

added which he had previously overlooked. To most chemists the task which Dr. Bolton has completed would seem an appalling one. To those who know him personally his success will not seem surprising. It is a wonderful book in every respect. Dr. Bolton's interest in this matter is further evidenced by his recent letter to *Science*, printed also in the *Chemical News*, of July 7.

E. H.

SCHOOL CHEMISTRY. BY CHARLES BASKERVILLE, PH.D., The University of North Carolina. Richmond, Va.: B. F. Johnson Publishing Co. 1899. 159 pp. Price, 60 cents.

This book has been prepared for use in high schools, and academies, and is intended to give the pupil an elementary knowledge of the more important chemical facts and theories, especially those connected with every-day life. The book is divided into thirty-seven lessons, each of which consists of a few pages of descriptive text, followed by several well-described and pertinent experiments. Water is first taken up, then atoms, oxygen, air, oxidation, the other non-metals, five lessons on organic chemistry, metals, salts, the soil, vegetable and animal chemistry. The aim of the book is well carried out by the author, but it may be questioned whether the aim of "school" chemistry should not be primarily to train and discipline the mind by the use of the scientific method, as well as to interest the pupil in the study of natural science, and only secondarily to impart knowledge of chemical facts and theory. This order is reversed by the author.

The make-up of the book is good, the proof-reading unusually thorough, but the book is marred by many carelessly constructed sentences and loose statements. There is a very complete index.

JAS. LEWIS HOWE.

A SHORT HISTORY OF THE PROGRESS OF SCIENTIFIC CHEMISTRY IN OUR OWN TIMES. BY WILLIAM A. TILDEN. Longmans, Green, and Co., 39 Paternoster Row, London, New York, and Bombay. 1899. ix+276 pp. 12mo.

Dr. Tilden, the well-known professor of chemistry in the Royal College of Science, London, in the spring of 1898, gave a course of lectures to working-men on the progress made in the science and practice of chemistry during the preceding sixty years. Only able to sketch in very broad outline the general features of the subject, he felt the need of some book of moderate size to

which he could refer his hearers, and which would afford a historical survey of the succession of events that led up to the system of theory in chemistry accepted at the present day. Finding no such book he wrote the volume under review. To appreciate the work one must have some knowledge of elementary physics and chemistry, for it does not profess to be a text-book. The period covered by Dr. Tilden, corresponds to the reign of Queen Victoria, and the book might well have been named "Evolution of Chemistry in the Victorian Era." In ten chapters, the author treats of matter and energy; the distribution of the chemical elements and their recognition by the chemist; the rectification and standardization of atomic weights; the numerical relations among the atomic weights and classification of the elements; origin and development of the ideas of valency, and the linking of atoms; the development of synthetical chemistry; the origin of stereochemistry; electricity and chemical affinity; and the liquefaction of gases.

Dr. Tilden writes clearly, has a full acquaintance with his subject, and selects the material judiciously; he is liberal in giving credit to each discoverer for his share of joint work in developing a given theory or law. In writing of the development of certain branches of chemistry he recognizes the work of our own Morley, J. P. Cooke, and F. W. Clarke, as well as that of the French, Russians, Germans, and Italians.

At the close of the volume the author gives a useful list of "Important Events Arranged in Chronological Order;" in this we find the invention of Bunsen's gas-burner credited to the year 1866, but the reviewer is perfectly certain that the "Bunsen-burner" was used in the Heidelberg laboratory many years earlier; it was thought no novelty in 1864.

Dr. Tilden writes in conclusion:

"In the ancient universities of Great Britain . . . the spirit of mediævalism is no longer wholly predominant. We may therefore look forward hopefully to the day, not far distant, when science and letters, no longer fierce competitors for academic vintage, may walk hand in hand, each conscious of her own dignity, but ready to yield to the other her due share of honor."

The volume successfully carries out the intentions of the

author, and can be recommended to all interested in the development of physical science. HENRY CARRINGTON BOLTON.

EXAMINATION OF WATER CHEMICAL AND BACTERIOLOGICAL. BY WILLIAM P. MASON. New York: John Wiley and Sons. London: Chapman and Hall, Limited. 1899. 135 pp. Illustrated. Price, \$1.25.

This book is divided into three parts: First, an introduction, pointing out the popular misconception of water analysis and emphasizing the necessity of knowing the source of the sample in order to properly interpret the result of the analysis. To this end, throughout the book, much matter is given to enable the analyst to pass upon the quality of a drinking-water from his analysis. Part two gives directions for sampling, and methods of chemical analysis. It is needless to say that these latter, coming from such an authority upon water analysis, as Prof. Mason, are of the best, and are well arranged. Part three deals with so much of the biological examination of water as is of most use to the chemist, leaving the wider field of ultimate differentiation to the biologist. RICHARD K. MEADE.

THE LIQUEFACTION OF GASES. BY J. CAURO. Paris: Gauthier-Villars. 1899. 83 pp.

This treatise on the liquefaction of gases has the thoroughness that one might expect if it were prepared for presentation to a class of students specializing in the subject. There is a cryogenic laboratory at Leyden; it is not hard to foresee the establishment of a chair of *cryogenics* at some enterprising university. But everyone at the present moment wants the thermodynamics of gases explained to him. It should be done scientifically, fully, and consecutively. The mathematics involved is anything but abstruse; the facts are entertaining and the story of the successive steps in its history positively fascinating. The work in review could hardly be more fitted to serve for such a purpose as a full scientific presentation of the subject.

The discussion of the physics of gases in the first chapter, of their curves near the critical-point and of isothermals, leads up to the discussion of the Joule-Thomson effect, and closes with a scheme of methods of refrigeration. It is interesting to note amongst these "the principle of cascades." This was the basis of Pictet's work. Another way of expressing it would be by successive falls in the critical-points of the liquids used, one being volatilized to chill the next, and so on until the required