

PHYSICAL DIAGNOSIS

SIXTH EDITION

ILLUSTRATED

RALPH H. MAJOR, M.D.

*Professor of Medicine
and of the History of Medicine,
The University of Kansas*

MAHLON H. DELP, M.D.

*Professor of Medicine,
The University of Kansas*

W. B. SAUNDERS COMPANY, Philadelphia and London

1962

© 1962 by W. B. Saunders Company. Copyright, 1937, 1940, 1945, 1951 and 1955 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: 62-8813

Contributors

THE AUTHORS wish to acknowledge with thanks the generous assistance in the preparation of this edition by their colleagues in the University of Kansas School of Medicine.

LARRY L. CALKINS, M.D.

Associate Clinical Professor of Ophthalmology.

MARVIN DUNN, M.D.

Associate in Medicine (Cardiology).

MARTIN J. FITZPATRICK, M.D.

Associate Professor of Medicine (Chief of Division of Respiratory Diseases).

LEONARD F. PELTIER, M.D.

Professor of Surgery (Orthopedic).

G. O'NEIL PROUD, M.D.

Professor of Otorhinolaryngology and Chairman of the Department.

RONALD A. YOUMANS, M.D.,

Instructor in Medicine (Neurology).

Preface to the Sixth Edition

THIS SIXTH edition of **PHYSICAL DIAGNOSIS** appears twenty-five years after the first edition saw the light of day in 1937. During this past quarter century medicine has advanced at a phenomenal pace. There have been advances in physical diagnosis as well as in other fields of medicine.

This twenty-fifth anniversary edition is not a scissors and paste revision. The entire work has been rewritten from the title page to the index. Many new illustrations have been added and old ones discarded. In the preparation of this edition we are under deep obligations to our colleagues mentioned elsewhere. We wish also to express our appreciation of the criticisms and helpful suggestions offered by Dr. Lawrence E. Putnam who had the patience to read every line of the text of the last edition.

THE AUTHORS

Preface to the Fifth Edition

WITH THIS, the fifth edition of **PHYSICAL DIAGNOSIS**, it is a great pleasure to welcome Dr. Mahlon Delp as co-author. Dr. Delp, as resident in medicine, secured much material, both in illustrations and in factual data, for the first edition of this work. In the intervening years, he has been continuously active in teaching physical diagnosis and has become familiar with almost every line of this text. His suggestions for improvement have been invaluable.

In this Edition, many parts of the text have been rewritten, many additions have been made, and the order of certain paragraphs has been changed. The chapter on history taking and recording has been moved from the end of the book to the position of an early chapter—a suggestion made by numerous colleagues. Many new illustrations have been added and some old ones eliminated. These changes, we feel, have produced an obvious improvement in the work.

We are under especial obligations to our colleagues, Dr. Rosemary Schrepfer, Dr. Max Allen, Dr. Robert Bolinger, Dr. E. Grey Dimond, Dr. Fethi Gonlubol, and Dr. Ralph Edwards, for illustrations they have kindly permitted us to use. Our indebtedness to Miss Arline Nichols for her artistic drawings and to Mr. William McGrew and his associates for their excellent photographs is quite obvious to anyone reading this book.

May, 1956

THE AUTHORS

Preface to the First Edition

THIS BOOK is a summary of some of the things I have learned in fifteen years' experience in teaching physical diagnosis to medical students. In it I have tried to emphasize, as Skoda did a century ago, that physical signs are produced by physical causes, and that these underlying physical causes must be understood before the physical signs can be properly appreciated.

I have deliberately avoided any chapters on roentgenology, electrocardiography, urine, feces, etc., for two reasons. First, this is a textbook of physical diagnosis, and second, these other subjects are far better presented in books written by experts in these fields. Where roentgenograms, electrocardiograms or pulse tracings are employed they are used only to make certain explanations clearer.

I have made free use of quotations, partly because of an interest in classic descriptions, and partly because of the excellence of many of these early accounts. I have also, in many instances, employed the illustrations used by the pioneers in certain fields of investigation, thinking for instance that Traube's original curve of pulsus alternans is of more interest than any one of the thousands of curves of this condition which have been made since.

