Modern civilization furnishes no better example than this of the possible victory over pestilence and disease, when the warfare is carried on in the light of modern scientific knowledge. The building of the Panama Canal and the sanitary record of the Japanese in their war with Russia are the two great object lessons of recent years, demonstrating that men can neither work nor fight to the best advantage unless protected from infectious and preventable diseases. The civilized nation which will hereafter put an army in the field or undertake a great engineering problem without first preparing the way by proper and adequate sanitary engineering and equipment will be regarded by the other nations as quite as foolish as a government which would build a vast fleet of modern warships and then arm them with the muzzle loading ordnance of one hundred years ago. An epidemic of typhoid fever in a military camp should be considered a greater disgrace to an army than a defeat in battle, since defeat may come in spite of the greatest exertions and the highest wisdom, while typhoid and yellow fever would be the result of ignorance or disregard of well-known laws of prevention. All nations will profit by the sanitary lesson of the Panama Canal.—*Journal of the American Medical Association.*

SCIENTIFIC BOOKS

General Chemistry for Colleges. By Alexander Smith. 8vo, pp. 529. New York, The Century Co. 1908.

This book is practically a somewhat abbreviated and simplified edition of the author's "Introduction to General Inorganic Chemistry" which appeared two years ago. The "Introduction" attracted much attention among teachers of chemistry, and received high praise as an excellent and comprehensive presentation of the subject, but it appears that many teachers, while admiring the book as a treatise, considered it too extensive and difficult for beginners, even at the age of college students.

It is evidently on account of these objections to the larger text-book that the shorter work under consideration has been prepared. This is shorter to the extent of more than two hundred pages, and it has been considerably simplified, chiefly by omissions of less fundamental theoretical matter. It is to be observed that the theoretical topics that have been retained have been presented with the same fullness as before, and that the aspect of the new book in its arrangement and illustrations is very similar to that of the old one, although some conspicuous changes have been made in the presentation of some of the theoretical topics, and other minor changes and improvements have been introduced.

It appears to be somewhat doubtful that the present book will appeal to the majority of those who considered the former book too difficult, because the chief changes are those of omission, and they could be made easily while using the larger book.

There is evidently a tendency at the present time to use less childish chemical text-books for older students than was formerly the custom, and this movement is undoubtedly an excellent one, as far as the education of our more capable students is concerned. Therefore, the new book, by a teacher who has shown such ability in text-book production, is to be welcomed, although it may not be considered entirely "easy," and it is to be hoped that we shall soon have a revision of his "Introduction," which, whatever may be thought of it for beginners, is a very useful book for more advanced students.

As a single criticism it may be said that several of the brief statements in regard to metallurgy need revision, even in the later edition. This metallurgical weakness is a very common fault in elementary text-books of chemistry.

H. L. Wells

Thermodynamics of Technical Gas Reactions. Seven Lectures. By Dr. F. Haber, Professor at the Technische Hochschule, Carlsruhe. Translated by Arthur B. Lamb, Ph.D., Director of the Havemeyer Chemical Laboratory, New York University. Pp. 356. London, Longmans, Green and Co. 1908.

Since Gibbs and Helmholtz showed that the

mere heat evolved is not a true measure of the driving force of a chemical reaction, chemistry has felt an ever-growing need of accurate determinations of that which is the true measure, the free energy. A knowledge of this quantity permits the theoretical chemist to predict the direction in which a reaction will proceed or the state of equilibrium to which it will arrive, and enables the technical chemist to calculate the possible yield in a given manufacture, or the amount of work obtainable from a given process.

The present volume is by far the most important contribution towards this end which has as yet been made. It is a book written to technical chemists by an acknowledged master of technical chemistry, but it will doubtless find a larger audience among the uncommercial chemists; especially in this country where a broad knowledge of thermodynamics is not yet regarded as indispensable in the training of the chemical engineer.

The first three chapters deal with the theorems of thermodynamics and the development of the general free energy equation. In the fourth and fifth chapters comes the exhaustive discussion of the conditions of equilibrium in such important reactions as the water-gas process, the Deacon process and the formation from the elements of water, carbon dioxide, ammonia and the halogen acids. The sixth chapter critically summarizes all the existing data on the specific heat of gases, which must be known if we are to calculate the free energy at one temperature from that at another. The last chapter treats in detail the experimental methods which have been employed in the study of gaseous equilibria.

After a single perusal of the book the reader may not appreciate the infinite pains, or the critical acumen amounting nearly to inspiration, with which the author has extracted the truth from a great mass of uncertain and frequently contradictory experimental material. His success in this task has been demonstrated several times since the appearance of the German edition by new experimental investigations which have fully corroborated his conclusions.

The English edition, an excellent translation, contains additional matter in the form of three appendices. The first reviews the new and sensational method proposed by Nernst for the calculation of chemical equilibrium from thermal data. The second gives in detail the results of experiments carried on in the laboratories of Nernst and the author on the free energy of formation of carbon dioxide and water, of experiments by Lewis on the electromotive force of the oxyhydrogen cell, and of others by Lewis and Falkenstein on the Deacon process. The third appendix contains a miscellany of short notes dealing chiefly with the reaction velocity in gaseous systems.

To all who are interested in making chemistry an exact science, and who are not unwilling to read a book requiring a little thought and study, this work is heartily commended.

GILBERT N. LEWIS

Handbook of Flower Pollination. By DR. PAUL KNUTH; translated by J. R. AINSWORTH DAVIS. Vol. 2. Oxford, Clarendon Press. 1908.

For many years Hermann Müller's "Fertilization of Flowers by Insects," which had been translated into English, was the standard reference-book on all subjects connected with the relation of flowers to their insect-visitors. It was, however, getting very much out-of-date; so Dr. Paul Knuth, taking it as a basis, undertook the preparation of a new work, intended to include all the information available up to the date of publication. The new "Handbuch der Blütenbiologie" could not be included, like Müller's work, in a single volume, so it was divided into several sections. The first of these consisted of a general introduction; then came an account of the observations made in Europe; and finally, those from other parts of the world were to be given. Knuth did not live to see the last section published, but it was brought to a satisfactory completion in 1905 under the editorship of Dr. Ernst Loew.

There was naturally a demand for an English translation of the "Handbuch," and this