

NINTH EDITION

*Textbook of*  
**PEDIATRICS**

NINTH EDITION

# *Textbook of* **PEDIATRICS**

Edited by

**WALDO E. NELSON, M.D., D.Sc. (Hon.)**

Professor of Pediatrics, Woman's Medical College of  
Pennsylvania and Temple University School of  
Medicine; Attending Pediatrician, St. Christopher's  
Hospital for Children, Philadelphia

Associate Editors

**VICTOR C. VAUGHAN, III, M.D.**

Professor and Chairman, Department of Pediatrics,  
Temple University School of Medicine; Medical  
Director, St. Christopher's Hospital for Children,  
Philadelphia

**R. JAMES McKAY, M.D.**

Professor and Chairman, Department of Pediatrics,  
The University of Vermont College of Medicine; Chief  
of Pediatric Service, Medical Center Hospital of  
Vermont, Burlington

WITH THE COLLABORATION OF 78 CONTRIBUTORS

**W. B. SAUNDERS COMPANY · Philadelphia · London · Toronto · 1969**

W. B. Saunders Company: West Washington Square  
Philadelphia, Pa. 19105

12 Dyott Street  
London W.C. 1

1835 Yonge Street  
Toronto, Ontario 295

NOTICE

# PEDIATRICS

Textbook of

EDITED BY  
WILLIAM D. WATSON, M.D. (HON.)

Professor of Pediatrics, University of Pennsylvania School of  
Medicine, Philadelphia, Pa. 19104

ASSOCIATE EDITOR

WILLIAM D. WATSON, M.D.

Professor and Chairman, Department of Pediatrics,  
University of Pennsylvania School of Medicine, Philadelphia,  
Pa. 19104

ILLUSTRATED BY

WILLIAM D. WATSON, M.D.

WITH THE COOPERATION OF THE CONTRIBUTORS

Textbook of Pediatrics

© 1969 by W. B. Saunders Company. Copyright 1933, 1937, 1941, 1945, 1950, 1954, 1959 and 1964 by W. B. Saunders Company. Copyright under the International Copyright Union. All rights reserved. This book is protected by copyright. No part of it may be duplicated or reproduced in any manner without written permission from the publisher. Made in the United States of America. Press of W. B. Saunders Company. Library of Congress catalog card number 69:10311.

*To the Child's Physician*

and especially

*to those who through their expressed  
confidence in past editions of this  
book have provided the stimulus for  
this revision*



# CONTRIBUTORS

**S. T. ACHAR, M.D.\***

Madras, India.

**JOHN A. ANDERSON, M.D., Ph.D.**

Professor and Head of Department of Pediatrics, University of Minnesota Medical School, College of Medical Sciences.

**JAMES B. AREY, M.D., Ph.D.**

Professor of Pathology, Temple University School of Medicine. Pathologist, St. Christopher's Hospital for Children.

**VICTOR H. AUERBACH, Ph.D.**

Research Professor of Pediatrics (Biochemistry), Temple University School of Medicine. Director of Enzyme Laboratory and Director of Research Chemistry, St. Christopher's Hospital for Children.

**LEONARD BACHMAN, M.D.**

Professor of Anesthesia, University of Pennsylvania School of Medicine. Director of Anesthesiology, Children's Hospital of Philadelphia.

**HENRY W. BAIRD, M.D.**

Professor of Pediatrics, Temple University School of Medicine. Attending Pediatrician, St. Christopher's Hospital for Children and Temple University Hospital.

**GIULIO J. BARBERO, M.D.**

Professor and Chairman of Department of Pediatrics, Hahnemann Medical College and Hospital of Philadelphia.

**LEWIS A. BARNES, M.D.**

Professor of Pediatrics, University of Pennsylvania School of Medicine. Chief of Pediatrics, Hospital of the University of Pennsylvania; Senior Physician, Children's Hospital of Philadelphia and Philadelphia General Hospital.

\*Deceased.

**JOHN B. BARTRAM, M.D.**

Professor of Pediatrics, Temple University School of Medicine. Senior Attending Pediatrician, St. Christopher's Hospital for Children and Temple University Hospital.

**PAUL C. BEAVER, Ph.D.**

William Vincent Professor of Tropical Diseases and Hygiene, Tulane University School of Medicine.

**MILDRED J. BENNETT, M.S., Ph.D.**

Formerly Lecturer in Nutritional Sciences, University of California. Research Biochemist, Children's Hospital of the East Bay, Oakland, California.

**WILLIAM H. BERGSTROM, M.D.**

Professor of Pediatrics, State University of New York, Upstate Medical Center at Syracuse. Attending Pediatrician, State University Hospital and Crouse-Irving Memorial Hospital.

**JOSEPH B. BILDERBACK, M.D.**

Clinical Professor of Pediatrics, University of Oregon Medical School. Attending Pediatrician, Doernbecher Memorial Hospital for Children.

**RUSSELL J. BLATTNER, M.D.**

Professor and Chairman of Department of Pediatrics, Baylor University College of Medicine. Pediatrician-in-Chief, Ben Taub General Hospital and Jefferson Davis Hospital; Physician-in-Chief, Texas Children's Hospital; Chief of Pediatrics, Hermann Hospital.

**WILLIAM L. BRADFORD, M.D.**

Professor Emeritus of Pediatrics, University of Rochester School of Medicine and Dentistry; Distinguished Visiting Professor of Pediatrics, University of Missouri School of Medicine. Pediatrician, Strong Memorial Hospital, Rochester, New York; Consultant, Children's Mercy Hospital, Kansas City, Missouri.

**CARROLL F. BURGOON, JR., M.D.**

Professor of Dermatology, Temple University School of Medicine. Chief Attending Physician, Skin and Cancer Hospital of Philadelphia.

**ELSIE R. CARRINGTON, M.D.**

Professor and Chairman of Department of Obstetrics and Gynecology, Woman's Medical College of Pennsylvania.

**J. JULIAN CHISOLM, JR., M.D.**

Associate Professor of Pediatrics, Johns Hopkins University School of Medicine. Associate Chief Pediatrician, Baltimore City Hospitals.

