SCIENTIFIC BOOKS

Introductory Geology, a Text-book for Colleges. By Thomas C. Chamberlin and Rollin D. Salisbury. New York: Henry Holt & Co. 1914. Pp. xi + 708. 5¾ × 8 inches. Price $2.00.

In comparison with this latest product by geologist and printer there stands before the writer a long row of early treatises and texts in geology, American and English, dating from the early part of the last century. The contrast is great, both in matter and illustrations. These old books seem very crude and it is difficult for us to realize the limitations of scientific thought before Lyell showed the uniformity of nature's processes and laid in physical evolution the foundation for biologic evolution. Much space in the older books is used in proof of matters which are now common knowledge of educated people, and the illustrations are ludicrously poor. Even to fifteen years ago publishers tabooed photographic reproductions and regarded hand engraving as the only artistic and proper illustration. Modern photography has brought the far-away geologic and physiographic features to the secluded student, and thus qualified the aphorism that the first, second and third requisites of the geologist are travel.

From 1840 to 1860 the leading text-book in geology was that of Edward Hitchcock, which in 1860 had run to the 30th edition. The civil war distracted attention from scientific studies and for many years the only prominent book in geology was Dana's Manual, on which the older geologists now living were nurtured. Up to about 1900 the works of Dana and LeConte had fair possession of the schools. Chamberlin and Salisbury's geology in three volumes was published in 1905–1906, since which time the new books in geology and physiography "speak volumes" for the popular interest in earth science. Much of this regard may be traced to the popularizing of physiographic geology, led by Davis. The profuse photographic reproduction of natural features has been a stimulant to the magazine readers and encouragement to the authors and printers, while the commercial world has been interested through the economic study of the earth now specially emphasized by the national and state geologic surveys.

The book under review is the latest word (to-day) in general geology and probably the finest example of the bookmaker's art in works of the class. A duodecimo volume of 700 pages is made of practical size by the use of thin, fine-quality paper of medium finish. It was wise to change from the heavy, highly glazed paper used in the three-volume work and to sacrifice a trifle of the quality or clearness of the halftones and the maps, for the gain in other respects. By not wasting space on wide margins a four-inch measure is secured for the excellent letterpress. As in the larger work, the insets carry impressions on both sides. The 10-point type, wide measure, with forty lines to the page, coupled with the condensed style and brief treatment of less important topics, has produced a book of reference value in practical size for students' use. The general arrangement of the matter is in the usual order.

It will be generally conceded that the senior author has preeminence in America in philosophic geology. Consequently the book will be recognized as a very high authority, especially on the philosophic or theoretic side. As should be expected with this authorship there is much original matter, though some of the text and most of the illustrations are derived from the same authors' larger work. The text is in their characteristic terse and rather technical style. They do not attempt the impossible task of making geology simple and easy to the average college student.

No competent teacher will find in this book everything that he wishes nor all that he needs with the proper emphasis for his particular region. The body of geologic knowledge has become so vast that a single volume can do no more than generalize. The physiographic, geologic and climatic characters are so very different in the several provinces of America that no book of practical size and moderate cost can adequately present the special or local features. For example: over great areas of our northern lands the glacial phenomena are

the most obtrusive and available for study; in the Appalachian region and other mountain districts the structural or tectonic features are the more striking; in the Great Basin and over the southwestern plateaus the factor of aridity; in some districts, vulcanism; etc. The stratigraphic and paleontologic differences of the several sections are quite as important. Some one has said that the best conversation goes on in hints, and a text-book for nation-wide use must be merely suggestive on many subjects. The competent college instructor must be capable of making his own text-book for his own district. The tendency of general text-books and treatises will be to omit more and more of the elementary matter as it becomes the common knowledge of educated people, and another class of books will arise for observational and intensive study of particular provinces.

To point out minor omissions, slips or errors is both ungracious and unnecessary, and few are found in this book. One broad criticism will be made of the references to collateral literature and contemporary authors. The book does not make the mistake of loading its pages with a multitude of references. But when they are used at all they should be discriminating, impartial and up-to-date. Although there are abundant references to the publication of the U. S. Geological Survey and to the *Journal of Geology,* there are comparatively few references to other literature, and very few to articles of the last ten years. Yet the geologic literature of the last decade is large and much of it of masterly character, by eminent authorities, superseding for reference value much of the older writings. The geologists of the eastern states may feel that the book has a provincial character.

This book will be welcome to those who wish a geologic philosophy based on a scientific theory of the genesis of the globe. An admirable summary is given of the three hypotheses of earth origin; the Laplacian ("Nebular"), Lockyer's meteoritic and Chamberlin's planetesimal. The manner of the earth's origin is the basal postulate in all geophysical theories and in most geologic philosophy. On very many subjects the views of the geologist and his handling of problems must ultimately be grounded on his conception of the origin of the globe and its satellite. As all geologists up to recent years, and many of the more conservative at the present time, still hold to the discredited hypothesis of an originally incandescent globe, it will be seen that this work, like its three-volume predecessor, runs counter to many long-accepted theories and presents new and novel explanations.

