

In the first place, the author has in several instances failed to embody the latest fruits of historical research. Thus, in connection with the graphical representation of imaginaries he fails to mention Wessel; in speaking of non-Euclidean geometry he refers to Saccheri, but not to Lambert and Taurinus; in tracing the history of trigonometry he apparently overlooked the researches of Suter and Braunmühl, who show that the Arabs distinguished themselves by original work much more than was formerly supposed; he makes no mention of the Bakhshali manuscript, which throws considerable light on early Hindu arithmetic. As a rule, the facts presented are stated accurately. Among the exceptions are the following: Athelard of Bath is mentioned as the first translator of Euclid from the Arabic into Latin, but there is ground for the belief that earlier translations existed. Boyer attributes to Benjamin Peirce a research which seems to be due entirely to Charles S. Peirce; he misspells the name of Crozet, the author of the first American text on descriptive geometry; he gives Antissa instead of Antinoeia as the birthplace of Serenus.

In the next place, the book is deficient because it does not trace the evolution of theories. Something on the growth of mathematical ideas we have a right to expect even in a short history. If the reader consults this work on the introduction of the notion of infinity or of continuity, on the evolution of the theory of limits, on the number concept, or on the foundations of algebra, he will receive little satisfaction. But these topics are all of vital importance in elementary as well as in advanced mathematics.

FLORIAN CAJORI.

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Elementary Chemistry. For High Schools and Academies. By A. L. AREY, C.E., Rochester (N. Y.) High School. New York, The Macmillan Co. 1899.

The author has adopted the theoretically ideal plan of forcing the student to note the various features of chemical reactions without any suggestion as to the phenomena which one is expected to observe. Very few students have cultivated and trained their power of observation, and one of the most advantageous

purposes of the study of a science is to develop this side of their nature. This can only be done by teaching him what he sees and how he should see it and thus gradually training his powers of observation until he is able to observe new phenomena for himself and becomes independent of the observations of others. Several dangerous experiments are placed in the early part of the book with no notice of the precautions to be taken, and if this book was put into the hands of an inexperienced worker there would probably be disastrous results.

J. E. G.

Laboratory Exercises with Outlines for the Study of Chemistry, to accompany any Elementary Text.

By H. H. NICHOLSON, Professor of Chemistry in the University of Nebraska, and S. AVERY, Professor of Chemistry in the University of Idaho. New York, Henry Holt & Co. 1899.

This book is intended as a laboratory guide to be used in connection with a text-book. It is well arranged and the descriptions are clear and logical, and with conscientious use of a reference book should produce the desired results. In cases where dangerous materials are to be handled too much caution cannot be given. In exercise 3 the student is directed to rub in a mortar a piece of sulphur and a crystal of potassium chlorate the size of a grain of wheat. One who had never had experience with students just beginning the study of chemistry would be surprised at the differences of opinion as to the size of a grain of wheat.

J. E. G.

School Chemistry. By CHAS. BASKERVILLE, Ph.D. The University of North Carolina. Richmond, Va., B. F. Johnson Publishing Co. 1899.

The author wrote this book for use in summer schools for teachers. In attempting to cover the whole field in a short course he has prepared a work which will not give a student the necessary foundation either for teaching the elements of the subject or continuing its study with advantage. A few subjects thoroughly understood would probably be of more value than a little knowledge of many, so far as its use by the class of students for whom it is intended is concerned. The author has no doubt supplemented it by

valuable class and laboratory instruction as he reports its use for five years with success.

J. E. G.

The Living Organism. An Introduction to the Problems of Biology. By ALFRED EARL. London, Macmillan & Co. 1898. Pp. xiii + 271.

This book gives the too wordy reflections upon biological phenomena of an author who seems to have a fair general acquaintance with biological principles, but no very extensive knowledge of biological facts. The consequence is a book which is philosophical in form, discusses biological phenomena in an extremely general and abstract way, contains few errors, but, on the other hand, has little of suggestiveness for the advanced biologist. The style is flowing, but often obscure; and after reading a few pages one wearies of the pedantry which clothes well-known and simple ideas in a heavy blanket of abstract verbiage. Thus, the fact that organisms assimilate is put (in *Italics*) thus: "Both animals and plants depend for their continued existence upon certain material which is absorbed and changed in properties by contact with the living body." This is typical (p. 227): "The remarkable constancy of the living form, one of its distinctive signs, even when united in thought with the ceaseless occurrences tending to disturb that form, gives no positive indication of other than physical agents. Indeed, it is only by a just apprehension of everything that concerns or affects the organism, in other words, by a due regard to external changes as well to the more prominent activity of the organism, that it is possible to gain coherent knowledge of the fact known as life." We must conclude that the book contains little of importance for the working biologist.

C. B. DAVENPORT.

SUTER'S HAND-BOOK OF OPTICS FOR STUDENTS OF OPHTHALMOLOGY.

This little book, as its title implies, contains such small portions of geometrical optics as may be useful directly to a certain limited class of students. Like all fragmentary text-books, it suffers under the difficulties of such special treatment. Many important portions of the subject are omitted or barely mentioned, and

only those are developed in detail which appertain directly to the object in view. Thus the introductory and general portions, including the general treatment of refraction, are condensed almost to obscurity, and, considered as demonstration, are incomplete. Refraction through spherical surfaces is much more satisfactorily handled, and is succeeded by an excellent chapter on lenses, following in general the methods of Gauss. In both these chapters the use of algebraic signs is somewhat arbitrary and inconsistent. The principles thus expounded are then applied to the eye as an optical instrument, both in its normal condition, and in connection with the spectacle lenses used to correct its errors of refraction. These chapters form, as was to be expected, the most important part of the book. They are clear and instructive, and well illustrated by numerical examples. They are followed by discussion of cylindrical lenses, and prismatic glasses. The final chapters on the ophthalmoscope are too brief to be of great practical benefit.

The whole presentation of the subject is adequate to its immediate purpose, though the rare student of ophthalmology who has enough interest in the optical side of his work really to profit by this book would find it much more to his advantage to read instead a larger and more complete treatise.

FRANK P. WHITMAN.

BOOKS RECEIVED.

Memoirs Presented to the Cambridge Philosophical Society on the Occasion of the Jubilee of Sir GEORGE GABRIEL STOKES, Bart, Hon. LL.D., Hons. ScD. Lucasian Professor. Cambridge, at the University Press; New York, The Macmillan Company. 1900. Pp. xxviii + 447 and twenty-five plates. \$6.50.

Papers on Mechanical and Physical Subjects. OSBORN REYNOLDS, F.R.S. Cambridge, The University Press; New York, The Macmillan Company. 1900. Vol. I, pp. xv + 416. \$5.00.

An Introduction to the Study of the Comparative Anatomy of Animals. GILBERT C. BOURNE. London, George Bell & Sons; New York, The Macmillan Company. 1900. Vol. I, pp. xvi + 269. \$1.10.

Zoological Results, based on material from New Britain, New Guinea, Loyalty and elsewhere, collected during the years 1895, 1896 and 1897. ARTHUR WILLEY. Cambridge University Press;