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-