If in this twentieth century I have seemed to hark back too much to the descriptions of the older masters, it is because I have been impressed with the remark of Osler, "And when you can, read the original descriptions of the masters

who, with crude methods of study, saw so clearly." Also, since the descriptions of Biot's breathing, of Traube's semilunar space, of Skoda's resonance, and of other physical findings vary in different books, it is of interest to see what these men themselves wrote on these subjects.

I have drawn freely both in subject material and in illustrations from many sources for which I wish to express my indebtedness. The excellent texts of many writers have been drawn upon extensively, particularly those of Cabot, Rose and Elmer, Emerson, Norris and Landis, Pratt and Bushnell, Seifert and Müller, Edens and Letulle. In the sections on the heart I have been greatly aided by Hirschfelder's "Diseases of the Heart and Aorta," a book which in my judgment is one of the most clearly written and most interestingly presented treatises on cardiac diseases. The influence of Friedrich v. Müller on this book is clearly seen in its pages and the author considers himself unusually fortunate to have been a worker in his clinic in 1913, and again in 1933, twenty years later, to have followed the last course the master gave on physical diagnosis.

The illustrations have been taken from various sources but the majority are from patients seen in the University of Kansas School of Medicine. My colleagues, Dr. Edward H. Hashinger, Dr. Frank C. Neff, Dr. T. G. Orr, Dr. Arthur E. Hertzler, Dr. C. B. Francisco, and Dr. Nelse F. Ockerblad, have supplied me with many

photographs for which it is a pleasure to express my appreciation. The photographs are in themselves a testimonial of my indebtedness to our photographer, Mr. D. M. Sams. The drawings are mainly the work of Miss Kay Bell, to whom my obligations are also obvious. I am under great obligation to Dr. George Walker for assistance in the preparation of phonograms and of the sound tracings which were made with a cathode-ray apparatus of his design and construction. Miss Opal Woodruff, librarian of the University of Kansas School of Medicine, has been of the greatest assistance in the location of certain references in the literature.

I am very grateful to my colleagues, Dr. Peter T. Bohan, Dr. Graham Asher and Dr. Galen Tice, who have been kind enough to look over sections of the manuscript and have aided me with many helpful suggestions. To Dr. Edward H. Hashinger, who has had the kindness and

patience to review the entire manuscript, it is difficult to express adequate thanks. I have drawn very freely on "The Laboratory Notebook Method in Teaching Physical Diagnosis and Clinical History Recording" of Dr. Logan Clendening and have obtained even more assistance from him in the course of our conversations and discussions on the subject of physical diagnosis. If, after this enumeration of the aid I have received from so many sources, this treatise fails to prove a satisfactory outline of physical diagnosis, the fault is obviously mine.

In conclusion, this book is intended as a textbook of physical diagnosis, not as a yearbook or as an exhaustive encyclopedia. It attempts rather to indicate the paths of exploration a student should follow, and possibly suggests some byways that he may explore as the interest of the moment indicates.

RALPH H. MAJOR

Contents

1	INTRODUCTION	1
2	HISTORY TAKING AND RECORDING	9
3	PAIN	24
	HEAD	25
	THORAX	26
	HEART	28
	ABDOMEN	30
	LIVER	32
	SPLEEN	32
	KIDNEYS	32
	URETERS	32
	BLADDER	33
	EXTREMITIES	33
	ANESTHESIA	33
4	GENERAL INSPECTION	35
	PSYCHE OR MENTAL STATE ..	35
	POSTURE	37
	MOVEMENTS	38
	GAIT	39
	SPEECH	40
	NUTRITION	41
	STATURE	45
	TEMPERATURE	49
	SKIN	53

5

EXAMINATION OF THE HEAD AND NECK 62

FACE	64	THE EYES	67
HAIR	67		
General Principles of the Ear, Nose, and Throat Examination.....		79	
THE EAR	79	TEETH AND GUMS	87
NOSE	81	TONGUE	89
PHARYNX AND LARYNX	83	BREATH	91
CHEEKS	83	BUCCAL CAVITY	92
LIPS	84	NECK	93

