

Mosby's atlas of

Functional human anatomy

Ernest W. Becker

Mosby's atlas of

Functional human anatomy

Ernest W. Beck, B.S., M.A.

Medical Illustrator, Lake Forest, Illinois; formerly Executive Managing Editor, Journal of the American Medical Association and AMA's Specialty Journals; Member and Past President, Association of Medical Illustrators; formerly Editor of The Journal of Biocommunication

with

Maureen Groër, R.N., Ph.D.

College of Nursing, University of Tennessee, Knoxville, Tennessee

edited by

Harry Monsen, Ph.D.

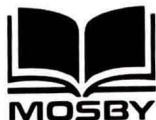
Professor of Anatomy, Department of Anatomy,
University of Illinois, College of Medicine, Chicago, Illinois

With 267 illustrations, 170 in full color

The C. V. Mosby Company

ST. LOUIS • TORONTO • LONDON 1982

Mosby's atlas of functional human anatomy



A TRADITION OF PUBLISHING EXCELLENCE

Editor: Thomas Allen Manning
Assistant editor: Nancy Mullins
Manuscript editor: Roger McWilliams
Design: Diane Beasley
Production: Diane Beasley

Copyright © 1982 by The C.V. Mosby Company

All rights reserved. No part of this book may be reproduced in any manner without written permission of the publisher.

Printed in the United States of America

The C.V. Mosby Company
11830 Westline Industrial Drive, St. Louis, Missouri 63141

Library of Congress Cataloging in Publication Data

Beck, Ernest W., 1923-

Mosby's atlas of functional human anatomy.

Includes index.

1. Anatomy, Human—Atlases. 2. Abnormalities, Human—Atlases. I. Groër, Maureen E., 1944-

II. Monsen, Harry, 1924- . III. Title.

[DNLM: 1. Anatomy—Atlases. QS 17 M894]

QM25.B424 611 81-14110

ISBN 0-8016-0554-7 AACR2

Consultants

Ruthanna Dyer, Ph.D.

Coordinator, Department of Human Biology,
Seneca College of Applied Arts and Technology,
Ontario, Canada

Anthony J. Gaudin, Ph.D.

Department of Human Sciences,
California State University,
Northridge, California

Edward J. Greding, Ph.D.

Assistant Professor,
Department of Human Biology,
Del Mar College,
Corpus Christi, Texas

Louise D. Hall

Professor, Department of Nursing,
Mohawk Valley Community College,
Utica, New York

Barbara Hansen, Ph.D.

Professor of Physiology,
School of Medicine,
University of Michigan,
Ann Arbor, Michigan

Carl Hoegler, Ph.D.

Associate Professor of Biology,
Marymount College,
Tarrytown, New York

Raymond Kahn, Ph.D.

Professor of Anatomy,
School of Medicine,
University of Michigan,
Ann Arbor, Michigan

Mary Jane Myers, Ph.D.

Chairman, Department of Human Sciences,
Clarke College,
Newton, Mississippi

Anna Marie Parmeley, M.A.

Associate Professor of Biology,
California State University,
Long Beach, California

Steven J. Person, Ph.D.

Assistant Professor of Biology,
Lake Superior State College,
Sault Ste. Marie, Michigan

John A. Pitts, Ph.D.

Head, Department of Biology,
North Shore Community College,
Beverly, Massachusetts

Melvin R. Schmid, Ph.D.

Professor, Department of Human Sciences,
Trenton State College,
Trenton, New Jersey

To my wife, **Joan**,
and to our children, **Christopher** and **Melinda**,
for offering daily encouragement and support.

Preface

This atlas is for students and practitioners in many health and life science fields. It makes no pretense of being complete; what is of interest and importance to one specialty may only be of passing curiosity to another. The subject matter of each plate has been carefully considered for its usefulness as standard reference material for the understanding of human anatomy, physiological principles, and frequently encountered pathological conditions. Some commonly practiced surgical procedures are also included, along with other subjects of interest and concern to those who provide patient care and treatment. Text copy has purposely been kept at a minimum to allow presentation of as many illustrations as possible.

This book consists of thirteen chapters. The first introduces readers to topographic anatomy, a depiction of parts of the body in relation to a definite and limited area of the surface. It is an attempt to orient superficial structures, including skeletal landmarks, to related structures that lie at a deeper level. The body is then examined in microscopic and macroscopic detail; the remaining chapters show essential features of the various systems of the body—integumentary, skeletal, muscular, nervous, special senses, endocrine, respiratory, circulatory, lymphatic and reticuloendothelial, digestive, and urogenital. The final chapter illustrates common surgical positions in select clinical procedures.

This traditional presentation of human anatomy provides illustrative and succinct textual support to courses in human anatomy, physiology, and integrated coverage of anatomy and physiology. Although primarily designed as a tool for quick reference in many courses, this atlas is flexible enough to be used in various settings by students, practitioners, and scientists alike.

