

very rocks forced him to the opinion that propylite has no right whatever to be regarded as an independent rock-type, but is always an alteration product of diabase, diorite, or andesite, by the change of the bisilicates to uralite or chlorite.

In chapter iv. the author discusses theoretically the structural results of faulting. He regards the schistose structure, so often observed in the andesite, as the result of faulting under intense lateral pressure, and shows that such sheets would naturally tend to arrange themselves in a logarithmic curve, as seems to be the case at the Comstock.

The chapter on chemistry is not very satisfactory. But few new rock analyses are offered, and none are ably discussed in connection with the microscopic diagnosis. The finding of very small quantities of ore in the accompanying rocks, especially the diabase, would seem to suggest just the reverse course of reasoning from that adopted; and certainly none of the facts presented appear to warrant the supplanting of von Richthofen's theory, that the ores came from great depths, by one ascribing their deposit to segregation produced by ordinary solvents (hydrogen sulphide and carbon dioxide) from the rocks at the side of the lode.

The discussion of the heat-phenomena of the lode receives especial attention in chapter vii. The rapid increase of temperature is well known to be one of the great hinderances in working the mines, being nearly double the average observed elsewhere. This has been accounted for by some by chemical action: as, for instance, the oxidation of pyrite, or the kaolinization of felspar. The author concludes, however, in light of the careful experiments conducted by Dr. Barus in reference to the latter theory, that such an explanation is untenable; and that the source of the heat must be sought in former, and not entirely extinct, volcanic activity.

The observations of Dr. Barus, bearing on the electrical activity of ore-bodies, are recorded in chapter x. They relate as well to the deposits at Eureka as to those in the Comstock, and, while not directly productive of results of practical importance to the prospector or miner, possess a very considerable scientific interest.

The execution of the plates and maps is up to the usual high standard of the survey publications. The chromolithographic representations of rock-sections in polarized light are particularly successful, and, as far as my experience reaches, are the best of the kind yet produced anywhere.

MARTIN'S ELEMENTARY PHYSIOLOGY.

The human body: an elementary text-book of anatomy, physiology, and hygiene. By H. NEWELL MARTIN. New York, Holt, 1883. 11+355 p., 4 pl., illustr. 16°.

THIS volume forms the second volume in the 'American scientific series, Briefer course,' published by the Messrs. Holt. It is an abridgment of a larger work by the same author, and is intended for use in schools and academies. The demand for such a book, and the difficulty of preparing one, are well known to any one who has sought in vain, among the numerous text-books now in the market, for one really scientific, and suited to the age and needs of his pupils. It is a book of about three hundred and fifty pages, but how it could well have been made smaller we do not see. The language is simple, the style clear, and the book, at the same time, easily comprehensible and thoroughly scientific. It is elementary without being superficial. The essential facts are pointed out to the pupil without taxing his memory with a mass of unimportant details, or vexing him with conflicting theories on unsettled questions. At the end of each chapter these are condensed, and their connection shown in a brief summary, which aids the memory, and excites the interest of the pupil. From the physiological facts are deduced the most important laws of hygiene, while the student gains glimpses of wider fields of anatomy and zoology in the footnotes.

A new and most important characteristic of the work is the series of directions to teachers for demonstrating on frogs and rats the main outlines of anatomy, and for physiological experiments accompanying each chapter. These are all clearly explained, and easy, yet it is to be feared that they will be neglected by three-fourths of the teachers using the book. Their importance might well and justly have been far more strongly urged in the preface. We hear every year less of the objections to such dissections. The great difficulty is, that most of the teachers in our schools and academies have been taught physiology in the old way; and many of them have never even seen the inside of a frog. They greatly over-estimate the difficulties of such dissections and experiments, and do not appreciate that the sight of the real organ or process is worth more to the pupil than an hour's study of text-books or charts. If the teacher will once try fairly the experiment of following these directions, he will be surprised at the small amount of extra work caused, and at the enthusiasm

which they call forth in his class. The figures of the book are large and clear: in one or two of the plates so much has been attempted that they appear, at first sight, confused; but this is a slight blemish in a book worthy, in other respects, of all commendation. The book is well fitted, in the language of the author in his preface, to "prepare the student for the work of subsequent daily life by training the observing and reasoning faculties."

