

of on the continent. It is to his credit that a very high percentage of his letters were preserved. In fact, from this new biography one can almost know what he was thinking about week-by-week after injuries incurred in a riding accident prevented him from continuing to go to sea.

Maury has usually been considered the father of physical oceanography in this country. In my opinion, he actually contributed much more to climatology and to physical geography, but the practical applications of his pioneering pilot charts have usually attracted the most attention.

Frances Leigh Williams does not try to refight the Civil War or to evaluate Maury as a scientist. She simply records what happened.

It is significant that about 240 pages of this book are devoted to notes, bibliography, and index. The reader is entirely free to judge the scientific contributions of an interesting man and to enjoy the contemporary picture of the Navy, life in Washington, the Civil War, and the European scene.

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AGARD-NATO Symposium

Advances in Materials Research in the NATO Nations. Proceedings of a symposium held at NATO, May 1961. H. Brooks, N. H. Mason, N. E. Promisel, and G. H. Cooper, Eds. Published for the North Atlantic Treaty Organization by Pergamon Press, London; Macmillan, New York, 1963. x + 549 pp. Illus. \$15.

In May 1961, a symposium on materials research, organized by the Structures and Materials Panel of the Advisory Group for Aeronautical Research and Development (AGARD) of NATO, was held in Paris. The symposium was held at the request of Frederick Seitz, then science advisor to NATO, in recognition of the importance of materials in modern technology. It was hoped that bringing together people interested in fundamental research, in applied research and development, and in the organization and management of research would stimulate and make more effective materials research in the NATO countries. The

volume under review records the proceedings of that symposium.

The volume is in three parts: Fundamental Research; Role of Basic Research in Development; and Organization. The first part consists of an introduction and review by Harvey Brooks, a keynote address by Seitz, and a series of 18 talks in which leaders in their fields review various aspects of basic research on materials, including such topics as polymers, diffusion, surface properties, dislocation theory and observation, flow and fracture, energy bands, superconductivity, semiconductors, and ferromagnetism. The papers are somewhat uneven in scope, ranging from reviews of broad areas of research, designed for the nonspecialist, to rather technical discussions based mainly on original research. The second part provides examples of cases in which basic research has made significant contributions to particular developments as well as more general discussions of the ways in which advances in basic understanding aid development. The third part contains interesting discussions of the way scientific research in general and materials research in particular are organized in various NATO countries: Canada, France, Netherlands, Norway, Great Britain, and the United States.

By far the greatest emphasis is on structural properties, an area in which there is perhaps the greatest gap between basic research and practical developments. Only a dozen or so pages are devoted to semiconductors and ferromagnetism where applications depend very directly on basic research and where the same people are often involved in both. In the past, structural materials have been developed largely by empirical cut-and-try methods in which research on basic physical processes and electronic structure have played only a minor role. It is evident from the reviews presented here that tremendous strides have been made in fundamental understanding and that the gap, while still wide, is closing. Both approaches are important, and both will continue to be important in the future.

The book should be of interest mainly to those doing basic or applied research in structural properties of materials and to those in scientific administration.

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Chemical Analysis

Complexation in Analytical Chemistry. A guide for the critical selection of analytical methods based on complexation reactions. Anders Ringbom. Interscience (Wiley), New York, 1963. x + 395 pp. Illus. \$15.

Complexation reactions owe their widespread use in chemical analysis chiefly to the work of Gerold Schwarzenbach, whose group, two decades ago, pioneered studies on ethylenediaminetetra-acetic acid (EDTA) and other exceedingly effective complexing agents based on the aminopolycarboxylic acids. Titrations with these "chelating" agents proved generally applicable to the great majority of metal ions, and EDTA has become a household item in all analytical laboratories. In 1957 Schwarzenbach published a monograph in which he developed the theory of "complexometric titrations" and gave procedures for a number of specific determinations. Anders Ringbom's intent is to extend Schwarzenbach's treatment and show "how to compare, without involved calculations, existing methods to determine their relative accuracy; how to choose the most favorable experimental conditions for each analysis; how to calculate and eliminate the interference of various side reactions; how to develop new methods for solving special analytical problems." He has fulfilled these aims with admirable lucidity, in a book which every analytical chemist should find useful and stimulating.

To simplify the involved calculations necessary for intelligent application of complexometry, Ringbom introduces the concepts of side-reaction coefficients and conditional stability constants. He applies the method consistently throughout the book and illustrates its effectiveness with numerous example problems. An appendix contains tabulations of coefficients for many common side-reactions as well as a long list of the equilibrium constants most likely to be needed.

Ringbom begins with a brief survey of complexation reactions, then presents a sensible approach to the law of mass action (in which he neatly side-steps the sticky problem of concentration versus activity by pointing out that 0.1 log unit, an uncertainty quite acceptable for most calculations, covers the activity coefficient variation for most ions in the ionic strength range

0.1–0.5*M*, the range of greatest interest to analytical chemists). He elaborates his conditional constant approach and applies it to the important topic of masking analytical reactions. There is a thorough treatment of complexometric titrations, with emphasis on end-point detection and estimation of the titration error (for which a handy diagram is provided) and a chapter in which acid-base reactions are treated as a special case of complexation. This novel approach leads to some interesting examples of the use of complexation side-reactions to improve acid-base titrations. Finally, there are chapters on complexation in ion exchange, metal extraction, and electrochemical and photometric analysis, and to all of them Ringbom brings fresh insight.

