

A TEXT BOOK
OF X-RAY
DIAGNOSIS

EDITED BY

S. C. HOMES

P. HILLERY

VOLUME
FOUR

HOMES, JOHN C. HOMES

SURGEON GENERAL

THE

WILEY



A TEXT-BOOK OF X-RAY DIAGNOSIS

BY BRITISH AUTHORS

IN FOUR VOLUMES

THIRD EDITION

Edited by

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PREFACE TO THE THIRD EDITION

THE SCIENCE OF RADIOLOGY has made enormous advances since the last edition in 1950. These advances are partly due to new techniques and improved equipment but largely due to closer collaboration between colleagues in all branches of medicine. Radiology is now a clinical science in its own right. The tempo of new radiological observations and techniques is so rapid that a work on only an encyclopædic scale could cover it. It is not our intention, however, to cover every nuance and refinement of diagnostic radiology. These volumes were conceived as a text-book, to describe fundamental principles in interpretation and relate them to the day-to-day clinical problems of the average X-ray department. This necessitates the exclusion of some rare and much theoretical material, but we hope that nothing of major significance has been omitted and that this edition, like its predecessors, will reflect the best current practice of radiology.

The Editors deeply regret the death of Sir Hugh Cairns, one of our contributors in neurology in the last Edition. We welcome as new contributors Mr. D. W. C. Northfield, Dr. C. J. Hodson, Dr. David Sutton, Dr. John D. Dow and Dr. P. G. Keates.

We are grateful to the block makers and printers and in particular to Mr. F. Boothby and Mr. J. Goodhall in the publishing house of H. K. Lewis and Co. Ltd., whose continuous interest and co-operation have contributed so much to the success of this text-book.

THE EDITORS

June 1957

PREFACE TO THE FIRST EDITION

THE OBJECT of the Editors in presenting this text-book is to provide within reasonable limits a comprehensive survey of the present position of X-ray diagnosis. Diagnostic radiology is becoming an increasingly complex specialty, and it is difficult for one person to be equally expert in all its branches. The editors are fortunate therefore in having the help of collaborators, both radiological and clinical, who are distinguished in particular branches of the subject. It is hoped that this has made the work the more authoritative, and that it will be of value not only to the post-graduate student of radiology, but also to the clinician. In conformity with this design only essential details of technique are included, and the subject of X-ray physics is not dealt with.

For convenience of reference, the work is published in three volumes, each containing as far as possible subjects of allied interest. Thus Vol. I deals mainly with the thorax, Vol. II with the abdomen, and Vol. III with the skeletal and nervous systems.

It is not possible, even within the generous limits allowed by the publishers, to illustrate every condition demonstrable by radiology, but the illustrations chosen are, it is hoped, representative, and give due emphasis to the common lesions met with in radiological practice. Considerable interchange of material for illustrations has taken place between the various contributors to the book and the Editors are greatly indebted for the loan of illustrations from other colleagues, detailed acknowledgments of which will be found at the beginning of each volume. They are also grateful to Mr. Boutall, of Messrs. Vaus & Crampton, for the care and attention he has given to the preparation of the blocks, and to Messrs. Hazell Watson & Viney for their careful work with the printing.

Finally, the Editors desire to express their sincere thanks to the publishers, and in particular Mr. H. L. Jackson and Mr. F. Boothby, for their co-operation and advice, without which this book could not have come into being.

October 1939

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Many films in this edition have been contributed by our colleagues at the Royal National Orthopædic Hospital : DR. E. H. ALLEN, DR. R. O. MURRAY and DR. W. B. YOUNG.

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VOL. IV

THE BONES AND JOINTS AND SOFT TISSUES. S. L. BAKER, Ph.D., M.Sc., M.R.C.S., L.R.C.P., D.P.H.; F. CAMPBELL GOLDING, M.B., Ch.M., F.R.C.P., F.F.R., D.M.R.E.; E. DUFF GRAY, M.A., M.D., F.F.R., D.M.R.E.; SIR HAROLD GRAHAM-HODGSON; C. J. HODSON, M.B., B.S., F.R.C.P., F.F.R., D.M.R.E.; DONALD HUNTER, C.B.E., M.D., F.R.C.P.; M. H. JUPE; PETER KERLEY; KARL NISSEN, M.D., B.Sc., F.R.C.S.; S. COCHRANE SHANKS; CECIL G. TEALL; E. ROHAN WILLIAMS.