6

INSPECTION, PALPATION AND PERCUSSION OF THE CHEST 103

INSPECTION OF THE CHEST	104	SEGMENTAL ANATOMY OF THE	
PALPATION OF THE CHEST ..	111	LUNG	124
PERCUSSION OF THE CHEST ..	113	PERCUSSION OF THE CHEST	
PERCUSSION OF THE NORMAL		IN DISEASE	126
CHEST	119		

7

AUSCULTATION OF THE LUNGS 131

STETHOSCOPES	131	PLEURAL FRICTION RUB	141
SOUNDS HEARD ON AUSCULTATION OF THE NORMAL CHEST	133	HIPPOCRATIC SUCCUSSION ..	141
NORMAL BREATH SOUNDS ...	134	FALLING-DROP SOUND.....	142
ABNORMAL BREATH SOUNDS..	138	LUNG-FISTULA SOUND.....	142
RALES	138	VOCAL RESONANCE	142
		THE COIN SIGN	143

8

PHYSICAL FINDINGS IN DISEASES OF THE LUNGS 145

ACUTE BRONCHITIS	145	INTERSTITIAL EMPHYSEMA ..	148
CHRONIC BRONCHITIS	145	BRONCHIAL ASTHMA	148
BRONCHIECTASIS	145	PLEURISY	149
EMPHYSEMA	146	PNEUMOTHORAX	151

PULMONARY ATELECTASIS ..	152	TUBERCULOSIS OF THE LUNG	155
MASSIVE COLLAPSE OF THE		FIBROSIS OF THE LUNG	159
LUNG	152	CARCINOMA OF THE LUNGS ..	161
LOBAR PNEUMONIA	153	ABSCESS OF THE LUNGS	161
BRONCHOPNEUMONIA	154	INFARCTION OF THE LUNGS ..	162
TUBERCULOSIS	154	PULMONARY EDEMA	162
ACUTE MILIARY TUBERCULO-		SUMMARY	163
SIS	155		

9 THE HEART 166

INSPECTION, PALPATION AND	
PERCUSSION OF THE HEART	166

10 AUSCULTATION OF THE HEART..... 179

SOUND AND HEARING	179	SYSTOLIC MURMURS	190
LISTENING TO THE HEART ...	180	DIASTOLIC MURMURS	193
THE HEART SOUNDS	181	FUNCTIONAL MURMURS	197
GALLOP RHYTHMS	187	AUSCULTATION OF BLOOD	
FRICTION SOUNDS	187	VESSELS	199
CARDIAC MURMURS	188		

11 THE PULSE 201

INEQUALITY OF THE PULSES	202	VESSEL WALL.....	215
PALPATION OF THE PULSE ...	203	CAPILLARY PULSE.....	216
CHARACTERISTICS OF THE		VENOUS PULSE.....	216
PULSE	204		

12 BLOOD PRESSURE 218

PALPATORY METHOD	218	THE NORMAL BLOOD PRES-	
AUSCULTATORY METHOD ...	219	SURE	221
CARDIAC IRREGULARITIES	221		

ELEVATION OF BLOOD PRES- SURE HYPERTENSION	222
THE BLOOD PRESSURE IN CO- ARCTATION OF THE AORTA.	223

LOW BLOOD PRESSURE: HY- POTENSION	223
--	-----

13

PHYSICAL FINDINGS IN CARDIOVASCULAR DISEASES . . . 224

PERICARDITIS	224	ENDOCARDITIS	236
ARTERIOSCLEROTIC HEART DISEASE	227	CONGENITAL HEART DISEASE	237
HYPERTENSIVE HEART DIS- EASE	229	ANEURYSM	240
COR PULMONALE	230	THE ELECTROCARDIOGRAM . .	242
MYOCARDITIS AND MYOCAR- DIAL DISEASE	231	THE X-RAY IN THE DIAGNO- SIS OF CARDIAC DISEASE . .	243
HEART FAILURE	231	PERIPHERAL VASCULAR DIS- EASE	243
CHRONIC VALVULAR HEART DISEASE	232		

