

denying ordinance, of avoiding the use of formation or fossil names in the chapters dealing with individual systems. In the case of rocks, the effect is that of rather deadening repetition; one reads, for example, "The nonmarine stratified rocks include coarse to fine conglomerates, abundant sandstones, sandy to clayey shales, and red beds". In the case of fossils, the avoidance of generic names in the text leads to clumsy paraphrases, "The microscopic shells of foraminifers of a type provided with calcareous globular chambers are characteristic of Cretaceous marine deposits throughout the world", or inaccurate statements, "The most important guide fossils among plants are various sorts of ferns, and among invertebrates the leading guides are the protozoans called 'fusulines', shaped like large wheat grains" (Guide Fossils of the Pennsylvanian, p. 199).

The German work, by Prof. R. Brinkmann, is detailed and precise. Obviously intended for more advanced students, it is a whole world apart in its teaching method. An introductory chapter on the measurement of geological time is followed by sections on each system, and the work concludes with chapters on the development of life and the course and flow of earth history. The European sequence is given as typical, and an attempt is made to indicate the principal successions in the other countries of the world. (An unwelcome survival is the union of Ordovician and Silurian into one system.) Sections on the flora and fauna, the climate, floral and faunal provinces, the chief movements of land and sea, and periods of volcanic and intrusive activity are included where possible. A valuable feature is a series of correlation tables, giving thicknesses of individual formations within each system. The author mentions in the preface that he has avoided the use of specific names; he is certainly not sparing in his use of generic ones. For example, in the Permian are cited *Pseudoschwagerina*, *Parafusulina*, *Neoschwagerina*, *Sumatrina* and *Polydiexodina* among the Fusulinids, in the Jurassic *Pachyteichisma*, *Tremadictyon*, *Craticularia*, *Cnemidastrium*, *Hyalotragos*, *Stellispongia* and *Peronidella* among the sponges. Indeed, considered from the student's point of view, with the emphasis on passing an examination, this book, slim though it may seem, contains an appalling amount of information. The sheer memory work needed to assimilate and reproduce this would be very great, and, as experience shows, once used, most of the detail would very soon vanish from the mind.

Clearly the American book represents a reaction from this type of detailed teaching. Enough has already been said to indicate the dangers of simplification. Perusal and comparison of these two books, indeed, causes one to wonder whether the days of teaching world stratigraphy or detailed historical geology have not come to an end. In no case can a local succession be taught in detail sufficient to cover a stay of a week in an area. Is the abridged account worth learning? To the reviewer it appears that after a brief generalized account of the stratigraphic succession, the subject is best taught by examples carefully chosen to illustrate principles, with a minimum of lectures, but a maximum of references, rigidly confined to the given topic, and by discussion periods after these have been read. The Cambrian, Ordovician and Silurian of Britain could be taught as a unit to illustrate variation of sedimentation in a geosynclinal sea, and the results illumined by the recent work on the East Indian region at the present day. The Devonian of

Europe and eastern North America as an example of the interfingering of marine and terrestrial deposits, the Carboniferous Limestone as showing facies variations in a relatively clear sea, the Permian-Carboniferous of the southern hemisphere as an approach to the Gondwanaland problem, the Jurassic as showing the use of zones and perhaps also as an example of deposition in an epicontinental sea, are cases that spring to mind. If the principles are rightly known, the student will be able to understand and interpret the local rock succession wherever he may go. The memorization of detailed successions, of use in only one spot, takes up time that could be better spent.

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MICROCHEMICAL ANALYSIS

Methods of Quantitative Micro-Analysis

Collected and edited by M. F. Milton and Dr. W. A. Waters. Pp. viii+599. (London: Edward Arnold and Co., 1949.) 60s net.

THIS book is the outcome of a survey of modern micro-analytical techniques by a group of experienced analysts who, during the War, were members of one of the research organisations of the Ministry of Supply. It assembles in a single volume of convenient size a wealth of practical detail on micro-chemical procedures, with illustrative examples drawn from published work covering a wide field of analytical chemistry. Although many of the methods were developed for highly specialized use, they are capable of extended application in quantitative analysis and save time, bench space and reagents as compared with older macro-chemical methods.

The book is divided into six parts, separately and jointly indexed. These deal successively with gravimetric apparatus and general micro-chemical techniques, the micro-analysis of organic compounds, volumetric analysis, colorimetric analysis (including nephelometry and fluorimetry) and electro-chemical and gasometric methods of analysis. There is also an appendix giving reference tables and graphs for use with the van Slyke manometric apparatus. Contributors assisting the editors in the preparation of the subject-matter were G. Ingram, J. T. Stock and K. M. Wilson.

The volume is intended for the laboratory worker with a sound general training in chemistry, and theoretical considerations are accordingly brief. General principles, however, are clearly and simply dealt with. The special apparatus recommended, much of which can be made in the laboratory, is described in detail, illustrated by excellent line drawings, and is of reliable pattern. General micro-chemical techniques and special procedures (for example, for organic groups) are carefully described, and the many critically selected examples, notably of colorimetric and volumetric procedures, include useful and reliable methods for the determination of metals, acid radicals and organic compounds, particularly in complex biological material. Supplementary tables of methods in summarized form, with cross-references to the text, are an important feature of the book and give valuable guidance in the choice of a suitable method.

This practical manual will be welcomed by analysts and should promote the more general use of micro-chemical techniques.

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