized as summaries of structure and function, to present a sequence of events, or additional material that you may choose to include. Each table is referenced in the text and is intended to facilitate your teaching and to help your students learn. For some of the tables in the opening chapters, guidance for using them to best advantage is provided for students.

New terms appear in bold type within the text, and all such terms are fully defined in an extensive glossary, with phonetic pronunciations. Bold type may also be used for emphasis whenever one of these terms is used again in a later chapter.

Each chapter begins with a chapter outline and student objectives to prepare the student for the chapter itself. New terminology and related clinical terms are also listed, with phonetic pronunciations. Each of these terms is fully defined in the glossary, with cross-references back to the chapter in which the term is introduced.

At the end of each chapter are review questions and a study outline. The study outline includes all of the essentials of the chapter in a concise form. The review questions may be assigned as homework or used by the students as a review or self-test. Following each question is a page reference in parentheses. This reference cites the page(s) in the chapter on which the content needed to answer the question correctly can be found. The answers themselves are included in the Instructor's Guide. The questions in the sections titled For Further Thought may be used in a variety of ways; one of the best is for a brief class discussion, and the answers are in the Instructor's Guide.

An important supplementary learning tool for your students is available in the form of a *Student Workbook* that accompanies this text. For each chapter in the textbook, the workbook offers fill-in and matching-column questions, figure-labeling and figure-coloring exercises, and crossword puzzles based on the chapter's vocabulary list. Also included

are three comprehensive, multiple-choice chapter tests to provide a thorough review. All answers are provided at the end of the workbook.

Ancillary materials for the teacher using this text are all available on the F. A. Davis website (please contact your F. A. Davis sales representative for access information): a complete Instructor's Guide, a test bank using three formats, PowerPoint lecture outlines, and question packages suitable for pre-tests, post-tests, or both. The Instructor's Guide contains notes on each chapter's organization and content (useful for modifying the book to your specific teaching needs), topics for class discussion, answers to the chapter review questions from the textbook, and detailed answers to the For Further Thought questions.

Suggestions and comments from colleagues are always valuable, and yours would be greatly appreciated. When we took on the task of writing and illustrating this textbook, we wanted to make it the most useful book possible for you and your students. Any suggestions that you can provide to help us achieve that goal are most welcome, and they may be sent to us in care of F. A. Davis Company, 1915 Arch Street, Philadelphia, PA 19103.

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To the Student

This is your textbook for your course in human anatomy and physiology, a subject that is both fascinating and rewarding. That you are taking such a course says something about you. You may simply be curious as to how the human body functions or you may have a personal goal of making a contribution in one of the health-care professions. Whatever your reason, this textbook will help you to be successful in your anatomy and physiology course.

The material is presented simply and concisely yet with accuracy and precision. The writing style is informal yet clear and specific; it is intended to promote your comprehension and understanding.

ORGANIZATION OF THE TEXTBOOK

To use this textbook effectively, you should know the purpose of its various parts. Each chapter is organized in the following way:

Chapter Outline—This presents the main topics in the chapter, which correspond to the major headings in the text.

Student Objectives—These summarize what you should know after reading and studying the chapter. These are not questions to be answered, but rather are, with the chapter outline, a preview of the chapter contents.

New Terminology and Related Clinical Terminology—These are some of the new terms you will come across in the chapter. Read through these terms before you read the chapter, but do not attempt to memorize them just yet. When you have finished the chapter, return to the list and see how many terms you can define. Note those you may not be sure of and look them up. All of these terms are fully defined in the glossary.

Study Outline—At the end of the chapter is a concise summary of the essentials in the chapter. You may find this outline useful as a quick review before an exam.

Review Questions—These are also at the end of the chapter. Your instructor may assign them as homework. If not, the questions may be used as a self-test to evaluate your comprehension of the chapter's content. The page number(s) in parentheses following each question refer you to the page(s) in the chapter on which the content needed to answer the question can be found.

For Further Thought—The heading tells you what these questions are for: thinking. Your instructor may use these for class discussion, and, if so, please do not ever be afraid that your contribution may be mistaken. Raise your hand, speak up with your best thoughts, and listen to those of others. Together you will find the answers.

OTHER FEATURES WITHIN EACH CHAPTER

Illustrations—These are an essential part of this textbook. They are intended to help you develop your own mental picture of the body and its parts and processes. You may not have thought of mental pictures as being important, but they are, and each new one you create is a major step in learning. Each illustration is referenced in the text, so you will know when to consult it. With a little concentration, you will have it in your mind for whenever you need it. You will see that each illustration has a question after the legend. These questions provide an ongoing quiz; try to answer each one as you come to it. The answers are given in Appendix G, the next-to-last appendix before the glossary.

Takeaways—At the end of each major section in a chapter is a small set of questions headed "Takeaways." The answers to these questions are just what the heading suggests: information to take with you. For what purpose? When might you see it or need it again? You may be asked for this information on an exam given by your instructor. And for the first few chapters, you will come across this information in later chapters. The human body is a remarkable network of interrelated functions, and these Takeaways are intended to help you make your own connections to remember these relationships. This is indeed another ongoing quiz. Take a few minutes and try to answer each set before moving on. And don't worry if you cannot do so on a first attempt. The answers are given in Appendix H.

Boxes—Discussions of pathophysiology and clinical applications are in separate boxes in the text so that you may find them easily. Your instructor may include all or some of these as required reading.

Bold Type—This is used whenever a new term is introduced, or for emphasis when an old term is especially important. The terms in bold type are fully defined in the glossary, which includes phonetic pronunciations.

Tables—This format is used to present material in a very concise form. Some tables are summaries of text material and are very useful for a quick review. Other tables present additional material that complements the text material. Still other tables are lists that are easier to read and take in than the same information in narrative form. Some tables in the first few chapters come with suggestions for making the best use of them.

Glossary—Found at the end of the book, the glossary is your dictionary. All of the terms in bold type in the text, as well as others, are defined here. Make use of it, rather than wonder what a word means. The sooner you have a definition

firmly in your mind, the sooner it is truly part of your knowledge.

To make the best use of your study time, a *Student Workbook* is available that will help you to focus your attention on the essentials in each chapter. The various kinds of questions follow the exact sequence of each textbook chapter, so the work may be completed little by little. Also included are three different kinds of comprehensive chapter tests to help you determine which topics you have learned thoroughly and which you may have to review (see "best ways to learn" in the next section). You will find this workbook very helpful.

SOME FINAL WORDS OF ENCOURAGEMENT

Learning a science or related sciences is rarely easy, but can be made easier than we might have thought it would be. Your success in this course depends to a great extent on you. Try to set aside study time for yourself every day; a little time each day is usually much more productive than trying to cram at the last minute.

Two of the best ways to learn something are to take a test on it and to teach it to someone else. (Remember that we can use bold type for emphasis—we really mean this.) Both of these involve questions that you have to answer. To do this before you have to take an actual test, ask questions of yourself as you are studying. What kinds of questions? The simplest ones. If you are studying a part of the body such as an organ, ask yourself: What is its name? Where is it? What is it made of? What does it do? That is: name, location, structure, and function. These are the essentials. If you are studying a process, ask yourself: What is happening here? What is its purpose? That is: What is going on? And what good is it? Again, these are the essentials (and all are covered thoroughly in the *Student Workbook*). If you like to study with a friend or in a group, you can ask one another questions. Take turns teaching, and listen to everyone's answers.

We hope this textbook will contribute to your success in this course and in your education.

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VCS
TS

To my students
All past, yet very much present
VCS

To Brooks, for his encouragement
TS

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