application of oil to the many varieties of industries. It is impossible in the space available to present more than an outline of its character and contents. It contains a vast amount of information, being encyclopædic in scope, within the field to which it is devoted. It must represent an enormous amount of labor in searching the literature, compiling and condensing data, and last, but not least, the reading of the proof. Though not stated on the title page, the book is a second edition, as indicated by the copyright entries, the first issue having been copyrighted in 1916. Each copy is accompanied by an unstamped card provided for advising the author of errors discovered by those who use the work. This is an excellent plan, and it is to be hoped that the example will be followed, inasmuch as the author promises to communicate to those who notify him of errors a summary of those that have been indicated by others. This method of keeping in touch with one's readers ought to be popular, but an experience along the same line by the present reviewer, who adopted it in a book published by him, showed that but very few availed themselves of the opportunity, for though hundreds of copies of the book have been sold, only a score or so have taken advantage of the opportunity.

As might be expected, the bulk of the book is devoted to the petroleum oils, but about two score pages are given to the fixed oils used in lubrication, which section contains a very large amount of information. In the initial paragraph, the reviewer notes a slight typographic error, the name of the radicle "glyceryl" being spelled "glyceril," but a more serious error is the statement that the radicle of glycerin or glycerol is $(C_3H_5(OH)_3)$. There is some accidental confusion here. It is probable that the author intended to write "formula" instead of "radicle." It is gratifying to see the correct spelling of the word "radicle," so often incorrectly spelled "radical," which is the adjective form.

The work is divided into 11 sections, the limits of which are indicated by thumb-pieces, but while there is a table of contents (placed a little awkwardly on the fly-leaves), there is no summary of the titles of the sections themselves, which seems to be a slight defect.

The descriptive matter is preceded by some elementary mathematics, including methods of arithmetic relating to fractions, and a brief presentation of the principles of logarithms, with a two page table of five-figure logarithms, but it is doubtful if any one who does not understand the use of such a table could gain much from what is there given.

The printing and other mechanical features of the book are excellent, and reflect credit on all concerned. The author's painstaking efforts have resulted in a most valuable compendium in a most important field of industry.

HENRY LEFFMANN.

CHEMISTRY AND CIVILIZATION. By Allerton S. Cushman, A.M., Ph.D., Director, Institute of Industrial Research. Ex-Lieut. Col. Ordnance Dept., U. S. A. Small 8vo., 148 pages, index, six plates and two illustrations in the text. Boston, Richard G. Badger. \$2.50 net.

Doctor Cushman delivered the 1920 course of lectures with the above title at the Wagner Free Institute of Science, under the Richard B. Westbrook Foundation, and has presented the substance of the course with numerous additions in the book in hand. It is a very valuable and interesting essay. English-

speaking chemists are now actively engaged in bringing to the notice of the mass of the people the value of both pure and applied chemistry, and Doctor Cushman's book will be no small aid in the propaganda. Beginning with a summary of the development of the science from its earliest period to the establishment of accurate methods of procedure, the author passes to the service of the science to the human race, starting with the researches of the early nineteenth century, certain distinguished leaders being especially noted. The application of chemistry to industry is then taken up, several of the key industries being noted, namely, the alkali industry (Leblanc to Solvay), sulphuric acid, the Bessemer and Siemens-Martin processes, the discovery of benzene and the introduction by Kekulé of the benzene-ring theory, with the subsequent extensive and valuable development of synthetic chemistry.

"Chemistry and War," the subject matter of the fourth chapter, covers the topics of nitrogen fixation, coal-tar industries, poison gases and gas masks, sources of potash and chemical developments in military surgery. Concerning the first topic, one of the most important problems in applied chemistry, the book gives a concise and highly informing account. A footnote describes in some detail the work accomplished by German chemists at the plant of the BASF during the war. In this connection attention may be called to the fact that in the Emil Fischer memorial address before the (British) Chemical Society, the speaker stated that if the Germans had not had available the Haber process for utilization of atmospheric nitrogen, the war would have closed in the summer of 1915, for the British blockade would have prevented the Central Empire from getting supplies of Chili nitrate. Doctor Cushman points the moral of this fact in its relation to the development of the nitrogen fixation industries in the country, and his book will render most valuable service in this regard.

A chapter on "Chemistry and the Future" presents interesting data in regard to radio-activity and, of course, the author wrestles a little with the Einstein theory.

The last chapter discusses some of the modern aspects of chemistry, including colloids, the future of alcohol, chemical actions at high and low temperatures and pressures, the low motor-fuel problem and the story of helium. The last item naturally leads the reviewer to examine if the author has been caught in the bewitchment of the bibliography of this element, and finds it stated that Lockyer and Janssen had mapped the yellow line of the element in the sun in 1865, and had called it helium. The now famous eclipse occurred in 1868, and there is no evidence that Janssen had any share in coining the name, at least, Lockyer said in 1894, that he coined the name for "laboratory purposes."

Dr. Cushman's book deserves to be widely read among the intelligent members of the community who though not trained in chemistry are interested in the developments of our chemical industries. The literary style is excellent. The reviewer is glad to see that the American spelling of chemical terms is adopted.

HENRY LEFFMANN.