PACKARD'S BRIEFER ZOÖLOGY.

Zoölogy. By A. S. PACKARD, jun. New York, Holt, 1883. 5+334 p., illustr. 16°.

The *Zoölogy* of the same series as the preceding is also an abridgment of and introductory to the larger text-book by the same author. Of the 315 pages of the text, only 130 are devoted to invertebrates: of the 180 pages devoted to vertebrates, many are occupied by large and very ornamental but hardly useful pictures. Of about 300 cuts, 90 are devoted to birds and mammals, and 40 to fish: of these a few are anatomical, the rest illustrations. The removal of many of these cuts would leave room for more print, without affecting the attractiveness of the book. The book is intended for young pupils, and yields to the common prejudice that birds and mammals are most interesting to this class. Yet precisely these animals come least within their reach, and their study of birds especially involves far more memorizing than observation on the part of most young pupils. These same pupils, in one afternoon excursion, could collect scores of insects, in which Professor Packard, as his other books show, could easily interest them. But to insects proper only 16 pages are devoted. Here a few pages of tables for determining the families, at least with one or two of the most common and familiar species as examples under each, would encourage the young student to new search and observation.

Of most of the lower types and classes the young student sees generally only one or two specimens, if any. Here clear, sharp, and exact definitions are needed to enable him to distinguish between essential and non-essential characters. These we miss; and here, as under certain types in the larger text-book, the student becomes bewildered in the attempt to burden his memory with a mass of, to him, equally important data. This is especially noticeable in the treatment of the difficult type of the Coelenterata, but more or less marked

elsewhere. The points of affinity and difference between the succeeding types and the structural characteristics which form the basis of classification in the subdivision of those types are not clearly or sharply stated. There are no grand outlines to direct the student's attention. In a text-book intended exclusively for use in the laboratory, it is perhaps admissible that typical and specific characteristics should appear side by side, and with equal emphasis; in a text-book designed largely for use in the classroom as well, it is a great defect. These outlines are little, if any, clearer in the abridgment than in the larger book. The anatomical cuts are generally good, but they are most of them small, much smaller than those of the elk or moose; and in some of them so much has been attempted that the organs are sometimes difficult to trace. Larger and more schematic drawings would have been more useful. Barring certain of these defects, Professor Packard's larger work is the best text-book which we have for use in our higher schools and colleges, but it certainly has not been improved by abridgment.

MARIE'S HISTORY OF THE SCIENCES.

Histoire des sciences mathématiques et physiques. Par M. MAXIMILIEN MARIE. Tome I. De Thalès à Diophante. Paris, Gauthier-Villars, 1883. 286 p. 8°.

THIS volume is devoted to the mathematics of the Greeks, and covers nearly a thousand years (640 B.C. to 325 A.D.).

The author divides this time into three periods, roughly distinguished by the nature of the work done in geometry; the first period (640 B.C. to 310 B.C.) being that in which no attempt was made to apply arithmetic to geometry, but exclusive attention was given to dealing with and comparing concrete magnitudes without reference to their numerical measures. During the second period (310 B.C. to 150 B.C.), numerical measures of complex magnitudes began to be investigated, — for example, Archimedes obtained a first approximation for the ratio of the circumference of the circle to its diameter; but the numerical work was merely incidental, and was usually suggested by some problem connected with astronomy: while, in the third period (150 B.C. to 325 A.D.), reasoning on concrete magnitudes began to be largely replaced by reasoning on their measures, and geometry developed mainly in the direction of trigonometry.

At the beginning of the history of each of these periods is an introductory chapter con-