**AMOS CHRISTIE, M.D.**

Professor of Pediatrics, Vanderbilt University School of Medicine.

**DAVID B. CLARK, M.D., Ph.D.**

Professor and Chairman of Department of Neurology, University of Kentucky College of Medicine. Chairman of Department of Neurology, University of Kentucky Medical Center Hospital.

**DAVID F. CLYDE, M.D., Ph.D., D.T.M.&H.**

Professor of International Medicine, University of Maryland School of Medicine. Member, Expert Advisory Panel on Malaria, World Health Organization.

**CHARLES D. COOK, M.D.**

Professor and Chairman of Department of Pediatrics, Yale University School of Medicine. Pediatrician-in-Chief, Yale-New Haven Hospital.

**ROBERT E. COOKE, M.D.**

Given Foundation Professor of Pediatrics and Chairman of Department of Pediatrics, Johns Hopkins University School of Medicine. Pediatrician-in-Chief, Johns Hopkins Hospital.

**ALLEN C. CROCKER, M.D.**

Assistant Clinical Professor of Pediatrics, Harvard Medical School. Senior Associate in Medicine, Children's Hospital Medical Center.

**EDWARD C. CURNEN, M.D.**

Carpentier Professor of Pediatrics, Columbia University College of Physicians and Surgeons. Attending Pediatrician and Director of Pediatric Service, Babies Hospital and Vanderbilt Clinic, Columbia-Presbyterian Medical Center.

**ANGELO M. DiGEORGE, M.D., M.S. (Ped.)**

Professor of Pediatrics, Temple University School of Medicine. Senior Attending Pediatrician and Director, Division of Endocrine and Metabolic Disorders, St. Christopher's Hospital for Children.

**PAUL A. Di SANT'AGNESE, M.D., Sc.D. (Med.), Dr. Med. (Hon.)**

Clinical Professor of Pediatrics, Georgetown University School of Medicine. Chief of Pediatric Metabolism Branch, National Institutes of Health.

**JOHN J. DOWNES, M.D.**

Assistant Professor of Anesthesia and Pediatrics, University of Pennsylvania School of Medicine. Senior Anesthesiologist and Director of the Intensive Care Unit, Children's Hospital of Philadelphia.

**JOHN M. DUNN, M.D.**

Associate Professor in Psychiatry (Child), Temple University School of Medicine. Staff Psychiatrist, St. Christopher's Hospital for Children.

**HEINZ F. EICHENWALD, M.D.**

William Buchanan Professor and Chairman of Department of Pediatrics, University of Texas Southwestern Medical School in Dallas. Chief of Staff, Children's Medical Center; Chief of Pediatrics, Parkland Memorial Hospital.

**ERNEST C. FAUST, Ph.D., LL.D.**

Emeritus Professor of Parasitology, Tulane University School of Public Health and Tropical Medicine.

**HARRY A. FELDMAN, M.D.**

Professor and Chairman of Department of Preventive Medicine, State University of New York, Upstate Medical Center at Syracuse. Attending Physician, State University Hospital.

**F. CLARKE FRASER, Ph.D., M.D., C.M., D.Sc. (Acadia), F.R.S.C.**

Professor of Human Genetics, Department of Genetics, McGill University. Director of Department of Medical Genetics, Montreal Children's Hospital.

**LYTT I. GARDNER, M.D.**

Professor of Pediatrics, State University of New York, Upstate Medical Center at Syracuse. Attending Pediatrician, State University Hospital; Consultant Pediatrician, Syracuse Memorial Hospital.

**SYDNEY S. GELLIS, M.D.**

Professor and Chairman of Department of Pediatrics, Tufts University School of Medicine. Pediatrician-in-Chief, Tufts-New England Medical Center.

**ELI GOLD, M.D.**

Associate Professor of Pediatrics, Case-Western Reserve University School of Medicine. Pediatrician, Cleveland Metropolitan General Hospital.

**ROBERT J. HAGGERTY, M.D.**

Professor and Chairman of Department of Pediatrics, University of Rochester School of Medicine and Dentistry. Pediatrician-in-Chief, Strong Memorial Hospital.

**SCOTT B. HALSTEAD, M.D.**

Professor of Tropical Medicine, University of Hawaii School of Medicine.

**ROBISON D. HARLEY, M.D., Ph.D.**

Associate Professor of Ophthalmology, Temple University School of Medicine. Attending Ophthalmologist, St. Christopher's Hospital for Children, Temple University Hospital, and Atlantic City Hospital.

**JEROME S. HARRIS, M.D.**

Professor of Pediatrics, Duke University School of Medicine. Attending Pediatrician, Duke Hospital.

**ROBERT H. HIGH, M.D., M.S. (Ped.)**

Chairman of Department of Pediatrics, Henry Ford Hospital, Detroit.

**PAUL H. HOLINGER, M.D.**

Professor of Bronchoesophagology, Department of Otolaryngology, University of Illinois College of Medicine. Attending Bronchoesophagologist, Presbyterian-St. Luke's Hospital; Attending Bronchoesophagologist and Laryngologist, Children's Memorial Hospital, University of Illinois Research and Educational Hospitals, and Illinois Eye and Ear Infirmary.

**JOHN B. ISOM, M.D.**

Associate Professor of Pediatrics and Neurology, University of Oregon Medical School. Pediatric Neurologist, University of Oregon Medical School Hospital.

**CHARLES A. JANEWAY, M.D., M.D. (Hon.)**

Thomas Morgan Rotch Professor of Pediatrics, Harvard Medical School. Physician-in-Chief, Children's Hospital Medical Center; Consulting Pediatrician, Boston Hospital for Women and Beth Israel Hospital.

**SAMUEL KAPLAN, M.D.**

Professor of Pediatrics and Associate Professor of Medicine, University of Cincinnati College of Medicine. Director of Division of Cardiology, Children's Hospital.

**ROBERT KAYE, M.D.**

Professor of Pediatrics, University of Pennsylvania School of Medicine. Deputy Physician-in-Chief, Children's Hospital of Philadelphia.

