

Nevertheless, the six contributions form a very appropriate ancillary part of the volume and are certainly directly related to portions of the programme of the International Geophysical Year under active study at the present time. These individual papers are entitled: "The Measurement of Atmospheric Radio Noise", by F. Horner (Radio Research Station, Slough); "Whistlers and Dawn Chorus", by M. G. Morgan (Dartmouth College, Hanover, U.S.A.); "Radio Reflections from Auroræ", by A. C. B. Lovell (Manchester), P. A. Forsyth (Saskatchewan) and L. Harang (Auroral Observatory, Tromsø); "Apparatus for Radio-Echo Meteor Survey", by A. C. B. Lovell; "Ionospheric Forward Scatter", by K. L. Bowles (U.S. National Bureau of Standards); and "Ionospheric Back Scatter", by A. M. Peterson (Stanford University). All these sections form well-illustrated reviews, each with selected references which should prove useful for further study.

The publication of this volume (in two sections) shows that the work of preparation for the International Geophysical Year has successfully stimulated the production of a most useful addition to the scientific literature on the detailed characteristics of the ionosphere and related physical phenomena.

R. L. SMITH-ROSE

ÅNGSTRÖM RADIATION AS PHENOMENON AND AS TOOL

Handbuch der Physik

Herausgegeben von S. Flügge. Band 30: Röntgenstrahlen. Pp. vii+384. Band 32: Strukturfor- schung. Pp. vii+663. (Berlin: Springer-Verlag, 1957.) 88 and 144 D.M., respectively.

THESE books, though edited, printed and published in Germany, are largely written in English. In Vol. 30 only the first chapter, on the production of X-rays, by W. Schaaffs, is in German. The remaining chapters deal with experimental methods of X-ray spectroscopy at ordinary wave-lengths, by A. E. Sandström; experimental methods of soft X-ray spectroscopy and the valence-band spectra of the light elements, by D. H. Tomboulion; X-ray microscopy, by P. Kirkpatrick and H. H. Pattee; and the continuous X-ray spectrum, by S. T. Stephenson. Vol. 32 contains French contributions also; the chapters are on experimental methods for determining crystal structures by X-rays (in French) by A. Guinier and G. von Eller; on the theoretical principles of structural research by X-rays, by J. Bouman; on the study of the structure of liquids and amorphous substances by means of the diffusion of X-rays (also in French), by G. Fournet; on size of particles and lattice defects, by W. W. Beeman, P. Kaesberg, J. W. Anderegg and M. B. Webb; on electron diffraction (in German), by H. Raether; and lastly on neutron diffraction and interference, by G. R. Ringo. It is the last two chapters that necessitate 'Ångström radiation' instead of 'X-radiation' in the title of this review.

The names of the authors guarantee the quality and accuracy of the various chapters. Vol. 30 contains references up to 1956, but much of it has a curiously old-fashioned ring, as if it could have been written in the thirties without much difference. (The chapters on soft X-ray spectra and X-ray microscopy are clear exceptions.) In the field of emission spectra of medium wave-lengths, however, there are

signs of a revival of interest. Sandström, in summing up the experimental results, states "These two effects [asymmetry and overlapping] raise the question of the definition of the wave-length of a line with a finite width. Usually the wave-length of the peak intensity is preferred as it is the one detail most easily identified. However, the centre of gravity of the area below the intensity distribution curve could also be chosen. . . . No X-ray wave-lengths have been determined with an accuracy better than ± 0.002 XU, which value has to be considered the ultimate limit of accuracy, systematic errors excluded. Some narrow lines in the region of medium wave-lengths excepted, the absolute value of the error certainly exceeds ± 0.004 XU. Considering the systematic errors, as well, errors 10 times as big are to be expected". The differences between peak and centre-of-gravity wave-lengths, and systematic errors of 4×10^{-5} Å., are big enough to be disturbing in the type of counter diffractometry now being developed, and it is to be hoped that the needs of crystallographers will stimulate the spectroscopists, who are presumably better equipped for the undertaking, to push the systematic error into the next decimal place, and to produce reliable line profiles extending several half-widths on both sides of the peak.

I am a crystallographer, and I turned with some relief from the phenomenon to its applications. Guinier and von Eller's description of experimental techniques is characteristically lucid. Bouman manages to give the theory of almost everything from symmetry elements to intensity statistics, not excluding lattice distortion, in 140 pages. Fournet's chapter on amorphous states and that of Beeman *et al.* on small particles and lattice defects carry particular aspects of the theory considerably further, and supplement the experimental techniques on low-angle scattering. The chapters on diffraction of material particles contain much to fascinate the conventional X-ray worker.

The German and the English sections are indexed in both German and English in the two volumes. The French sections in Vol. 32, however, are indexed only in French, a fact that does not seem to be stated clearly anywhere, and was discovered empirically. There are copious references to the original papers by means of footnotes, and each chapter ends with a general bibliography. The bibliographical coverage seems very thorough; only two papers which I sought were not found mentioned in the expected places. There are no author indexes, so it could not be checked whether they appeared elsewhere. Altogether, these two volumes will be indispensable for the spectroscopist and the crystallographer, and each will learn much from the volume intended for the other.

A. J. C. WILSON

RADIATION PHYSICS IN MEDICINE

Radiological Physics

By M. E. J. Young. Pp. x+365. (London: H. K. Lewis and Co., Ltd., 1957.) 42s. net.

MEDICAL practitioners specializing in radio-diagnosis or radiotherapy require an understanding of certain aspects of radiation physics of a relatively advanced nature. There are few suitable text-books on the subject for doctors preparing for their professional examinations, and thus a new