Ernest W. Beck
Maureen Groër
Harry Monsen

Author's note and acknowledgment

Throughout my career as a medical illustrator, the questions most often asked by those for whom the drawings and paintings are created have been "Can I have it tomorrow?" and "How much will it cost?" My answers are invariably "No" and "Enough to pay my bills." Few for whom the work is created fully realize the time required for thinking and planning—the preparation of a preliminary sketch frequently takes more hours than the final rendering. Developing a thorough understanding of what is to be shown, arranging components in a layout, sizing within space limitations, depicting subject matter with clarity and precision, naming anatomical parts, writing succinct, pertinent legends and text useful to the reader—all of these are parts of the process, and each requires deliberateness and care. This atlas was created from the start with the knowledge that no artist/author is omniscient and that no single book can be all-inclusive. It is a beginning, with many more plates planned in future editions.

For one who daily for more than 30 years has done little else than prepare medical illustrations for other authors, pharmaceutical companies, practitioners, and encyclopedias, I am grateful to the C.V. Mosby Company for asking me to prepare this atlas. My thanks to Chet Dow, Tom Manning, Nancy Mullins, Roger McWilliams, Diane Beasley, and the production personnel for their separate roles in coordinating the many factors necessary to produce this book. The distinguished consultants listed elsewhere have been of immeasurable help in selecting subject matter and critiquing text and illustration content.

To those educators, practitioners, authors, and other medical illustrators who have contributed to my understanding of the human body, I am most grateful.

For assistance in authoring the text portion I am deeply indebted to Maureen Groër; for meticulous editing and scrutiny for anatomical accuracy I am particularly appreciative to the distinguished anatomist, Harry Monsen.

My gratitude also to Catherine P. Anthony and Gary A. Thibodeau, authors of *Textbook of Anatomy and Physiology*, for allowing use of several plates developed for that text.

I want to acknowledge specifically those medical illustrators, past and present, whose standards of excellence and achievement have influenced my style of rendering: William Brudon, Robert Demarest, Vincent Destro, Robert Drake, Mary Dixon Elder, Gerald Hodge, Emil Hospodar, Tom Jones, Lucille Cassel Innes, Carl Linden, David Mascaro, Jean McConnell, Biagio Melloni, Laurel Schaubert, William Schwarz, Willard Shepard, and many more.

Ernest W. Beck

Mosby's atlas of functional human anatomy

Contents

1 Topographic anatomy

- 1 1 Directions and planes of section, 2
- 1 2 Surface relationships of the skull, 4
- 1 3 Paranasal sinuses; oral and nasal cavities, 6
- 1 4 Sound areas as determined by percussion, 8
- 1 5 Topography of projected thoracic and abdominal viscera—ventral view, 10
- 1 6 Topography of projected thoracic and abdominal viscera—dorsal view, 12
- 1 7 Projection of heart and great vessels to anterior wall of thorax, 14
- 1 8 Projection of lungs and bronchi to rib cage, 16
- 1 9 Regions of the abdomen, 18
- 1 10 Abdominal and pelvic viscera from the right side, 20
- 1 11 Abdominal and pelvic viscera from the left side, 22
- 1 12 The peritoneum, 24
- 1 13 Full-term pregnancy (in relation to viscera), 26

2 The integumentary system

- 2 1 The skin, 30
- 2 2 Common skin disorders, 32
- 2 3 Common skin disorders, 34

3 The skeletal system

- 3 1 Structure of long bone, 38
- 3 2 Microscopic structure of bone, 40
- 3 3 The skull, 42
- 3 4 Fetal skull, 44
- 3 5 The skeleton (in relation to body outline), 46
- 3 6 Cartilages of the nose, 48
- 3 7 The vertebral column, 50
- 3 8 Male and female bony pelvis (compared), 52
- 3 9 Skeleton of the thorax, 54
- 3 10 Hip joint, 56
- 3 11 Shoulder joint, 58
- 3 12 Elbow joint, 60
- 3 13 Wrist joint, 62
- 3 14 Knee joint, 64
- 3 15 Pathology of gouty arthritis, 66
- 3 16 Bones of the foot, 68
- 3 17 Arches of the foot, 70
- 3 18 Clubfoot (talipes), 72
- 3 19 Bone growth—upper limbs, 74
- 3 20 Bone growth—lower limbs, 76
- 3 21 Longitudinal section of a molar tooth and surrounding structures, 78
- 3 22 Deciduous arch (temporary teeth) and permanent teeth, 80

4 The muscular system

- 4 1 Structure of skeletal muscle, 84
- 4 2 Muscles of facial expression, 86
- 4 3 Muscles of the upper limb, 88
- 4 4 Muscles of the trunk, 90
- 4 5 Muscles of the lower limb, 92
- 4 6 Intramuscular injections, 94

5 The nervous system

- 5 1 The central and peripheral nervous systems, 98
- 5 2 The autonomic nervous system (schematic diagram), 100
- 5 3 The brain, 102
- 5 4 Hydrocephalus and the ventricular system, 104
- 5 5 The spinal cord (schematic view), 106
- 5 6 Branchings of a spinal nerve; cross section of nerve trunk, 108
- 5 7 The brachial and lumbosacral plexus, 110
- 5 8 Spina bifida, 112
- 5 9 The trigeminal nerve, 114
- 5 10 A synapse (diagrammatic view), 116

