

ing materials. By giving comprehensive references to the literature, the manual should develop in the student one of the most important habits of the professional chemist, the consistent use of the library and its original literature as the best preparation for intelligent laboratory work. The present edition aims to bring this feature up to date by references to recent publications and by corrections based on such new work.

J. STIEGLITZ.

Qualitative Chemical Analysis. By ARTHUR A. NOYES. Sixth edition. Pp. IX, 130. The Macmillan Co., New York. \$1.50.

In this edition of Dr. Noyes's excellent manual of qualitative analysis for inorganic substances, modifications of the detailed instructions for some of the procedures are introduced in the characteristic effort of the author to refine its methods, so as to have qualitative analysis approach quantitative work in accuracy and reliability.

J. STIEGLITZ.

Chemistry of the Farm and Home. By WILLIAM EDWARD TOTTINGHAM, Assistant Professor of Agricultural Chemistry, University of Wisconsin, and JOSEPH WAITE INCE, Assistant Chemist, North Dakota Experiment Station. 424 pp. Webb Publishing Company, St. Paul. 1916.

This book, written primarily for use in secondary schools of agriculture, aims, as stated in the preface, to "present in elementary form the whole field of the application of chemistry to agriculture," and to be of especial importance to "students completing their education in the high school or secondary school." In the first five chapters there is presented "sufficient general chemistry to serve as a foundation for the study of the succeeding chapters which are of applied character." The chapters on general chemistry cover 165 pages, and treat in a very general manner of the following subjects: water and its constituent elements; the atmosphere and its chief element nitrogen with the acid, base and salt compounds formed from it; the five nonmetals chlorine, sulfur, phosphorus, carbon and silicon, including simple organic compounds; and finally a few important metals, sodium, potassium, calcium, copper, magnesium, zinc, iron and aluminium.

It is doubtful if the authors have succeeded in giving in this brief study a fundamental knowledge of chemistry such as is necessary to an understanding of its application to the complex problems of agriculture as presented in the rest of the book. The remaining chapters constituting the applied part cover 259 pages, and consider the following topics: the plant, the soil, fertilizers, manure, the animal, animal feeding, dairy products, human food and miscellaneous materials. It must be remembered, however, that the book is elementary in form and treatment and for use in secondary schools. It is thus primarily simply informational. As such it is well written, presents a large amount of interesting

and useful agricultural information, and will stimulate the student to further study. In general there seem to be too many striking things mentioned without sufficient explanation. It also includes too much general agriculture for a book bearing the name of Chemistry. A study of the book in connection with its purpose, as a text for secondary schools, raises the old questions as to whether secondary school science should be pure or applied. The authors, believing the latter, justify their work.

Individual points to criticize are not many, and most of these are questions of personal viewpoint. The statement on page 14 that "Chemistry is an exact and unalterable science" seems misleading, and the use of the names dextrose and levulose instead of glucose and fructose is contrary to most general usage. On page 44 the statement that "oxygen causes the fermentation of fruit juices" must certainly be considered as wrong.

As a whole the book commends itself to those desiring a text of this character for secondary schools of agriculture, and it will undoubtedly find a large place in such schools.

JOSEPH S. CHAMBERLAIN.

The Principles of Feeding Farm Animals. By SLEETER BULL, M.S., Associate in Animal Nutrition, College of Agriculture and Agricultural Experiment Station of the University of Illinois. The Macmillan Company, New York City. 1916. pp. 373. Price, \$1.75.

In this book the author has endeavored "to present the scientific facts underlying the art of feeding animals in such a manner that the book will not only be suitable for use as a text for college courses in general feeding, but will also be valuable to the farmer who has not had a technical education in agriculture." In this task, which is by no means a simple one, the author has succeeded in a rather remarkable degree. The subject matter may be grouped in four divisions. Chapters 1-6, The scientific basis of feeding; Chapters 7-8, Practical feeding and feeding rations; Chapters 9-19, The different crops and materials used as feed with their character and special use; Chapters 20-22, Efficiency of feed, fertilizing value of the manure and valuation of feeds. Finally, there is appended a series of very good tables on the composition, digestible nutrients and net energy of feeds, feeding standards and digestible nutrients in different amounts of feeds.

The discussion of the scientific basis of feeding is perhaps inadequate for a very thorough knowledge of the subject, but is certainly sufficient both for a college class and a practical feeder to apply the facts presented in the rest of the book. The description of crops and materials used as feeds is especially full, and is made very definite and practical in connection with particular uses to which each is put. The tables form a very satisfactory part of the book.

In some cases statements are too general and indefinite for a clear under-

standing, as, for example, the description of the properties of enterokinase on p. 46. The statements on pp. 9 and 11 of the nutritive values of true protein and nonprotein are confusing. It is also to be wondered at that the author should use Fahrenheit degrees instead of Centigrade. As a whole the book is well planned and well written, presenting in a brief form both the theory and practice of feeding. It cannot fail to find wide use by the two classes of people the author desires to reach, namely, the student and the feeder.

JOSEPH S. CHAMBERLAIN.