

AN AMERICAN TEXT-BOOK OF GEOLOGY. *Geology*. By Thomas C. Chamberlin and Rollin D. Salisbury. Vol. i. Geologic Processes and their Results. Pp. xix+654; with 24 plates and 471 figures in the text. (New York: H. Holt and Co., 1904.)

THE work of which this is the first volume, bearing the names of two well known professors in the University of Chicago, is addressed to the mature student, and is designed "to present an outline of the salient features of geology, as now developed." The present instalment, dealing with the nature and results of the processes now in operation upon the globe, will naturally prepare the way for the second volume, to be devoted to tracing the history of past ages. Agreeing with other writers in approaching the science from this side, the authors have been led by their own experience as teachers to depart somewhat from the beaten track in their general plan of treatment, as well as in the relative importance assigned to certain specific subjects. They tell us in their preface that they have laid little stress on the generally recognised divisions of geology, "dynamical," "structural," "stratigraphical," &c., but have tried rather to emphasise the historical element even in the discussion of special themes, thus bringing out the essential unity of the science. Again, some subjects, such as the development of drainage-systems, the ultimate cause of crust-movements, and others, receive here fuller treatment than has been customary in works of this scope.

Most of the original features of the book we heartily welcome. We think, too, that the authors have generally been happy in their treatment of the more dubious and debatable problems of physical geology. Their design in this has been freely to introduce the theoretical element when necessary, and at the same time "to avoid confusing the interpretations based on hypothesis with the statements of fact and established doctrines." Where important differences of opinion exist, the alternative hypotheses are set forth and their consequences compared. In some instances this candour is pushed rather far, as when the cause of vulcanism is discussed on seven distinct hypotheses. Having regard to the class of students for whom the book is primarily intended, we think that the authors have needlessly hampered themselves by trying to make it intelligible to one who has had no previous acquaintance with the rudiments of geology. How far they have succeeded in this it is not easy to judge. Thus the technical terms of the field-geologist, "dip," "anticline," "dyke" and the like, are not formally defined until we reach a late section of the volume, but the conceptions implied have necessarily been introduced much earlier. Such difficulties inevitably confront the writer of an elementary class-book, but they might safely be ignored in a work like the present.

After a preliminary outline of the general scope of geology, the authors proceed to discuss in turn the geological effects of the atmosphere, of running water,

of underground water, of snow and ice and of the ocean. Their clear exposition of the mechanism of rain- and river-erosion, with due regard to the controlling conditions, is an admirable summary of a fundamental part of geology which in most of our text-books receives very inadequate treatment. It is written on modern lines, the fertile conception of the "base-level of erosion," with its important consequences, being introduced at an early stage. The subject is one which American geologists, with their unrivalled opportunities, have made peculiarly their own, and it could scarcely have fallen into better hands. The other geological agents are discussed in the same comprehensive but concise manner, and the chapter dealing with glacial action is, as might be expected from the authors, of special interest.

The chapter on movements and deformations of the earth's body contains much material which is not elsewhere accessible to the student in a connected shape, and some originality appears in matter as well as in treatment. Consideration of the possible causes of the great crust-movements leads to an inquiry into the original and present distributions of temperature in the globe, and to a comparison of the nebular hypothesis with that of "accretion." The comparison is presented in a judicial manner, and the enunciation of the accretion hypothesis is tantalisingly brief; but a fuller discussion is promised in the second volume. Geologists sometimes need to be reminded that cosmogony is a legitimate part of their province, not to be surrendered without good reason shown. At least it is well that students should see just how much of accepted physical principles and how much of arbitrary assumptions go to the building of dogmas which have carried alarm into some quarters.

The treatment accorded to igneous action seems to us in some respects unsatisfactory. Descriptive petrography is, no doubt wisely, represented by a brief summary, an appendix to a generalised account of "the origin and descent of rocks." But what follows seems to lack due proportion. "Vulcanism" is used to include intrusive as well as extrusive action, but the chapter is occupied almost exclusively with the latter. The plutonic and other igneous intrusions, the varied forms which they assume, and their intimate relation to crust-movements and to geological history in general, are dismissed almost without notice. The full and admirable discussion of volcanoes might thus give a student the impression that these superficial phenomena are the only important effects of igneous activity.

The volume concludes with a chapter on the geologic functions of life, and a good index is added. The book is issued in handsome form; but the highly glazed paper, presumably adopted for the sake of the figures, is irritating to the reader. The abundant figures, selected from various sources, are well chosen to illustrate the text, and well reproduced. The subjects are for the most part American. A useful feature is the illustration of various types of topography by actual maps, taken from the beautifully contoured sheets of the United States Geological Survey. A. H.