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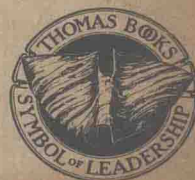
Incorporates Essay on
Clinical Physiology for
which the author was
awarded the
Duckston Browne Prize
and Medal of the
Harveian Society
of London.

The Clinical Physiology of Physical Fitness and Rehabilitation

Featuring
The Cohnheim-Walch
thesis of adaptation in
pathological processes,
illustrated by select
cardiological case his-
tories of subjects with
extraordinary physical
efficiency.

Concerned with
PHYSIOLOGICAL,
PSYCHOLOGICAL,
AND CLINICAL
PROBLEMS OF
PHYSICAL FITNESS
--its establishment
--its maintenance
--its reestablishment

The central nervous
system is concerned with
the attainment of motor
aims. Adrian's thoughts
relating to the sensory
basis of perception
as applied to the
interpretation of
neurological case
histories of
athletic champions.



The Clinical Physiology of Physical Fitness and Rehabilitation

by

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**THE CLINICAL PHYSIOLOGY
OF PHYSICAL FITNESS
AND REHABILITATION**

**Dedicated to the Memory of
SIR CHARLES SHERRINGTON, O.M., F.R.S.
(1857-1952)
on the occasion of the hundredth
anniversary of his birth.**

Introduction

IN his Gowers Memorial Lecture at the Royal Society of Medicine in London on November 15, 1956, Sir Francis Walshe pointed out that modern clinical medicine originated with the publication in 1819 of Laennec's treatise on auscultation in which he described the discovery of the stethoscope and its application in medical practice. Laennec's contribution did not only lie in the fact that he introduced into medicine a major diagnostic procedure. His teachings also led to the systematic development of the techniques of direct physical examination of the patient.

By contrast, James Parkinson, in his *Essay on the Shaking Palsy* which had appeared only 2 years earlier, in 1817, relied exclusively on inspection. Parkinson did not examine his patients. His monograph contained an accurate and detailed account of the appearance of the sufferer of this malady, of his stance, gait and tremor. But it said nothing about the mask like face and muscular rigidity which, as Walshe points out, "we now recognize to be constant and characteristic features of the disease." Parkinson had watched his patients from a distance, as they walked in the streets, sat or stood about; but "he had never laid his hands upon them." Parkinson's book belonged to the 18th, Laennec's to the 19th Century. Thus, it was Laennec's school in Paris and not Parkinson's in London which revolutionized medicine by setting out to correlate signs of the diseases with the body lesions underlying them, during life by means of clinical studies, after death with the methods which pathology offered.

It was as a result of these developments that disease entities were described for the first time in modern terms, that illnesses such as diphtheria, typhoid, general paralysis and pulmonary tuberculosis were defined. A new idea was conquering medicine. Laennec introduced into hospital wards and laboratories a new kind of inquisitiveness which was bound to lead to knowledge far beyond description and classification of nosological entities.

Two generations were to pass before the next categorical advancement of medicine took place. One after the other, the agents responsible for the production of the specific diseases were discovered. And with the discovery of these agents therapeutic weapons became available through which they could be controlled. It was this phase of progressive mastery over human illness which characterized the evolution of medicine during the first half of the 20th Century. Laboratory research and experimental studies yielded a rich harvest—though at a price: The art of clinical observation declined. Today it stands at a level lower than it was during the last quarter of the 19th Century. Walshe writes:

The average case notes of today have become almost verbless and are often little more than an index of conventionally chosen sets of physical signs sought for in every case. How rarely is the eye, as it traverses those deserts of nouns and of plus and minus signs, refreshed by some flash of originality of observation or of presentation.

DE
L'AUSCULTATION
MEDIATE

OU

TRAITÉ DU DIAGNOSTIC DES MALADIES
DES POUMONS ET DU COEUR,
FONDÉ PRINCIPALEMENT SUR CE NOUVEAU
MOYEN D'EXPLORATION.

PAR R. T. H. LAENNEC,

D. M. P., Médecin de l'Hôpital Necker, Médecin honoraire
des Dispensaires, Membre de la Société de la Faculté de
Médecine de Paris et de plusieurs autres sociétés nationales
et étrangères.

Μίγα δὲ μέρος ἡγεῖσθαι τῆς τέχνης εἶναι
τὸ δύνασθαι σκοπεῖν.

Pouvoir explorer est, à mon avis, une
grande partie de l'art. Hipp., Epid. III.

TOME PREMIER.