14

ABDOMEN AND GENITALIA 247

ABDOMEN	247	Auscultation of the Abdo- men	263
Topographical Anatomy . .	247	The Roentgen Ray in the Diagnosis of Diseases of the Abdomen	264
Inspection of the Abdomen	248		
Palpation of the Abdomen	257		
Percussion of the Abdomen	262		
GENITALIA	266	Female Genitalia	270
Male Genitalia	266	RECTUM	276

15

THE EXTREMITIES 279

HANDS	279	LEGS	291
FINGERS	284	KNEES	301
WRISTS	288	THE FEET	301
ARMS	289	ARTHRITIS	303
THE SHOULDERS	290		

16

EXAMINATION OF THE NERVOUS SYSTEM	308
MENTAL STATE	308
THE MOTOR SYSTEM	312
SENSORY EXAMINATION"	320
CRANIAL NERVES	323
AUTONOMIC FUNCTIONS....	329
INDEX	331

Introduction

Hippocrates, whom we revere as the Father of Medicine, achieved this title through his integrity of character, his ability as a teacher, his accuracy in describing disease and his uncanny skill as a diagnostician. How did Hippocrates make his diagnoses? First, he took a careful history, noting the patient's age, occupation, dietary habits, his place of residence, where he formerly had lived and many facts regarding his family. He then examined his patient with meticulous care, employing not only inspection but also percussion and auscultation to a limited extent. To quote him directly, "In the examination one should see all that is possible to see, to feel, to hear and to learn what he can through smell, touch, hearing—that is through the nose, the tongue and the intelligence." Having finished the physical examination, Hippocrates examined the excreta of the body, the urine and the feces. He recorded his findings and left records of 42 clinical cases, almost the only records of the kind for the next 1700 years. We can read these case histories today and make the diagnoses ourselves, thanks to the careful account written by Hippocrates two thousand years ago. Hippocrates laid great stress on physical diagnosis and some of the classical findings and procedures bear his name.

There are four methods of physical diagnosis: inspection, palpation, percussion, and auscultation. Logically, the examination of the patient should proceed in this order. First, look at the patient—inspection; then touch him—palpation; then tap him—percussion; and lastly, listen to him—auscultation. Look, touch, percuss, listen. If one always follows this order, he will avoid many errors.

The importance of a rigid routine in examining patients cannot be overemphasized. Most errors in physical diagnosis are not the result of ignorance, but of haste and carelessness. Thoroughness in examination produces more correct diagnoses than sudden flashes of brilliancy. One should follow into the minutest detail every slight variation from the normal just as a detective follows every clue in unraveling a mystery. In many respects the methods of the physician are those of the detective, one seeking to explain a disease, the other a crime. Conan Doyle, the physician-author, was inspired to create the master-detective, Sherlock Holmes, by one of his teachers, Dr. Joseph Bell, whose uncanny powers of observation made an indelible impression upon the mind of the young medical student. The extent to which keenness of observation may be developed is illustrated by an anecdote told of Jean Nicolas Corvisart, who played an important and honorable role in the history of physical diagnosis. One day, while examining a portrait, Corvisart remarked, "If the painter has been accurate, the original of this picture died of heart disease." An investigation proved Corvisart's diagnosis to be correct. Voltaire's story *Zadig*, which every medical student should read, gives another and older story of how acuteness of observation can be developed.

The power of observation is developed by practice, by systematically following a routine which, with repeated use, becomes second nature. The physician should look long before he palpates, palpate long before he percusses, and percuss long before he listens. Frequently a student proceeds to place his stethoscope on the patient's



Figure 1. Hippocrates of Cos.

chest as soon as the patient has undressed, without having percussed or even inspected him. In many respects a regulation forbidding a student to own a stethoscope until he has studied physical diagnosis for six months would be a wise measure.