In true scientific spirit and with some deference to conservatism, the authors have been fair in treatment of old theories and modest in presentation of the new views, usually setting the older thought side by side with the new philosophy. A few of the topics which have original treatment, in consequence of the new cosmogeny, are: origin and nature of the deep-seated rocks; origin of the ocean and the atmosphere; origin of the sub-oceanic and continental relief; diastrophism and mountain structure; vulcanism; duration of life; climatic changes; subdivision of Precambrian time. Ore deposits are given a fair presentation under the topic "Groundwaters." The chemic and biologic processes of the ocean are given space instead of long description of the commonplace erosional work.

The historical portion of a text-book is the most difficult to handle. Selection and condensation must be made from a vast body of paleontologic fact and from uncertain or conflicting stratigraphy. And such matter is the most difficult to keep up-to-date and to make satisfactory to the experts. In general, this matter of the book seems judicious and well balanced, but the New York stratigraphy is too old. Under the Silurian the curious mistake of Hall, Emmons and Dana in placing the Oneida conglomerate beneath the Medina, instead of above it, is repeated, although the correction was made years ago in the New York State Museum publications, and in SCIENCE.

The series of paleogeographic maps, depicting the evolution of the continent, are copied with some reduction from the three-volume work.

It would seem desirable that, for comparison, reference should have been made to the extended series of similar maps recently published by Schuchert, and also to the series by Willis; especially as the three sets of maps show very different conceptions of the ancient epicontinental seas.

This book is probably the most comprehensive, original and suggestive of any single volume in geology now printed.

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Technical Mechanics. By Edward R. Maurer, Professor of Mechanics in the University of Wisconsin. Third edition, rewritten. New York, John Wiley and Sons, 1914.

Maurer's "Technical Mechanics," of which the first edition was published in 1903, has a recognized position among useful text-books for students of engineering. The reprints previous to the present or third edition contained few changes; but practically the whole book has now been rewritten. The aim of the author, however, remains unchanged, the words of the original preface describing the book as "a theoretical mechanics for students of engineering" being again used as applying to the present rewritten edition. It has been the author's object to "furnish an adequate course of instruction for students of engineering in one semester, five times per week." The recasting for the present work has involved not only changes in arrangement and form of presentation, but some changes in subject-matter, such as the omission of the chapter on attraction and stress and some amplification of rigid-body dynamics. The scope and order of the work are indicated by the chapter headings: Composition and resolution of forces; forces in equilibrium; simple structures; friction; center of gravity; suspended cables; rectilinear motion; curvilinear motion; translation and rotation; work, energy, power; momentum and impulse; two-dimensional motion; three-dimensional motion; appendices on theory of dimensions of units and moment of inertia of plane areas. Especially worthy of note are the twelve pages in the chapter on momentum and impulse devoted to a lucid explanation of gyroscopic action and its applications to the gyro-compass, the mono-rail car, the gyro-stabilizer for ships, and the self-steering torpedo. A wholly new collection of problems is given, most of which are collected at the end of the book, thus avoiding interruption of continuity of exposition in the text. The illustrations, more than 500 in number, are executed with notable care.

Those who know the original edition need not be told that the author's presentation is, with few if any exceptions, sound, and that a notable quality of his exposition is conciseness without sacrifice of logical accuracy or completeness. Some teachers may perhaps think the virtue of conciseness is at times carried so far as to make the book unduly difficult reading for the beginner. The many teachers who have successfully used previous editions will, however, undoubtedly find the rewritten work even more satisfactory.

In reviewing the first edition[1] of this book, the writer took occasion to discuss certain questions regarding the presentation of fundamental principles of dynamics. At the present time special interest attaches to Professor Maurer's presentation of principles because of his position as chairman of the committee on the teaching of mechanics appointed in 1913 by the S. P. E. E. The appointment of this committee seems to have been due largely to certain rather vigorous criticisms of current methods of presenting fundamental principles, especially the "fundamental equation of dynamics" and the definitions of units of force.

Professor Maurer uses the equation $F = ma$, but his explanation of it makes it seem subsidiary to the equation $F/W = a/g$, or $F = (W/g)a$; the latter equation being explained as a special case of $F/F' = a/a'$, where a, a' are the accelerations due to forces F, F' acting on the same body at different times. In order to pass from the equation $F = (W/g)a$ to the equation $F = ma$ (or $F = Kma$ if units are unrestricted) use is made of the fact that different bodies in the same locality are equally accelerated by gravity. In the view of the

[1] Science, Vol. XXI., p. 302.