A PARIS,

CHEZ J.-A. BROSSON et J.-S. CHAUDE, Libraires
rue Pierre-Sarrazin, n° 9.

1819.

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AN
ESSAY
ON THE
SHAKING PALSY.

BY
JAMES PARKINSON,
MEMBER OF THE ROYAL COLLEGE OF SURGEONS.

LONDON:
PRINTED BY WHITTINGHAM AND ROWLAND,
Goswell Street,
FOR SHERWOOD, NEELY, AND JONES,
PATERNOSTER ROW.

1817.

L

James Parkinson's *Essay on the Shaking Palsy*, published in England in 1817, and René Theophile Hyacinthe Laennec's book *De l'Auscultation* which appeared in 1819 in France belong, as it were, to different epochs of medical history. In his studies on what is now referred to as paralysis agitans, Parkinson relied exclusively on inspection. He did not examine his patients. But Laennec together with the discovery of the stethoscope introduced a new principle into medical practice, namely that of the physical examination of the patient. Not that Parkinson's research, limited as it now appears in the light of the methodological advancements which followed Laennec's contribution, was devoid of imaginative genius. In fact, some of his empirical observations have only recently been rediscovered, e.g., the unilateral disappearance following a stroke of the "shaking palsy" on the side opposite the cerebral lesion—it now serves as a basis for the understanding of certain forms of neuro-surgical treatment of Parkinsonism such as Cooper's efforts to ligate the arteria chorioidea. But in so far as Laennec observed as well as examined while Parkinson only observed, the latter was a 18th Century physician. By contrast Laennec is modern, he originated the diagnostic approach of contemporary medicine.

A reaction was bound to come. And when it came it was, in part at least, canalized into the growth of physical medicine and rehabilitation. There are, I think, three reasons for this development. First, in its very nature, modern medical research is impersonal. The patient as a person disappears behind the imposing array of techniques and procedures directed towards the diagnosis and treatment of "his disease." Secondly, it has become apparent that the elimination of the causes of diseases does not as such lead to the realization of the individual's expectations and of society's demands; namely to the restitution of the patient's fitness for life and of his fitness for work. Today, in spite of the remarkable successes achieved with the analytical approach to clinical research we no longer look upon diseases as entities "in rebus naturae," as patterns to be diagnosed "in the patient" and—at best—"treated and cured." Once more we look upon the ill individual so as he was looked upon more than a century ago: as a person who suffers and whose capacity to live a normal life is disturbed. We acknowledge that our diagnostic and therapeutic clinical efforts must be supplemented by physiological methods to restore the patient's fitness. This is the third reason for the growth of rehabilitation.

So far it was primarily the increasing interest in the economic value of fitness in a highly industrialized society, the new appreciation of "the monetary value of man's working capacity" which caused rehabilitation to advance so rapidly during the past 15 years; which led to the introduction of legislation such as the Vocational Rehabilitation and Hill Burton Amendment Acts of 1954; and to the establishment throughout the country of Rehabilitation Centers. But we must not close our eyes to the fact that rehabilitation so far has relied mainly on empirical data and that it is just beginning to develop into a scientific discipline of medicine. The formulation of original physiological and clinical theories of the kind that are today guiding internal medicine, surgery and neurology has lagged behind in rehabilitation.

The vast field of observation from which medical rehabilitation will have to synthesize its concepts and methods is the clinical physiology of exercise. It is significant that no book exists in this country that deals with the subject under reference. Physiotherapy, orthopedic surgery, industrial and social medicine and other specialties which have contributed so much to rehabilitative practice represent entities of their own. Singly or in combination they are not rehabilitation. In order to stand on its own feet rehabilitation will have to accept the primacy of exercise in the clinical sector which it occupies and with creative imagination and in detail develop its own therapeutic techniques and facilities. It is as well to point out that this aim has not yet been achieved and that the rich resources of physical education and athletics from which a great deal can be learned have so far been insufficiently utilized.

There is of course the coordinative role which rehabilitation must play in that it has to use medical, social, psychological, vocational and other techniques that had been available for a long time. This role is played well, in fact at times too well and the question has recently been asked whether rehabilitation is perhaps in danger of becoming top heavy with paper work, team discussions and other dialectical procedures while the treatment of the patient is left to the judgment of technical aids. The majority of physicians are still unaware of the difference between physiotherapy and rehabilitation. An important public relations job remains to be done within the medical profession.