Inspection, the first step in the examination of a patient, is also the oldest method. Just when it was first used we do not know, but probably at the time when the Neanderthal, or some other primitive man, emerged from the stage in which instinct was succeeded by reason and other mental processes. The most primitive man probably looked at his fellow man in much the same way that we do today. Sometime back in those hazy historical epochs the discovery of inspection was made.

Leaving behind us those remote periods and coming down to the earliest times which have left a written record, we find the physician using inspection in the examination of his patients. The Papyrus Ebers, one of the most venerable medical treatises in the world, compiled about 1500 B. C., describes a great variety of disease conditions, including enlargement of the lymph glands, skin eruptions, pterygium of the eye and warts on the vulva, showing that the ancient Egyptian physician had trained his powers of observation and constantly used inspection in

the diagnosis of disease. Hippocrates was a great master of inspection and saw so much with his eyes that when we read twenty-four hundred years later his description of certain diseases, we can almost make an instantaneous diagnosis. "It has often been remarked that his clinical pictures of phthisis, puerperal septicemia, epilepsy, epidemic parotitis and some other diseases might, with a few changes and additions, take their place in any modern text-book" (Garrison).

There are isolated references to the use of percussion and auscultation in ancient times. Hippocrates used auscultation to a limited extent. He was familiar with the pleural friction rub, which he described as "squeaking like leather"; in edema of the lungs he noted that, if one presses his ear against the chest and listens, "it boils inside like vinegār"; and he also described the well-known succussion splash since known as "Hippocratic succussion." Aretaeus the Cappadocian, in the second century of the Christian era, observed that in tympanites "if you tap with your hand, the abdomen sounds." Johannes Platearius of Salerno in the twelfth century noted that, in ascites, the abdomen on percussion gave the tone of a half-filled leathern bottle, while tympanites produced the tone of a drum. William Harvey, the discoverer of the circulation of the blood, observed that, when the blood was moved from the veins to the arteries, "a pulse is made which may be heard in the chest." These observations, however, remained isolated, unknown to and unappreciated by the medical profession.

For more than twenty-two hundred years, from the time of Hippocrates, nearly five hundred years before Christ, until the work of Auenbrugger in the latter part of the eighteenth century, the physician had at his disposal only inspection and palpation in the examination of patients. He made mistakes, but he must have made correct diagnoses too; otherwise, he could not have maintained his position as a leader of the society in which he found himself or upheld his reputation as a learned man. He looked at his patient's tongue, he noted whether he had fever,

he felt and counted his pulse, but he knew little of the condition of his heart and lungs until the nineteenth century dawned, and percussion and auscultation were re-discovered.

Leopold Auenbrugger was the son of an innkeeper in southern Austria. As a young lad, he assisted his father in his duties, one of which was to keep the guests' glasses well filled with wine. He learned from his father that he could tell a cask of wine was filled, half-filled or empty, by thumping on its end. This simple expedient gave him the germ of the idea which later led to his great discovery.

Leopold's father was ambitious for his son, gave him a good education and later sent him to Vienna to study medicine. He was an industrious student, a young man of charm, good sense and genial disposition. After graduation he rapidly achieved success in his profession and, when twenty-nine years of age, was appointed physician to the Spanish Military Hospital, the largest and finest hospital in Vienna. Ten years later, in 1761, he published in Latin his *Inventum Novum*, in which the new art of percussion was described.

Auenbrugger states in his preface that "in making public my discoveries, I have been actuated neither by an itch for writing nor a fondness for speculation, but by a desire of submitting to my brethren the fruits of seven years' observation and reflection."

For forty-seven years Auenbrugger's little book of ninety-five pages remained unnoticed. In 1808 Corvisart, the physician of Napoleon, translated it into French, only one year before Auenbrugger's death. Corvisart could easily have revamped the book and published it as his own, since Auenbrugger had been utterly neglected and forgotten. But with a fine sense of honor and integrity, he called attention to Auenbrugger's neglected treatise and wrote in his preface "It is he and the beautiful invention which of right belongs to him that I wish to recall to life."