6 Special senses

- 6 1 The right eye (horizontal section), 120
- 6 2 Exterior of the eye; muscles that move the eye, 122
- 6 3 Aqueous humor; acute glaucoma; astigmatism, 124
- 6 4 Retina of the eye (ophthalmoscopic view), 126
- 6 5 The lacrimal apparatus, 128
- 6 6 Layers of the retina, 130
- 6 7 Sense of hearing, 132
- 6 8 Auditory tube in child and adult (compared), 134
- 6 9 The membranous labyrinth of the ear, 136
- 6 10 Internal structures of the ear—cochlea and organ of Corti, 138
- 6 11 Sense of smell, 140

7 The endocrine system

- 7 1 The thyroid gland, 144
- 7 2 The parathyroid glands (rear view), 146
- 7 3 The pancreas, 148
- 7 4 The adrenal glands, 150

8 The respiratory system

- 8 1 Nasal cavity and related structures, 154
- 8 2 Gas exchange between air and blood, 156
- 8 3 Segmental anatomy of the lungs, 158
- 8 4 Diseases of the respiratory system, 160
- 8 5 Cystic fibrosis, 162
- 8 6 The Heimlich maneuver for dislodging aspirated foods or other foreign objects, 164

9 The circulatory system

- 9 1 Principal arteries and veins, 167
- 9 2 Structure of blood vessels, 170
- 9 3 Blood flow through the heart, 172
- 9 4 Circulatory system of the fetus, 174
- 9 5 Congenital heart defects, 176
- 9 6 Congenital heart defects, 178
- 9 7 Conduction system of the heart; the electrocardiogram, 180
- 9 8 Coronary circulation of the heart, 182
- 9 9 External cardiac compression, 184
- 9 10 Subdivisions of the mediastinum, 186
- 9 11 Arterial aneurysm in brain as cause of CVA (stroke); vascular disease processes associated with hypertension, 188

10 The lymphatic and reticuloendothelial system

- 10 1 The lymphatic system, 192
- 10 2 A lymph node (diagrammatic view); lymphocytes, 194
- 10 3 Lymphatic drainage of the female breast, 196
- 10 4 The spleen, 198

11 The digestive system

- 11 1 Oral cavity and pharynx (midsagittal section), 202
- 11 2 The tongue, 204
- 11 3 The salivary glands, 206
- 11 4 Cleft lip; cleft palate, 208
- 11 5 The stomach, 210
- 11 6 The small intestine, 212
- 11 7 Duodenal ulcer, 214
- 11 8 The large intestine, 216
- 11 9 The appendix, 218
- 11 10 Appendectomy, 220
- 11 11 The liver, 222
- 11 12 A liver lobule (three-dimensional scheme), 224
- 11 13 Cirrhosis—clinical manifestations, 226
- 11 14 The gallbladder, 228
- 11 15 Cholecystectomy, 230
- 11 16 The vomiting act, 232

12 The urogenital system

- 12 1 Mitosis, 236
- 12 2 Meiosis—female (oogenesis), 238
- 12 3 Meiosis—male (spermatogenesis), 240
- 12 4 The female pelvic organs, 242
- 12 5 External female genitalia and perineum, 244
- 12 6 Menstrual cycle, 246
- 12 7 Ovulation, fertilization, and implantation of an ovum, 248
- 12 8 Ovary and stages of ovum development, 250
- 12 9 The lactating breast, 252
- 12 10 Fertilization to implantation, 254
- 12 11 Development of the embryo, 256

- 12 | 12 Involution and puerperium, 258
- 12 | 13 The male pelvic organs (midsagittal section), 260
- 12 | 14 Anterolateral abdominal wall and inguinal area in the male, 262
- 12 | 15 Male genital duct system, 264
- 12 | 16 The bladder—male and female, 266
- 12 | 17 The kidneys, 268
- 12 | 18 The nephron unit, 270

13 | Common surgical positions

- 13 | 1 Basic supine, Trendelenburg's, reverse Trendelenburg's, and lithotomy positions, 274
- 13 | 2 Modified Fowler's and sitting, basic prone, and jackknife (Kraske's) positions, 276
- 13 | 3 Knee-chest position and lateral positions for chest and kidney procedures, 278
- 13 | 4 Sims's, right kidney, and spinal tap positions, 280

1 | Topographic anatomy

Directions and planes of section

Surface relationships of the skull

Paranasal sinuses; oral and nasal cavities

Sound areas as determined by percussion

Topography of projected thoracic and abdominal viscera—
ventral view

Topography of projected thoracic and abdominal viscera—
dorsal view

Projection of heart and great vessels to anterior wall of thorax

Projection of lungs and bronchi to rib cage

Regions of the abdomen

Abdominal and pelvic viscera from the right side

Abdominal and pelvic viscera from the left side

The peritoneum

Full-term pregnancy (in relation to viscera)