The use of exercise in clinical practice is the most neglected sector of medical therapy. Medical schools and schools of physiotherapy have been all too complacent in this respect. A change of the present situation will come through the efforts of those few doctors who know physiology and medicine, who possess personal experience in gymnastics and athletics, who without prejudice and without concern for vested interests apply the resources of physical education and of physical and corrective therapy, and who have knowledge of the crafts and of the world of art. There are of course not many who comply with these prerequisites. But then, the author finds himself in agreement with Sir Francis Walshe's view *viz.*

. . . [that] it has always been select minorities that have provided the ideas and the drive from which new and specialized knowledge in every field has come. It is in the very essence of things that this should be so, for Providence in its inscrutable wisdom has not ordained that Nature should be organized on democratic principles by which every man is born equally endowed.

E.J.

Lexington, Kentucky

Acknowledgments

MUCH of the physiological material contained in this book was discussed with Sir Charles Sherrington in Eastbourne, England during the last 2 years of his life. To him I owe a great debt. Lord Adrian's advice and his monograph *The Sensory Background of Perception* were invaluable to me in the preparation of the chapters concerned with clinical neurology and neurophysiology. The late Professor Henry Sigerist was the first to draw my attention to the paper on "Adaptation in Pathological Processes" by William Henry Welch. Professor Boring allowed me to quote from his text, *Sensation and Perception in the History of Experimental Psychology*. Sir Henry Dale and Professor Otto Loewi helped to clarify certain aspects of autonomic adjustment to exercise as discussed in Chapter IV. Through the courtesy of Professor Otto Warburg, Berlin, I am in a position to reproduce the painting of Paul Ehrlich by Eugen Spiro which has been hanging in his study for more than four decades. Dr. Comroe's concepts of dyspnea and many of Dr. Isaac Starr and Dr. Sidney Arbeit's ideas on ballistocardiography have proved to be of importance in the preparation of this monograph. I was fortunate in being able to consult Professor H. W. Knipping of Cologne on the relationship of cardiovascular and respiratory changes during exercise and training and Dr. Erwin Straus in Lexington, Kentucky, on "The Human Element in Human Movements", to use a phrase coined by Dr. F. J. J. Buytendijk of Utrecht, Holland.

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E. J.

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**THE CLINICAL PHYSIOLOGY
OF PHYSICAL FITNESS
AND REHABILITATION**



JULIUS COHNHEIM

Julius Cohnheim was born in Demmin in Pommerania (Germany) on July 20, 1839.

He studied medicine in Würzburg, Marburg, Greifswald and Berlin. He obtained the M.D. degree for a thesis "De pyrogenesi in tunicis serosis" (published in *Virchows Archiv*, Volume XXII under the title "Über die Entzündung seröser Häute."). At the Berlin Institute for Pathology he first worked under Kuchne on bio-chemical problems, viz., on glycolytic ferments, reporting his results in a paper on "Zur Kenntnis der zuckerbildenden Fermente," *Virchows Archiv*, Volume XXVIII. Soon, however, he devoted all his attention to histology. A study "Über die Endigung der Muskelnerven" (On nerve endings in muscles) appeared in *Virchows Archiv*, Volume XXXIV and in the *Centralblatt der medizinischen Wissenschaften*, 1866, in which he described what was subsequently called the "Cohnheimschen Muskelfelder." He introduced the method of freezing and immediate section of fresh tissues. His publication "Über den feineren Bau der quergestreiften Muskelfaser" (Structural details of the striated muscle fiber) in *Virchows Archiv*, Volume XXXIV has become a classic. In 1867, Cohnheim wrote his famous paper "Über die Endigung der sensiblen Nerven in Hornhaut" (Sensory nerve endings in the cornea), *Virchows Archiv* Volume XXXVII, in which he reported his discovery of gold impregnation of nervous tissues.

Cohnheim died in Leipzig in 1884 at the age of 45. With him medicine lost the greatest intellect that has ever entered the field of pathology. He shattered the time honored erroneous belief that nature is in possession of unfailing healing powers against diseases and that therefore the physician must confine himself to strengthening the methods which nature uses to counteract disease processes. By describing the great variety and the frequent uselessness of adaptations in pathological processes, Cohnheim raised the revolutionary issue of introducing non-natural, artificial means of treatment. It was on the basis of this brilliant trend of thought that the imaginative mind of Paul Ehrlich came to experiment with chemicals and dyes and all sorts of synthetic "non-natural" substances from which our present science of chemo- and antibiotic therapy originated.

Cohnheim was the genius who disentangled the complex interplay of pathological and physiological processes with which clinical medicine is confronted, as William Henry Welch explained to the medical profession in America when he returned from his graduate studies in Germany towards the end of the last century.