cautious in expressing personal views, a circumstance, by the way, that medical students will find unusual but which ought to do them a lot of good. Teachers will also probably find the anatomical parts explained with greater lucidity than the more recondite problems of visual physiology where, as is inevitable in as catholic an approach as Davson has succeeded in following, a few inconsistencies have crept in. Examiners, though the smallest but perhaps the most important group of people who may turn to this book, will be in a quandary. If they are omniscient—and they would scarcely be examiners if they were not—they will realize that this book contains heresies, and that in some respects it is already out of date. Are they going to mark a student's performance on his ability to provide answers to the questions they have set or on his ability to reproduce the gospel according to this book? They will allow their judgment to be governed by the book in matters which are well established or beyond dispute, but would be wise to tolerate an unexpected answer on the student's part if this appears reasonable.

R. A. Weale

PORPHYRIN DISORDERS

Diseases of Porphyrin Metabolism

By A. Goldberg and Prof. C. Rimington. (A Monograph in the Bannerstone Division of American Lectures in Living Chemistry.) Pp. xvi+231. (Springfield, Ill.: Charles C. Thomas, 1962.) 9.75 dollars.

DISCOVERIES in pure science usually precede their developments in applied science, and it is refreshing to encounter a topic in which both forms of science have in turn contributed equally to knowledge. This is especially true of the development of our understanding of porphyrin metabolism. Towards the end of the nineteenth century and the beginning of this, Garrod and other clinicians in Britain and in Germany observed red pigments in the urine and fæces of patients with certain diseases. The first scientific advances were made by Fischer and his colleagues, who investigated the chemistry of these porphyrin pigments and established their chemical structures and synthesized them. In 1935 Waldenstrom, a clinician, demonstrated the presence of porphobilinogen (PBG), a colourless precursor of porphyrins, in the urine of subjects with acute intermittent porphyria. This condition was thus clearly distinguished from congenital or photosensitive porphyria in which large amounts of preformed porphyrins were excreted. In 1946, Shemin and Rittenberg showed that, in the rat and in normal man, glycine was specifically incorporated into the protoporphyrin of the circulating hæmoglobin. Subsequent work by British and American groups showed that the uroporphyrin and coproporphyrin of Series I excreted by patients with congenital porphyria were synthesized from the same precursor as the protoporphyrin of the circulating hæm, even though this pigment belonged to Series III. Acetate was then found to be incorporated into hæm, and the brilliant work of Shemin involving the chemical degradation of the labelled protoporphyrin isolated from hæmoglobin after feeding ^{14}C- and ^{15}N-labelled glycine and ^{14}C-acetic acid showed the origins of all the atoms of this compound. This worker suggested that the protoporphyrin was synthesized by way of a monopyrrolic precursor formed by condensation of two molecules of an asymmetric four-carbon compound derived from glycine and acetic acid. Four molecules of the monopyrrole condensed to yield uroporphyrinogen from which coproporphyrinogen and protoporphyrin were afterwards formed. The monopyrrolic precursor was thought to be porphobilinogen and its isolation by Westall was a triumph for a clinical chemical department; progress then had to await the establishment of its structure by Cookson and Rimington and its synthesis by Jackson and Macdonald. This was soon followed by the demonstration of the enzymatic synthesis of porphobilinogen from succinyl coenzyme A and glycine via δ-aminolaevulic acid (ALA). Since then there have been many investigations on the mechanism of specific formation under physiological conditions of Series III porphyrins.

The disturbances of this biosynthetic pathway responsible for the various clinical disorders of porphyrin metabolism are now subjects of intensive study in a number of laboratories throughout the world. Although many details remain to be filled in, our knowledge has progressed considerably and has supported Garrod's concept that these inborn errors of metabolism were due to enzymatic deficiencies. The precise abnormality leading to the excessive excretion of ALA and PBG in acute porphyria, however, remains to be elucidated.

The time is ripe for a comprehensive review of our knowledge of the porphyrins and of the diseases associated with disturbances of their metabolism and we are fortunate in having this book, the senior author of which has contributed so much to this subject since he first recognized the importance of porphyrins at a time when they were little more than biochemical curiosities. Dr. Goldberg has made important contributions both to the clinical aspects of the disease and to the mechanisms of production of the experimental porphyrias. The first chapter concerns general aspects of the porphyrias, their classification and geographic distribution, and the second discusses the chemistry and biosynthesis of the pigments themselves and their distribution in the body. There follow successive chapters on congenital (erythropoietic) porphyria, acute intermittent porphyria and the various forms of cutaneous porphyria. Each is described from both the clinical and the chemical points of view. Subsequent chapters concern diseases of porphyrin metabolism other than the porphyrias, the incidence of porphyria in animals, and include an account of the various forms of experimental porphyria. It is a pity that the recent discovery of griseofulvin-induced porphyria was made too late to be included.

Nevertheless, it is difficult to praise this monograph too highly; the format and style are well up to the standard set by the series. In particular, the photographs of patients and the microphotographs of tissues, coloured when demonstrating the presence of fluorescent porphyrins, are excellent and the list of references is up to date to 1961. It is unlikely that this book will be read by all clinicians, all pathologists or all biochemists; it will be of very great interest to clinicians who have actually encountered patients with disorders of porphyrin metabolism, especially neurologists who have seen the devastating sequelæ the disease can leave in the nervous system, and dermatologists who will learn of the various forms of porphyria which can cause photosensitivity. To the pathologist the subject illustrates beautifully the way science and medicine have developed to mutual advantage, while for the biochemist the book reveals many remaining problems especially in determining the details of abnormalities in enzymatic syntheses responsible for these interesting diseases.

C. H. Gray

RARE EARTH AND ACTINIDE SPECTRA

Operator Techniques in Atomic Spectroscopy

By Prof. Brian R. Judd. (McGraw-Hill Advanced Physics Monograph Series.) Pp. ix+242. (London and New York: McGraw-Hill Book Company, Inc., 1963.) 77*s*.

IT was round about 1948 that the electron spin resonance group at Oxford began to investigate rare earth salts, and thereby created for themselves an urgent need to