Histology

Cell and Tissue Biology

Fifth Edition

Edited by

Leon Weiss

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Introduction

If there was a time when Histology could be viewed as being out of the main stream of science and medicine, that time is past. My colleagues and I offer this comprehensive text, HISTOLOGY, and believe it has fair claim on students of Medicine and Biology.

This edition, primarily intended for courses in Histology in medical schools and graduate schools, should be useful in the study of the other basic biomedical sciences and, beyond that, in clinical medicine. Indeed, so close have the basic and clinical sciences grown that what the medical student learns from this text will be used in Physiology, Immunology, Pathology, and Pharmacology and be discussed at the patient's bedside on clinical rounds. For example, the division of lymphocytes into T and B cells and their subgroups by the labeling of distinctive cell surface molecules is intrinsic to our histological account of lymphatic tissue. This material is also an essential part of Immunology and Pathology and the student will need it in working up patients with leukemia or lymphoma.

Knowledge of the endocrine system has been enormously expanded and made more rational, as we show in this edition of HISTOLOGY, by the application of immunocytochemical methods that disclose the presence of specific hormones in specific cells. Hormones, whose presence there was unexpected, have been discovered in the islet tissue of the pancreas. Systems, such as the *enteroendocrine system*, have been newly recognized. These basic findings quickly enter the clinical domain and knowledge of them is required for the rational management of diabetes, thyrotoxicosis, and other endocrinopathies. Further examples of the convergence of the basic and clinical sciences can readily be drawn from every chapter in this book.

HISTOLOGY in this, its Fifth Edition, continues to have as its plan the presentation of the microscopic and submicroscopic structure of the body at a comprehensive level but without undue detail. We depend upon bright field microscopy and transmission electron microscopy and, in addition, call upon a large number of morphological, biochemical, and physiological techniques in order to present a complete and coherent picture of our subject. These techniques include histo- and cytochemistry, autoradiography, scanning and high voltage electron microscopy, freeze-fracture-etch, tissue culture, and a variety of cell disruption and separation techniques. We cover human tissue; but, since much of the material we deal with has an experimental basis, we turn where appropriate to experimental animals.

While we have shortened the text in many places in this edition, in other places new information has caused us to expand it. The chapter on the pancreas has been divided into two chapters: Exocrine Pancreas (and Salivary Glands) and Islets of Langerhans. A new chapter on the Heart is offered. Every chapter, moreover, is introduced by a list of its sections' headings and the sections are presented in a sequence logical for each tissue. By these arrangements, and a full table of contents and index, the student may go

efficiently to the page needed in the book. We provide whole chapters—as those on teeth, placenta. heart, pineal, and the special senses—that may not be used in some Histology courses. While these chapters add to the length and to the value of HISTOLOGY, they clearly do not add to the required reading load of students in those courses. We hope that our book will serve students in both long courses and short courses.

My colleagues and I write at a time, long anticipated by histologists, when it is being demonstrated in system after system that the structure of tissues is not arbitrary. Tissue structure is rather the morphologic expression of the interactions of diverse cells tightly regulated by immediate, short-range, and long-range factors—including the functions of the cells themselves. The structure and the functions of tissues are entirely interdependent and neither can be understood without the other. The study of such cellular interplay represents a significant expansion of cell biology into the biology of tissues. Because this expansion is at the heart of our exposition, we have subtitled this edition of HISTOLOGY, *Cell and Tissue Biology*.

With this edition Elsevier Science Publishing Company, Inc. assumes the publishing of HISTOLOGY. I have been heartened by the confidence of Charles Ellis, President of Elsevier, and John Lawrence, Head, Biomedical Publications, who enlisted this book and has guided its publication, and appreciate their decision to publish texts in the basic medical sciences. Barbara Conover, Director of Editing, coordinated the venture. Edmée Froment, Art Director, designed the entire book. Virginia Kudlak dummied it. Barbara Rowe, who worked out of my office, gathered and inventoried the manuscript. I have followed these dedicated book women in the intricate work needed to turn a complex heavily illustrated manuscript into a book. If this volume has the physical quality and presence to justify its claim as a definitive work, it is due to them.

I am grateful for the advice and generosity of Robert McGraw of the McGraw-Hill Book Company, who, when unable to continue publishing HISTOLOGY, materially aided me in transferring the elements of this book to its new publisher.

I thank Robert Marshak, my Dean at the School of Veterinary Medicine at the University of Pennsylvania, for his effective support of the basic sciences and his encouragement of this text. I am indebted to Michael Sorrell, Patricia McManus, Joyce Knoll, Fern Tablin, Lillian Maggio, and Karen Young—my laboratory colleagues who critically read the manuscript. Robert Walker's advice on the organization of chapters and on the clarity of exposition was invaluable.

Roy Greep created this multi-authored text and brought it to maturation. He remains a cherished friend and advisor. This book is dedicated to him.

I am proud of my colleagues, the authors of this book, who with magnanimity and profound scholarship have written chapters of exceptional quality. This book has bound us together. I hope that our solidarity and common purpose confers a unity on this work evident to the reader. I thank Alan Tartakoff, who revised the section of the Golgi Complex in Chapter 1, and I remain indebted to James Lake for his treatment of ribosomes in Chapter 1.

The National Institutes of Health, the National Science Foundation, and other granting agencies have supported the research that brought Histology to its present exciting and important state. Any success that we have in conveying this excitement and in stimulating young scholars we offer as tribute to these agencies.

Leon Weiss

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