interior. This last region was, however, largely a blank on the maps in the mythical library of "Thomas P. Keystone, Esq." and is not discussed in this book.

This fascinating story is illustrated by a number of contemporary maps, plans and views, and Prof. Brown has added a select bibliography and many useful notes. The book is issued by the American Geographical Society and more than maintains the high standard of its publications.

J. N. L. BAKER.

PRACTICAL PHYSICAL CHEMISTRY

Physico-Chemical Methods

By Prof. Joseph Reilly and Prof. William Norman Rae. Fourth edition, revised. Vol. 1. Pp. ix+610. Vol. 2. Pp. vii+586. (London: Methuen and Co., Ltd., 1943.) 2 vols., 84*s*. net.

THE fact that another edition of "Reilly and Rae" has been called for after a lapse of only three years —abnormal years from the academic point of view—is adequate testimony to the usefulness of this comprehensive work on practical physical chemistry. A complete revision would have been impossible, but the authors have managed to prune out a good deal of material more suited to an introductory text than to an advanced treatise. Simultaneously they have introduced new matter by adding the necessary pages under a decimal system of pagination; the original pagination thereby being preserved. It is to be hoped that this war-time measure will disappear when conditions permit. The whole work tends to grow, for another volume is promised, dealing particularly with gas analysis, microanalysis and related topics.

Space prevents mention of all the additional matter, but the authors have lost no opportunity of introducing methods of recent origin; for example, in volume 1 Emmett's method for the determination of the specific surface of sub-microscopic particles, high-speed stirring equipment, data on the properties of laboratory glasses, the latest apparatus for hydrogenation and new photographic techniques and sensitive materials. Previous gaps have been filled by the inclusion of new sections on the graphical representation of three-component systems, thermocouples and thermopiles, and on the determination of the specific heats of liquids. Similarly, in volume 2 there are innumerable additions. Gas analysis is an ever-expanding technique, while distillation naturally assumes an important place with appropriate additions to an already complete chapter. There is an especially interesting and valuable section on microdiffusion in liquid systems. Brief mention is made of the technique of growing large crystals and of some of the applications. A few pages are devoted to the air-driven ultracentrifuge, but the oil-driven type is only mentioned in passing. Although some small additions are made to the chapter on adsorption, the necessary expanded treatment is reserved for the third volume. A similar arrangement is made for the electron microscope. The glass electrode and the measurement of the dielectric properties of solids both come in for some revision. There is only a small point of criticism. A few of the diagrams could be better drawn in order to be worthy of the work as a whole.

In a comprehensive book of this character, it is presumed that every topic having a bearing on physical chemistry must be described. To follow such a presumption leads to difficulties, for in some directions the techniques have become so highly specialized as to be unsuitable for inclusion in this kind of manual. They require to be treated by a specialist in a separate monograph; for example, the ultracentrifuge, electron microscope, infra-red spectroscopy, X-ray crystal analysis and radioactive technique come into this category. While the omission of these topics might leave the impression of incompleteness, no physical chemist would reasonably object, since standard works on these subjects exist. The real function of the volumes under review is to bring together all the multiplicity of techniques, methods and appliances used in modern physical chemistry, but often unknown to, or undiscovered by, those practising the subject. "Reilly and Rae" already fulfils this function, and it is hoped will continue to do so in an even greater measure with the promised appearance of a third volume to complete the work.

H. W. MELVILLE.

THE EXTRUSION OF METALS

The Extrusion of Metals

By Claude E. Pearson. Pp. viii+205+37 plates. (London: Chapman and Hall, Ltd., 1944.) 18*s*. net.

IT is not a little surprising that an important industrial process, well over a hundred years old, should have had to wait until now for an author. Particularly is this the case where the process is one which has shown such marked advances as has extrusion during the past twenty or thirty years. Starting as a means of forming lead pipes, it is now a method of working metals which is of first-rate importance, and its potentialities, so far from being exhausted, may result in its serious incursion in the comparatively near future from the realm of non-ferrous metallurgy into that of the steels.

In this little volume the author gives a general survey of the whole field, theoretical as well as practical. The treatment is well balanced, and the information, collected from many sources, is clearly and impartially discussed. It is, however, more or less of an introduction to the study of extrusion, and to those already familiar with the process and the materials to which it is applicable, there will not be much which is unknown.

How much now remains to be investigated is shown by the wide gaps which still exist in our knowledge of the nature of the flow of the metal and the stresses required to effect it. The shape and contour of the die, for example, a matter to which the wire-drawer has for long devoted most careful consideration, receives only the most general treatment, although it must have a profound influence upon the ease with which the process is carried out. In this connexion, too, it may be pointed out that equation (8) on p. 125, in which the die angle is introduced, is similar to one proposed for wire-drawing, where its predictions are by no means entirely in accord with experimental results.

As a general introduction to its subject, this book is good; in its implications of the large field of work still demanding attention, it will be of real service to the research worker, but one puts it down with the impression that a process of such immediate importance and with such immense possibilities of expansion deserves a more comprehensive and detailed treatment than it has yet received.

F. C. THOMPSON.