Corvisart was destined to play another important role in the development of physical diagnosis. As one of the foremost teachers of medicine in Paris, he attracted



Figure 2. Leopold Auenbrugger.

many medical students, one of whom was René Théophile Hyacinthe Laennec. Corvisart recognized the industry, accuracy and brilliance of the young Laennec. He constantly encouraged him in his studies and taught him the value of percussion. The young student in turn was stimulated by the brilliance of his master's intellect and was deeply impressed and influenced by his high sense of integrity.

Laennec followed the usual course of the medical student of his day and, after living through many lean years, at last achieved a reputation as a careful, sane physician and slowly acquired a practice. One day while on his way to see a patient his attention was attracted by some small children who were playing on a long beam of wood in the court of the Louvre. One child was softly scratching the end of the beam with a pin, while the others, with their ears at the other end, were listening with delight to the sounds.

Laennec was thinking of his difficulties in examining a patient, a young woman who was suffering from heart disease. She was obese, and neither palpation nor percussion had aided him in his diagnosis. The sight of the children playing with the beam gave him an inspiration. Hurrying to the home of the patient, he asked for a sheet of paper, rolled it up tightly into a cylinder, applied one end to the chest



Figure 3. Laennec examining a patient at the Necker Hospital.

and the other to his ear. To his joy, he heard the sounds of the beating heart as well as the breath sounds in the chest.

This was the discovery of auscultation. Laennec spent three years improving upon his roll of paper and listening to the chests of patients. He learned to turn wood and made first a solid cylinder of wood. This solid cylinder transmitted the heart sounds well, but gave poor results when applied to the lungs. He then bored a hole through the cylinder and found that he heard the sounds in the lungs better. He experimented with various kinds of wood—ebony, cedar, cane, beech and linden—but found little difference between them. At length he devised an instrument of wood exactly one foot in length consisting of two parts with a canal through the center, which could be taken apart for carrying and joined together before using. It also had an adapter which changed the size of the aperture on the end placed against the chest. Laennec used the smaller aperture when listening to the heart and the larger, bell-shaped aperture when auscultating the chest. After considering many names he finally christened this instrument the stethoscope (στήθος—stethos = chest;

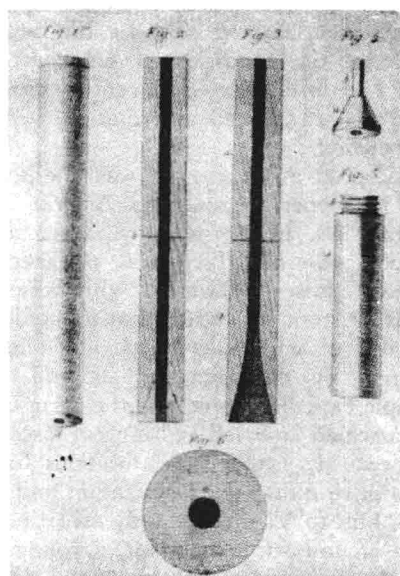


Figure 4. Laennec's stethoscope.

σκοπεῖν—skopein = to examine), the name it has carried ever since. His instrument, with slight modification, is still used extensively in European clinics (Fig. 4).

In 1819 Laennec published his famous *De l'Auscultation Médiate*, in which this new method of examination was explained and its application to the diagnosis of diseases of the lungs and heart fully described. In this work he was compelled, because he was speaking in a new medical language, to coin a large number of new words, most of which are still in common use. Such terms as pectoriloquy, cavernous breathing, egophony, bronchophony and rales have gained universal currency. Rales was the term he gave to certain sounds bearing resemblance to the "*râle des mourants*" or the "death rattle."

Nine years after the publication of Laennec's work, Piorry, another French physician, invented *mediate percussion*. Although Auenbrugger was the father of percussion, it should be recalled that he practiced immediate percussion or direct percussion, striking the chest directly with the fingers and noting the sounds produced. Piorry, in his work "*De la Percussion Médiate*" (Paris, 1828), claimed that better results could be obtained by placing a piece of ivory (plessimeter) over the