**JOHN A. KIRKPATRICK, JR., M.D.**

Professor of Radiology, Temple University School of Medicine. Radiologist, St. Christopher's Hospital for Children.

**JOHN W. LACHMAN, M.D.**

Professor and Chairman of Department of Orthopedic Surgery, Temple University School of Medicine. Staff Orthopedic Surgeon, St. Christopher's Hospital for Children and First Assistant Surgeon, Shriners Hospital for Crippled Children.

**THEODORE R. LAMMOT, III, M.D.**

Associate Professor of Orthopedic Surgery, Temple University School of Medicine. Associate Surgeon, Temple University School of Medicine, Shriners Hospital for Crippled Children, St. Christopher's Hospital for Children; Chief Orthopedic Consultant to Children's Seashore House, Children's Heart Hospital of Philadelphia, and Children's Aid Society.

**WILLIAM E. LAUPUS, M.D.**

Professor and Chairman of Department of Pediatrics, Medical College of Virginia Health Sciences Division of the Virginia Commonwealth University. Pediatrician-in-Chief, Medical College of Virginia Hospitals.

**HEROLD LILLYWHITE, Ph.D.**

Professor of Speech Pathology, University of Oregon Medical School.

**GEORGE H. McCracken, Jr., M.D.**

Assistant Professor of Pediatrics, University of Texas, Southwestern Medical School in Dallas. Attending Physician, Children's Medical Center and Parkland Memorial Hospital.

**R. JAMES MCKAY, M.D.**

Professor and Chairman of Department of Pediatrics, University of Vermont College of Medicine. Chief of Pediatric Service, Medical Center Hospital of Vermont; Attending Pediatrician, De Goesbriand Memorial Hospital.

**ROBERT W. MILLER, M.D., Dr. P.H.**

Chief of Epidemiology Branch, National Cancer Institute.

**JOHN D. NELSON, M.D.**

Associate Professor of Pediatrics, University of Texas, Southwestern Medical School in Dallas. Active Attending Physician, Children's Medical Center; Senior Attending Physician, Parkland Memorial Hospital.

**WALDO E. NELSON, M.D., Sc.D.**

Professor of Pediatrics, Woman's Medical College of Pennsylvania and Temple University School of Medicine. Attending Pediatrician, St. Christopher's Hospital for Children.

**CHARLES M. NORRIS, M.D., F.A.C.S.**

Professor and Chairman of Department of Laryngology and Broncho-esophagology (Chevalier Jackson Clinic), Temple University School of Medicine. Consultant in Otolaryngology, Lankenau Hospital.

**RICHARD W. OLMSTED, M.D.**

Professor and Chairman of Department of Pediatrics, University of Oregon Medical School.

**FREDERICK M. PARKINS, D.D.S., M.S.D., Ph.D.**

Assistant Professor and Director of Pedodontics, University of Pennsylvania. Dental Consultant, Medical Staff, Children's Hospital of Philadelphia; Consultant in Operative Dentistry, Veterans Administration Hospital.

**HOWARD A. PEARSON, M.D.**

Professor of Pediatrics, Yale University School of Medicine. Attending Pediatrician, Yale-New Haven Hospital.

**LAWRENCE K. PICKETT, M.D.**

Professor of Surgery and Pediatrics, Yale University School of Medicine. Attending Surgeon, Yale-New Haven Hospital.

**STANLEY A. PLOTKIN, M.D.**

Assistant Professor of Pediatrics, University of Pennsylvania School of Medicine. Associate Member, Wistar Institute of Anatomy and Biology; Associate Physician, Children's Hospital of Philadelphia.

**DANE G. PRUGH, M.D.**

Professor of Psychiatry and Pediatrics, University of Colorado School of Medicine and Dentistry. Chief of Child Psychiatry Division, University of Colorado Medical Center.

**W. JOSEPH RAHILL, M.D.**

Assistant Professor of Pediatrics, State University of New York at Buffalo School of Medicine. Assistant Attending Pediatrician, Children's Hospital of Buffalo.

**FREDERICK C. ROBBINS, M.D.**

Professor of Pediatrics and Dean, Case-Western Reserve University School of Medicine. Associate Pediatrician, University Hospital; Pediatrician, Cleveland Metropolitan General Hospital.

**HOWARD W. ROBINSON, Ph.D.**

Professor Emeritus of Physiological Chemistry, Temple University School of Medicine.

**MITCHELL I. RUBIN, M.D.**

Professor of Pediatrics, State University of New York at Buffalo School of Medicine. Attending Pediatrician and Head of Renal Division, Children's Hospital of Buffalo.

**JANE SCHALLER, M.D.**

Assistant Professor of Pediatrics, University of Washington School of Medicine. Director of Pediatric Arthritis Clinic and Attending Physician, University Hospital; Attending Physician, Children's Orthopedic Hospital and Medical Center; Attending Physician, King County Hospital.

**THOMAS F. McNAIR SCOTT, M.D.**

Professor of Pediatrics, University of Pennsylvania School of Medicine. Senior Physician, Children's Hospital of Philadelphia.

**CALVIN F. SETTLAGE, M.D., M.S.**

Director of Child Psychiatry and Staff Psychiatrist, Mount Zion Hospital and Medical Center.

**HARRY C. SHIRKEY, M.D.**

Professor of Pediatrics (Chairman) and Pharmacology, University of Hawaii School of Medicine. Medical Director, Kauaikeolani Children's Hospital; Chief of Pediatrics, Leahi (University) Hospital; Consulting Staff, Tripler General Hospital.

**CHARLES E. SMITH, M.D.\***

Berkeley, California.

**DAVID W. SMITH, M.D.**

Professor of Pediatrics, University of Washington School of Medicine.

**ALEX J. STEIGMAN, M.D., D.Sc. (Hon.)**

Professor of Pediatrics, Mount Sinai School of Medicine. Attending Pediatrician, Mount Sinai Hospital.

