Book Reviews

Petroleum Microbiology. Ernest Beerstecher, Jr., Elsevier, Houston, 1954. xv + 375 pp. Illus. $8.

The principles, processes, problems, and possibilities of applying microbiology to the petroleum industry are neatly treated in this book, which deals with much material so new that it is unsettled, speculative, and of a preliminary nature. Beerstecher has assembled and appraised this material in a commendable manner. His writing is lucid, entertaining, and informative. The book appears to be almost free of errors of fact, rhetoric, grammar, or typography. One of the few exceptions is a statement on page 120 to the effect that "it is now well established that the source materials of petroleum are largely composed of marine vegetation, much of which was microbial in nature." The section on bacterial plugging of porous formations is based on reports that are inadequate and partly erroneous.

In the introductory chapter Beerstecher marries microbiology to petroleum engineering by giving a short historical account of the parallel developments of each. Although many vigorous children can be expected from this marriage, a few paragraphs summarizing (for the benefit of petroleum people) the characteristics of microbes and their specialized methods of study and a little more information on the chemical composition and occurrence of crude oil (for the benefit of microbiologists) could have contributed to an earlier understanding.

Except for the section on micropaleontology, which outlines the significance of fossilized protozoans (Foraminifera, Radiolaria, and so forth) and algae (primarily diatoms) as indicators of oil deposits, the book deals mainly with the role of bacteria and allied microorganisms in geologic processes. Chapter II summarizes some of the many contributions of such microorganisms to the biogeochemistry of calcium, carbon, iron, nitrogen, phosphorus, silicon, and sulfur, with particular reference to marine and petroliferous sediments. Although the precise role played by bacteria in the origin of oil is still largely a matter of conjecture and debate, available information leaves little room for doubt that their activities are importantly contributory during the early stages of the process and they could contribute to the maturation, modification, and migration of petroleum.

Most comprehensive and complete are the two chapters dealing with the effects of hydrocarbons upon microorganisms and the effects of microorganisms upon hydrocarbons. Tables and text outline the ecology, characteristics, and oxidation products of numerous microorganisms that can attack virtually all kinds of hydrocarbon, including aliphatic, cycloparaffinic, aromatic, naphthenic, saturated, unsaturated, and substituted compounds. This ability of microorganisms to oxidize hydrocarbons is the basis for beliefs, summarized in Chapter X, that microorganisms might be used as reagents in the petrochemical industry. It is also the basis of various geomicrobiological prospecting methods proposed for employing bacteria or their products as indicators of oil deposits (Chapter V), and for their activities in oil-field flood waters (Chapter VII).

Among the harmful activities of microbes that may be prevented or ameliorated by the kind of knowledge here presented are fermentation of drilling muds (Chapter VI), corrosion (Chapter VIII), and infections of man associated with cutting oils (Chapter XI).

The usefulness of the book is augmented by more than 700 references to relevant literature, a glossary defining approximately 100 microbiological terms and nearly 50 petroleum technology terms, and indexes of authors, microorganisms, and subjects.

CLAUDE E. ZOBELL
Scripps Institution of Oceanography
University of California

Rare Metals Handbook. Clifford A. Hampel, Ed. Reinhold, New York, 1954. xiii + 657 pp. Illus. $12.

Developments in recent years, and particularly since the outbreak of World War II, have led to important uses of many metals that either are very expensive or exist in small quantities. These uses are found in many fields but particularly in nuclear energy, weapons, and instruments. This book should form a valuable addition to the libraries of people working in these fields and should also be of interest to metallurgists in general.

This book is an ambitious undertaking, since 35 different metals are described in addition to the rare earths. The danger in such a work is that the coverage will be inadequate and even inaccurate. The editor has clearly been aware of this and has sought the help of 34 different authors. This amounts to nearly one author for each metal and should assure reliable presentation.

Since the various chapters are by different people, they inevitably vary in style and organization. In general, however, the writing is clear and concise. A description is given of the mineral, its occurrence, and the methods of extraction. Methods of mechanical fabrication are given when these are of interest. Finally, the chemical and physical properties of the metal and its principal uses are described.

The last chapter, "Physical properties of metals," brings together values of all the usual physical constants into a series of tables. In addition, it lists nuclear cross-sections and prices as of 1953. This chapter is not limited to rare metals but includes the common ones as well.

This volume is a much-needed contribution to the metallurgical literature.

J. H. FRYE, JR.
Metallurgy Division, Oak Ridge National Laboratory