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THE NORMAL BONES AND JOINTS

BY

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A TEXT-BOOK OF X-RAY DIAGNOSIS

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THE NORMAL BONES AND JOINTS

SECTION I

THE NORMAL BONES AND JOINTS OF THE EXTREMITIES

BY

S. COCHRANE SHANKS, *C.B.E.*, M.D., F.R.C.P., F.F.R.

CHAPTER I

NORMAL BONES AND JOINTS

GENERAL

A KNOWLEDGE of the normal radiographic appearances of the bones and joints is essential to accurate radiographic interpretation. Equally important is a knowledge of anatomical variations, and alterations in the radiographic appearance due to variation in the position in which the part is radiographed. Certain standard positions have been generally accepted as being the most suitable in which to demonstrate the various bones and joints, and these will be indicated in their appropriate sections. For routine work it is important that a set of standard positions be adopted. Laxity in this leads to doubt in interpretation, and in some cases, such as that of the elbow joint, to appearances so misleading as to provoke misdiagnosis.

There are certain further elementary rules in routine examination of bones and joints which require emphasis.

(1) At least two views of the part under examination should always be obtained if possible. These should be at right angles to each other. Further views are frequently necessary. Failure to observe this rule gives rise to serious risk of missing, say, a fissure or fracture without displacement.

(2) Stereoscopy forms a useful alternative in cases where two right-angled views are not possible and sometimes it is advisable to use stereoscopy in addition to views in two planes, or to take both views stereoscopically.

(3) The bone or joint on the other side should always be examined in addition to the one in question, for comparison.

(4) Fluoroscopy should play no part in the examination of bones or joints, even in the case of setting or manipulating fractures. The surgeon who adopts the practice of setting fractures under fluoroscopic control is likely to have his surgical career cut short by an X-ray dermatitis of his hands.

THE BONES AND JOINTS IN ADULTS

The structure of these should be clearly seen in a radiogram of good quality.

In the Shaft the cortex, the underlying cancellous bone, the medullary canal and the nutrient foramen are visible. The normal periosteum is not.

The cortex presents a uniform opacity with a regular subperiosteal margin (except where muscular and tendinous insertions produce irregularity) and a less-defined but easily visible internal limit where it blends with the underlying cancellous tissue. The cortex is thickest in the middle zone of the shaft, and diminishes evenly in thickness towards the ends of the shaft, where it becomes continuous with the delicate cortex of the ends of the bone.

The cancellous bone forms a comparatively thin layer in the shaft, enclosing the medullary canal. Its mesh-like trabeculation can be seen through the cortical shadow.

The medullary canal is often invisible and, when seen, shows only as a poorly defined zone of increased translucency running along the centre of the shaft.

The nutrient foramen is not always seen, but where visible it appears as a fine canal running through the cortex into the medulla. As it runs inwards it is directed obliquely away from the growing end of the bone. It may simulate a cortical crack.

In the Ends of the Long Bones the cortex diminishes in thickness, when followed from the shaft, to an extremely thin shell of compact bone, covering an expanded mass of cancellous bone. It is thickest under the articular cartilage, at that portion, in other words, where it receives a more localised and so increased stress from the bones with which it articulates. This rather thicker subcartilaginous portion is noteworthy for its smooth regular contour. The extra-articular portions, on the other hand, tend to show mild irregularity of contour at the sites of ligamentous attachment. In this portion of the bone its strength as a weight- and stress-bearing structure depends on its cancellous bone. In place of the delicate, irregular, cancellous bone reticulum seen in the shaft, there is present a specialised regular architecture so arranged as to receive and withstand the stresses to which it is subjected. This structure, particularly marked in the neck of the femur, can be seen in some degree in the ends of any of the weight-bearing long bones.

The Joints.—The articular cartilages are normally undifferentiated from the soft tissues generally in a radiogram, as are the interarticular fibro-cartilages