**MARIE A. VALDES-DAPENA, M.D.**

Professor of Pathology, Temple University School of Medicine. Associate Pathologist, St. Christopher's Hospital for Children.

**VICTOR C. VAUGHAN, III, M.D., F.A.A.P.**

Professor and Chairman of Department of Pediatrics, Temple University School of Medicine. Medical Director, St. Christopher's Hospital for Children.

**LEWIS W. WANNAMAKER, M.D.**

Professor of Pediatrics and Microbiology, University of Minnesota; Career Investigator, American Heart Association, University of Minnesota Medical School. Member of Medical Staff, University of Minnesota Hospital; Attending Physician, Hennepin County General Hospital; Consultant, St. Paul-Ramsey Hospital.

\*Deceased.



**JOSEF WARKANY, M.D.**

Professor of Research Pediatrics, University of Cincinnati College of Medicine. Fellow, Children's Hospital Research Foundation.

**RALPH J. WEDGWOOD, M.D.**

Professor and Chairman of Department of Pediatrics, University of Washington School of Medicine. Director of Pediatric Services, University Hospital; Associate Chief of Pediatric Services, Children's Orthopedic Hospital and Medical Center; Attending Pediatrician, King County Hospital.

**WARREN E. WHEELER, M.D.**

Professor and Chairman of Pediatrics, University of Kentucky College of Medicine. Director of Pediatric Service, University of Kentucky Medical Center.

**STANLEY W. WRIGHT, M.D.**

Professor of Pediatrics, University of California, Los Angeles School of Medicine. Associate Program Director, Mental Retardation, The Neuropsychiatric Institute (UCLA).

## PREFACE

This, the ninth edition of the single volume Textbook of Pediatrics,\* has provided the editor his first opportunity to share editing responsibilities with medical colleagues. The relentless progression of time as it applies to the individual is sufficient reason to bring in younger blood to assume responsibility. But there are additional justifications. Chief among these are the great increase in medical knowledge and the potentials for application of it to the medical care of children.

It continues to be our goal to provide in a single volume a synthesis of pediatric knowledge which will be appropriate for the student as an introduction to pediatrics and for the clinician as a useful and competent reference. For the assembly of the text material we are dependent upon the many contributors, the selection of whom constitutes one of the major responsibilities of editorship. It is the final synthesis and shaping of the contributed manuscripts into a text with some semblance of unity and balance in each section and in the book as a whole which constitute the sizable and painstaking task that one should be wise enough to avoid.

Into such a forbidding situation we welcome Drs. Vaughan and McKay. They were not chosen lightly, nor did they come in blindly. Each has been a major contributor to past editions and Dr. Vaughan has given much help with sections other than his own in several editions. Their strengths are well known to the editor. Each has a broad base in pediatrics, each has special interests which are complementary, and each is a competent and stimulating teacher. For the current edition they have shared in the general planning, in the selec-

tion of contributors and in editing. At least for the editor it has been a pleasant and an invigorating experience.

No attempt will be made to delineate the changes in this edition; they are recorded and will be apparent in the Table of Contents. We have done our best with the help of the contributors to prepare a pediatric text which depicts the status and provides perspective of current knowledge in a usable manner. The task has been a tremendous one, and we can only hope that in some degree we have measured up. It is not difficult to be humble under such circumstances. There are new contributors for several of the major sections and for a larger number of the shorter ones. To both the old and new contributors we are indebted for the thoroughness with which they have covered their respective subjects and for their generosity in accepting the editing necessary to permit publication in a single volume and to provide a semblance of unity in literary style throughout.

As must be the case in a textbook such as this one, there are many unrecorded contributors who have helped in a variety of ways. Most of the members of our respective departments and many in other departments of our medical schools have provided assistance. It is not possible to acknowledge all of them, but we must give special credit to Drs. Richard Behrman, Mary Coté, Catharine Dacou, George Farrar, Joseph Garfunkel, Warren Grover, Doris Howell, Eleanor Hunt, Jerold Lucey, Demosthenes Pappagannis, Carol Philipps, Charles Poser, Nancy Huang and J. Viswanathan.

To our publisher, the Saunders Company, we acknowledge not only our continuing indebtedness for their interest and care in providing a suitable format but also for the pleasure of working with them. We must here acknowledge the long and pleasant association of Mr. John Shaw in the editing of our book and wish him all the best in the retirement which he is now looking forward to.

\*Griffith-Mitchell ('33, '37, '41), Mitchell-Nelson ('45, '50) and Nelson ('54, '59, '64) Textbook of Pediatrics; there were two 2 volume editions, Griffith, 1919, and Griffith-Mitchell, 1927. Both J. P. Crozer Griffith and A. Graeme Mitchell died in 1941, shortly after publication of the 3rd edition.

For the many tasks involved in the work of the book we have had not only the best but the most pleasant of help. The new members have included Mrs. Vaughan and Mrs. Estelle W. Brown (a former colleague and a long time friend of the senior editor and more recently a colleague of Dr. McKay). And as usual my family has constituted the inside work force: Jane (Mrs. Edward F. Beatty, Jr.), Ann (Mrs. Richard E. Behrman) and Deborah (William's wife).

And as for the final editing there has been no change. I need only repeat a paragraph from the Preface of the fourth edition (my first):

"Finally, the editorial 'we' must be explained. The task of editing has been shared by my wife. No one has made a comparable contribution. She has read and reread every word in this entire book, except those in this paragraph. If there is any evenness and smoothness of construction, much of the credit is hers."

And so with the associate editors and the contributors we trust that this ninth edition will serve effectively for those who are interested in and concerned about the welfare of children.

WALDO E. NELSON

# CONTENTS

## 1. THE FIELD OF PEDIATRICS

AN INTRODUCTION TO THE MEDICAL PROBLEMS OF INFANTS AND CHILDREN.....	1
The Pediatrician and His Patient.....	12
Waldo E. Nelson	

## 2. DEVELOPMENTAL PEDIATRICS

GROWTH AND DEVELOPMENT .....	15
Parameters .....	15
Fetal .....	18
Newborn Infant .....	20
Premature Infant .....	23
First Year of Life .....	23
Second Year of Life .....	26
Preschool Years .....	27
Early School Years .....	28
Adolescence .....	28
Special Aspects .....	31
Assessment of Physical Growth and Development .....	39
Assessment of Neurologic and Psychologic Development .....	54
Victor C. Vaughan, III	
PSYCHOLOGIC DEVELOPMENT.....	57
Basic Concepts .....	58
General Principles Governing Child Development .....	63
Stages of Psychologic Development .....	64
Calvin F. Settlege	
PSYCHOLOGIC DISORDERS.....	72
Psychopathology .....	72
General Considerations in Diagnosis and Treatment .....	75
Categories of Psychologic Disorders.....	77
Developmental Disorders .....	77
Situational Disorders .....	81
Neurotic Disorders (Neuroses) .....	84
Neurotic Character Disorders .....	88
Psychotic Character Disorders .....	89
Psychotic Disorders (Psychoses) .....	90
Psychologic Disorders Associated with Organic Brain Damage .....	92
Calvin F. Settlege	

THE ROLE OF THE PEDIATRICIAN IN EMOTIONAL AND BEHAVIORAL DISORDERS .....	93
John Malcolm Dunn	

DISORDERS OF COMMUNICATION .....	101
Hearing Disorders.....	101
Richard Olmsted	
Speech and Language Development and Disorders .....	104
Herold Lillywhite	
Reading Disabilities .....	107
John Isom	

CEREBRAL DYSFUNCTION .....	110
John B. Bartram	

MENTAL RETARDATION .....	113
Phenylketonuria .....	115
Down's Syndrome .....	117
Differential Diagnosis of Mental Retardation.....	119
Prevention .....	119
Prognosis .....	120
Treatment and Management .....	120
John B. Bartram	

THE PHYSICIAN AND THE CHILD WITH A PERMANENT HANDICAP.....	121
John B. Bartram	

THE CARE OF THE CHILD WITH A FATAL ILLNESS.....	124
Victor C. Vaughan, III	

## 3. NUTRITION AND NUTRITIONAL DISORDERS

NUTRITIONAL REQUIREMENTS.....	127
Water .....	127
Calories .....	128
Proteins .....	129
Carbohydrates .....	131
Fats .....	131
Minerals.....	132
Vitamins .....	136
Miscellaneous Factors .....	136
Evaluation of Diet .....	141
William E. Laupus and Mildred J. Bennett	



### 3. NUTRITION AND NUTRITIONAL DISORDERS—Continued

FEEDING OF INFANTS.....	143
Breast Feeding.....	144
Formula Feeding.....	149
Other Foods.....	157
First-Year Feeding Problems.....	159
Feeding During the Second Year of Life.....	160
<i>William E. Laupus</i>	

NUTRITIONAL DISORDERS.....	164
Malnutrition.....	164
Obesity.....	165
Protein Malnutrition.....	166
Vitamin A Deficiency.....	169
Vitamin B Complex Deficiency.....	171
Scurvy.....	175
Rickets of Vitamin D Deficiency.....	178
Tetany of Vitamin D Deficiency.....	183
Hypervitaminosis D.....	184
Vitamin E Deficiency.....	184
Vitamin K Deficiency.....	184
<i>Lewis A. Barnes</i>	

### 4. PREVENTIVE PEDIATRICS AND HYGIENE

PREVENTIVE PEDIATRICS.....	186
<i>Robert J. Haggerty</i>	
HYGIENE.....	194
<i>William E. Laupus</i>	

### 5. GENERAL CONSIDERATIONS IN THE CARE OF SICK CHILDREN

CLINICAL APPRAISAL OF INFANTS AND CHILDREN.....	197
History.....	197
Physical Examination.....	200
Laboratory Diagnostic Studies.....	202
<i>Dane G. Prugh</i>	

#### THE PATHOPHYSIOLOGY OF BODY

FLUIDS.....	203
Water.....	203
Sodium.....	206
Potassium.....	207
Calcium.....	209
Magnesium.....	210
Hydrogen Ion.....	211
Chloride.....	216
Phosphorus.....	216
<i>Robert E. Cooke</i>	

PARENTERAL FLUID THERAPY.....	217
Deficit Therapy.....	218
Maintenance Therapy.....	227
Abnormal Losses of Water and Electrolytes.....	230

Supplemental Therapy.....	232
Parenteral Solutions.....	232
<i>Robert E. Cooke</i>	

DRUG THERAPY.....	233
General Considerations.....	233
Drugs and Their Doses in Pediatric Practice.....	237
<i>Harry C. Shirkey</i>	

#### PREOPERATIVE AND POSTOPERATIVE CARE AND CARDIOPULMONARY

RESUSCITATION.....	313
<i>John J. Downes and Leonard Bachman</i>	

### 6. PRENATAL DISTURBANCES

PRENATAL FACTORS IN DISEASES OF CHILDREN.....	318
Genetic Factors.....	318
<i>Josef Warkany and F. Clarke Fraser</i>	
Chromosomal Abnormalities in Man: The Autosomes.....	325
<i>Stanley W. Wright</i>	

Intrauterine and Environmental Factors.....	338
<i>Josef Warkany and F. Clarke Fraser</i>	

CONGENITAL MALFORMATIONS.....	339
<i>Josef Warkany and F. Clarke Fraser</i>	

GENETIC COUNSELING.....	343
<i>Josef Warkany and F. Clarke Fraser</i>	

### 7. THE FETUS AND THE NEWBORN INFANT

THE FETUS.....	347
<i>R. James McKay</i>	

HIGH-RISK PREGNANCIES.....	351
<i>R. James McKay</i>	

THE NEWBORN INFANT.....	353
The History in Neonatal Pediatrics.....	353
Physical Examination of the Newborn Infant.....	353
Ordinary Care of the Newborn Infant.....	357
<i>R. James McKay</i>	

The High-Risk Infant.....	360
Multiple Pregnancies.....	361
Prematurity and Low Birth Weight.....	364
Postmaturity.....	371
Placental Dysfunction Syndrome.....	371
<i>R. James McKay</i>	

<b>Diseases of the Newborn Infant:</b>		<b>DEFECTS IN ERYTHROCYTE</b>	
<b>Premature and Full Term .....</b>	<b>372</b>	<b>METABOLISM .....</b>	<b>421</b>
Clinical Manifestations of Disease		<i>Victor H. Auerbach</i>	
During the Neonatal Period .....	372	<i>and Angelo M. DiGeorge</i>	
Congenital Anomalies .....	373	<b>DEFECTS IN METABOLISM OF AMINO</b>	
Birth Injury .....	373	<b>ACIDS .....</b>	<b>421</b>
Anoxia .....	378	<i>Victor H. Auerbach and</i>	
Pediatric Emergencies in the		<i>Angelo M. DiGeorge</i>	
Delivery Room .....	379	<b>DEFECTS IN METABOLISM OF</b>	
<i>R. James McKay</i>		<b>CARBOHYDRATES.....</b>	<b>435</b>
<b>Disturbances of Organ Systems .....</b>	<b>381</b>	<i>Victor H. Auerbach and</i>	
Respiratory Tract.....	381	<i>Angelo M. DiGeorge</i>	
Digestive System.....	391	<b>DEFECTS OF METABOLISM OF</b>	
Blood.....	396	<b>PYRIMIDINES AND PURINES.....</b>	<b>447</b>
Genitourinary System .....	397	<i>Victor H. Auerbach and</i>	
Cranium.....	398	<i>Angelo M. DiGeorge</i>	
Disorders of the Skin .....	398	<b>DEFECTS IN METABOLISM AND</b>	
Eye.....	398	<b>TRANSPORT OF LIPIDS .....</b>	<b>450</b>
The Umbilicus .....	398	<i>Victor H. Auerbach and</i>	
<i>R. James McKay</i>		<i>Angelo M. DiGeorge</i>	
<b>Metabolic Disturbances .....</b>	<b>400</b>	<b>EPILOGUE .....</b>	<b>451</b>
<i>R. James McKay</i>		<i>Victor H. Auerbach and</i>	
<b>Disturbances of the Endocrine</b>		<i>Angelo M. DiGeorge</i>	
<b>System .....</b>	<b>402</b>	<b>THE LIPIDOSES.....</b>	<b>453</b>
Infants of Diabetic Mothers.....	402	Gaucher's Disease.....	453
Hypoglycemia.....	403	Niemann-Pick Disease.....	455
<i>R. James McKay</i>		Tay-Sachs Disease .....	456
<b>Infections of the Newborn.....</b>	<b>404</b>	Recently Described Syndromes .....	458
Staphylococcal Infections .....	405	Syndromes with Increased Blood Fat.....	458
Pseudomonas Infections.....	407	Skin Xanthomas .....	459
Diarrhea in the Newborn .....	407	<i>Allen C. Crocker</i>	
Infection Due to Listeria		<b>ERRORS IN PIGMENT METABOLISM .....</b>	<b>461</b>
Monocytogenes .....	408	The Porphyrrias.....	461
Vibrio Fetus Infection .....	409	Hereditary Methemoglobinemias .....	468
Coxsackie Virus Infection .....	409	Hemochromatosis.....	469
Herpes Simplex .....	409	<i>J. Julian Chisolm, Jr.</i>	
<i>R. James McKay</i>		<b>10. IMMUNITY, ALLERGY AND</b>	
<b>8. SUDDEN UNEXPECTED DEATH</b>		<b>INFECTIOUS DISEASES</b>	
<b>IN INFANCY</b>		<b>IMMUNITY AND ALLERGY.....</b>	<b>471</b>
<b>SUDDEN UNEXPECTED DEATH IN</b>		<b>Development of the Immunologic</b>	
<b>INFANCY.....</b>	<b>411</b>	<b>System.....</b>	<b>471</b>
<i>M. A. Valdés-Dapena</i>		Components of the Immunologic	
<b>9. INBORN ERRORS OF METABOLISM</b>		System .....	471
<b>INBORN ERRORS OF METABOLISM.....</b>	<b>413</b>	Immunologic Responses .....	475
<i>Victor H. Auerbach and</i>		Maturation of Immunologic	
<i>Angelo M. DiGeorge</i>		Function.....	476
<b>DEFECTS OF PROTEIN METABOLISM.....</b>	<b>418</b>	<i>Charles A. Janeway</i>	
Plasma Proteins .....	418	<b>Immunologic Deficiency Diseases .....</b>	<b>477</b>
Plasma Enzymes.....	419	Phagocytes.....	477
Proteins of Other Tissues.....	420	Disorders of the Thymus.....	479
<i>Victor H. Auerbach and</i>		Lymphocytes .....	482
<i>Angelo M. DiGeorge</i>		Plasma Cells .....	483
		<i>Charles A. Janeway</i>	

# 10. IMMUNITY, ALLERGY AND INFECTIOUS DISEASES—Continued

## IMMUNITY AND ALLERGY—Continued

<b>Allergic Disorders</b> .....	488
Methods of Study of the Allergic	
Child.....	491
General Aspects of Allergic	
Management.....	494
Anaphylaxis and Serum Sickness .....	498
Urticaria .....	500
Allergic Rhinitis .....	501
Asthma .....	502
Eczema.....	506
Atopic Erythroderma .....	509
Gastrointestinal Allergy .....	509
Other Allergic Disorders .....	510
<i>Victor C. Vaughan, III</i>	

## INFECTIOUS DISEASES ..... 511

<b>Diseases of Connective Tissue</b> .....	511
Juvenile Rheumatoid Arthritis.....	512
Ankylosing Spondylitis .....	517
Systemic Lupus Erythematosus .....	519
Vasculitis Syndromes.....	522
Dermatomyositis .....	526
Scleroderma .....	528
Erythema Multiforme	
Exudativum .....	529
Erythema Nodosum .....	530
Goodpasture's Syndrome.....	530
Relapsing Nodular	
Nonsuppurative Panniculitis.....	531

*Ralph J. Wedgwood and  
Jane Schaller*

<b>Rheumatic Fever</b> .....	533
<i>Lewis W. Wannamaker</i>	

## Clinical Use of the Microbiology

<b>Laboratory</b> .....	543
Selection of Diagnostic	
Microbiologic Specimens .....	546
<i>T. F. McNair Scott and Stanley A. Plotkin</i>	

## Isolation Measures for Infectious

<b>Diseases</b> .....	553
<i>Waldo E. Nelson</i>	

## Bacterial Infections ..... 555

Streptococcal Infections .....	555
Scarlet Fever.....	556
Erysipelas .....	561
Diphtheria .....	562
Pertussis.....	567
Parapertussis .....	570
Purulent Meningitis.....	571
Tetanus .....	577
Brucellosis .....	580
Tularemia .....	582

Salmonella Infections.....	583
Typhoid Fever .....	585
Bacillary Dysentery .....	588
<i>William L. Bradford</i>	

Cholera .....	590
<i>R. James McKay</i>	

Pseudomonas Infections.....	592
<i>Warren E. Wheeler</i>	

Tuberculosis .....	594
<i>Robert H. High</i>	

Infections with Unclassified	
Mycobacteria (Atypical or	
Anonymous Mycobacteria) .....	611
<i>Robert H. High</i>	

Leprosy .....	612
<i>Alex J. Steigman</i>	

## Spirochetal Infections..... 614

Syphilis .....	614
Yaws.....	620
Pinta.....	621
Leptospirosis .....	621
Rat-Bite Fever .....	622

*Alex J. Steigman*

## Viral Infections and Those Presumed to be Caused by Viruses ..... 623

Measles .....	623
German Measles .....	627
Exanthem Subitum.....	632
<i>Russell J. Blattner</i>	

Erythema Infectiosum.....	633
Herpes Simplex .....	633
Varicella and Herpes Zoster.....	638
Smallpox .....	641
Vaccination Against Smallpox.....	644
Mumps .....	647

*T. F. McNair Scott*

Epidemic Influenza .....	651
Rabies .....	653
Yellow Fever.....	656
Lymphogranuloma Venereum .....	658
Infectious Mononucleosis .....	659
Acute Infectious Lymphocytosis .....	661
Cat-Scratch Disease .....	662
Cytomegalic Inclusion Disease.....	663
Infectious Neuronitis .....	664
<i>Russell J. Blattner</i>	

Dengue Fever and Dengue-Like	
Disease.....	665

Dengue Hemorrhagic Fever .....	667
<i>Scott B. Halstead</i>	

## Infections by Enteroviruses ..... 669

Coxsackie Virus Infections.....	669
ECHO Virus Infections .....	675
<i>Edward C. Curnen</i>	

Poliomyelitis.....	677
<i>Alex J. Steigman</i>	

<b>Acute Aseptic Meningitis Syndrome</b> .....	687	<b>Intestinal Protozoa</b> .....	748
<i>T. F. McNair Scott and Alex J. Steigman</i>		Amebiasis .....	748
<b>Encephalitis</b> .....	688	Acanthamebiasis .....	750
Encephalitis of Viral Origin .....	692	Giardiasis .....	750
Encephalitis of Unknown Origin,		Balantidiasis .....	751
Probably Viral .....	693	<i>Paul C. Beaver</i>	
Allergic Encephalitis .....	695		
Diagnosis, Prognosis and		<b>11. THE DIGESTIVE SYSTEM</b>	
Treatment .....	696	<b>THE ORAL CAVITY</b> .....	752
<i>T. F. McNair Scott</i>		Abnormalities in Growth and	
<b>Rickettsial Diseases</b> .....	698	Development of the Jaws and Teeth ...	752
Typhus Fever .....	700	Abnormalities of Development of the	
Murine Typhus .....	700	Palate and Soft Tissues of the Mouth...	760
Brill's Disease .....	701	The Lips .....	764
Scrub Typhus .....	701	The Tongue .....	765
Rocky Mountain Spotted Fever .....	702	Salivary Glands .....	766
Fièvre Boutonneuse .....	703	<i>Frederick M. Parkins and Giulio J. Barbero</i>	
Rickettsialpox .....	703		
Q Fever .....	703	<b>THE ESOPHAGUS</b> .....	767
<i>Eli Gold and Frederick C. Robbins</i>		Congenital Anomalies .....	767
<b>Mycotic Infections</b> .....	705	Acquired Diseases .....	771
Actinomycosis .....	705	Foreign Bodies in the Esophagus .....	773
North American Blastomycosis .....	705	<i>Paul H. Holinger</i>	
Cryptococcosis .....	706		
Phycomycosis .....	707	<b>THE GASTROINTESTINAL TRACT</b> .....	774
Nocardiosis .....	708	<b>Gastrointestinal Disturbances</b> .....	774
Sporotrichosis .....	708	Poor Appetite .....	774
Aspergillosis .....	709	Abdominal Pain .....	775
Therapy with Amphotericin B .....	709	Gastrointestinal Bleeding .....	776
<i>Jerome S. Harris</i>		Vomiting .....	777
Histoplasmosis .....	711	Fecal Elimination .....	778
<i>Amos Christie</i>		Diarrhea .....	782
Coccidioidomycosis .....	714	<i>Giulio J. Barbero</i>	
<i>Charles E. Smith</i>			
<b>Parasitic Infections</b> .....	717	<b>Congenital Anomalies of the</b>	
<b>Helminthic and Arthropod</b>		<b>Gastrointestinal Tract and Intestinal</b>	
<b>Diseases</b> .....	717	<b>Obstruction</b> .....	785
Infections Produced by Roundworms		Congenital Hypertrophic Pyloric	
(Nematoda) .....	717	Stenosis .....	785
Infections Produced by Tapeworms		Congenital Intestinal Obstruction .....	787
(Cestoda) .....	728	Acquired Intestinal Obstruction .....	793
Infections Produced by Flukes		<i>Giulio J. Barbero</i>	
(Trematodes) .....	731		
Arthropods as Causative Agents		<b>Diseases of the Gastrointestinal</b>	
and Transmitters of Disease .....	735	<b>Tract</b> .....	796
<i>Ernest Carroll Faust</i>		Peptic Ulcer .....	797
<b>Tropical Eosinophilia</b> .....	739	Mesenteric Lymphadenitis .....	798
<i>Paul C. Beaver</i>		Necrotizing Enterocolitis .....	798
<b>Protozoan Diseases</b> .....	739	Chronic Colitis .....	799
Malaria .....	739	Pneumatosis Cystoides Intestinalis .....	802
<i>David F. Clyde</i>		<i>Giulio J. Barbero</i>	
Kala-azar in Children .....	744	Intestinal Malabsorption .....	804
<i>*S. T. Achar</i>		<i>Paul A. di Sant'Agnese</i>	
Toxoplasmosis .....	745		
<i>Harry A. Feldman</i>		<b>ANUS, RECTUM AND SIGMOID</b> .....	814
		Malformations of the Anus and	
		Rectum .....	814
		Fissure in Ano .....	816
		Pruritus Ani .....	816



<b>11. THE DIGESTIVE SYSTEM—Continued</b>		
<b>ANUS, RECTUM AND SIGMOID—Continued</b>		
Prolapse and Proctidentia of the Rectum and Sigmoid .....	816	
Anorectal Abscess .....	816	
Fistula .....	817	
Hemorrhoids .....	817	
Neoplasms .....	817	
Congenital Defects of the Sacrococcygeal Region .....	817	
<i>Lawrence K. Pickett</i>		
<b>APPENDICITIS .....</b>	<b>817</b>	
<i>Lawrence K. Pickett</i>		
<b>PERITONEUM AND ALLIED STRUCTURES.....</b>	<b>819</b>	
Malformations of the Peritoneum.....	819	
Ascites .....	820	
Peritonitis .....	820	
Hernia and Hydrocele .....	821	
<i>Lawrence K. Pickett</i>		
<b>THE LIVER.....</b>	<b>825</b>	
<b>Biochemistry of Liver Disease and Liver Function Tests.....</b>	<b>826</b>	
<i>Robert Kaye</i>		
<b>Disorders Affecting Excretion of Bilirubin.....</b>	<b>831</b>	
Unconjugated Hyperbilirubinemias.....	831	
Conjugated Hyperbilirubinemias .....	833	
<i>Robert Kaye</i>		
<b>Infections .....</b>	<b>834</b>	
Neonatal Hepatitis .....	834	
Hepatitis in the Older Infant and Child.....	835	
Infectious Hepatitis.....	835	
Liver Abscess .....	838	
<i>Robert Kaye</i>		
<b>Chronic Liver Disease .....</b>	<b>839</b>	
Acquired Hepatic Diseases.....	839	
Familial Hepatic Diseases.....	841	
Nutritional Liver Diseases.....	845	
<i>Robert Kaye</i>		
<b>Indian Childhood Cirrhosis .....</b>	<b>845</b>	
<i>S. T. Achar</i>		
<b>Fatty Infiltration .....</b>	<b>846</b>	
<i>Robert Kaye</i>		
<b>Acute Liver Disease .....</b>	<b>847</b>	
Poisoning.....	847	
Acute Encephalopathy and Hepatomegaly with Fatty Infiltration.....	847	
Portal Hypertension.....	848	
Cysts.....	850	
<i>Robert Kaye</i>		
<b>The Gallbladder .....</b>	<b>850</b>	
<i>Robert Kaye</i>		
<b>The Bile Ducts .....</b>	<b>851</b>	
Cystic Dilatation and Perforation .....	851	
Atresia of the Extrahepatic Bile Ducts .....	852	
<i>Robert Kaye</i>		
<b>THE PANCREAS .....</b>	<b>854</b>	
Physiology of the Exocrine Glands of the Pancreas.....	854	
Tests of Pancreatic Function .....	855	
Sweat Tests for Cystic Fibrosis.....	855	
Anomalies of the Pancreas.....	856	
Cystic Fibrosis .....	856	
Pancreatic Deficiencies Not Due to Cystic Fibrosis .....	867	
Pancreatitis .....	868	
Cysts and Pseudocysts of the Pancreas ..	868	
Involvement of the Pancreas in Systemic Disease .....	868	
<i>Paul A. di Sant'Agnese</i>		
<b>12. THE RESPIRATORY SYSTEM</b>		
<b>RESPIRATORY PHYSIOLOGY AND ITS APPLICATION TO PULMONARY DISEASE ...</b>	<b>870</b>	
Methods of Assessing Ventilatory Function.....	877	
Artificial Respiration .....	879	
Inhalation Therapy .....	880	
<i>Charles Davenport Cook</i>		
<b>RESPIRATORY DISTURBANCES.....</b>	<b>882</b>	
<i>Heinz F. Eichenwald and George H. McCracken, Jr.</i>		
<b>THE UPPER RESPIRATORY TRACT.....</b>	<b>883</b>	
The Nose .....	883	
Elongated Uvula .....	884	
<i>Heinz F. Eichenwald and George H. McCracken, Jr.</i>		
<b>Infections of the Upper Respiratory Tract.....</b>	<b>884</b>	
Acute Nasopharyngitis .....	887	
Acute Pharyngitis.....	889	
Retropharyngeal Abscess.....	891	
Lateral Pharyngeal Abscess.....	891	
Peritonsillar and Retrotonsillar Abscesses.....	892	
Sinusitis .....	892	
General Considerations of Chronic Infections of the Upper Respiratory Tract.....	893	
Tonsils and Adenoids .....	894	
<i>Heinz F. Eichenwald and George H. McCracken, Jr.</i>		
<b>THE EAR.....</b>	<b>897</b>	
External Auditory Canal .....	898	
The Tympanic Membrane .....	898	
The Middle Ear .....	899	
Mastoiditis.....	900	
<i>John D. Nelson</i>		