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Note

Classics of Science

Classics in the Theory of Chemical Combinations (Dover, New York, 1963. 205 pp. Paper, \$1.85), edited by O. Theodor Benfey, is the first volume in a new series, "Classics of Science." Gerold Holton, editor of the series, writes in the preface that each volume will be "a collection of fundamental essays and other basic original articles in a certain field of science, presented in the sequence of its development, together with an introduction, commentary, and clarifying notes by the scholar responsible for the selection of the papers." This volume contains nine papers: "Researches respecting the radical of benzoic acid" (published in 1832) by Friedrich Wöhler and Justus Liebig; "Carbon, metallic and hydrogen, oxygen, and chlorine substitutions; Theory of chlorine substitutions; Nitrogen substitutions" (1854), Auguste Laurent; "On the constitution of salts" (1851), Alexander W. Williamson; "On a new series of organic bodies containing metals" (1852), Edward Frankland; "The constitution and metamorphoses of chemical compounds and the chemical nature of carbon" (1858), August Kekulé; "On a new chemical theory (2 papers, 1858), Archibald Scott Couper; "A suggestion looking to the extension into space of the structural formulas at

present used in chemistry. And a note upon the relation between the optical activity and the chemical constitution of organic compounds" (1874), Jacobus Henricus van't Hoff; and "On the relations which exist between the atomic formulas of organic compounds and the rotatory power of their solutions" (1874), Joseph Achille le Bel.

New Books

General

Alcohol and Civilization. Salvatore Pablo Lucia, Ed. McGraw-Hill, New York, 1963. 432 pp. Paper, \$3.95; cloth, \$7.50.

America Encounters Japan. From Perry to MacArthur. William L. Neumann. Johns Hopkins Press, Baltimore, 1963. 365 pp. \$6.50.

The Atomic Age. Scientists in national and world affairs. Morton Grodzins and Eugene Rabinowitch, Eds. Basic Books, New York, 1963. 634 pp. \$10.

Birds of Hampshire and the Isle of Wight. Edwin Cohen. Oliver and Boyd, Edinburgh, Scotland, 1963. 290 pp. Illus. 30s.

The Care of the Earth. A history of husbandry. Russell Lord. New American Library, New York, 1963. 384 pp. Illus. Paper, 95¢.

Cities and Space. The future use of urban land. Lowdon Wingo, Jr. Published for Resources for the Future by Johns Hopkins Press, Baltimore, 1963. 267 pp. Illus. \$5.50.

Darwiniana. Essays and reviews pertaining to Darwinism. Asa Gray. A. Hunter Dupree, Ed. Harvard Univ. Press, Cambridge, Mass., 1963. 351 pp. \$5.

Dialogues Concerning Two New Sciences. Galileo Galilei. Translated from the Italian and Latin (Elzevir edition, 1638) by Henry Crew and Alfonso de Salvio. McGraw-Hill, New York (reprint of 1914 edition), 1963. 313 pp. Illus. Paper, \$2.95.

Educators Guide to Free Guidance Materials. Compiled and edited by Mary Horkheimer Saterstrom and Joe A. Steph. Educators Progress Service, Randolph, Wis., ed. 2, 1963. 241 pp. Paper, \$6.50.

Fallacies in Mathematics. E. A. Maxwell. Cambridge Univ. Press, New York, 1963. 95 pp. Illus. Paper, 95¢.

The Family and Human Adaptations. Three lectures. Theodore Lidz. International Univ. Press, New York, 1963. 126 pp. \$3.

Gyroscopes. What they are and how they work. James C. Sparks, Jr. Dutton, New York, 1963. 91 pp. Illus. \$3.50 (juvenile book).

A History of Electricity. Edward Tattall Canby. Hawthorn, New York, 1963. 111 pp. Illus. \$5.95. A popularization.

The History of Sciences in India. Proceedings of a symposium (Calcutta), August 1961. P. Maheshwari, Ed. National Inst. of Sciences of India, New Delhi, 1963. 351 pp. Illus. Paper, R.13.75.

Human Possibilities. A dialectic in contemporary thinking. W. Paul Kiley. Philosophical Library, New York, 1963. 104 pp. \$3.

Jahrbuch: Der Deutschen Akademie der Wissenschaften zu Berlin, 1961 (970 pp. DM. 38.50); **Jahrbuch, 1962** (674 pp. DM. 37). Akademie Verlag, Berlin.

Land and Life. A selection from the writings of Carl Ortwin Sauer. John Leighly, Ed. Univ. of California Press, Berkeley, 1963. 441 pp. Illus. \$8.95.

The Languages of Science. A survey of techniques of communication. John Wolfenden. Basic Books, New York, 1963. 191 pp. Illus. \$4.95.

The Long White Line. The story of Abbott Laboratories. Herman Kogan. Random House, New York, 1963. 320 pp. Illus. \$5.95.

Man and Science. W. Heitler. Translated from the Swiss edition (1962) by Robert Schlapp. Basic Books, New York, 1963. 108 pp. Illus. \$4.50.

Man and the Living World. Karl von Frisch. Translated by Elsa B. Lowenstein. Harcourt, Brace, and World, New York, 1963 (© 1949 by Deutscher, Berlin). 320 pp. Illus. \$7.50.

Man on His Nature. The Gifford Lectures given at Edinburgh in 1937–1938. Charles Sherrington. Cambridge Univ. Press, New York, ed. 2 (© 1951), 1963. 308 pp. Illus. Paper, \$1.95.

The Management of Ineffective Performance. John B. Miner. McGraw-Hill, New York, 1963. 379 pp. \$7.95.

Mansfield on the Condition of the Western Forts 1853–1854. Robert W. Frazer, Ed. Univ. of Oklahoma Press, Norman, 1963. 286 pp. Illus. \$4.95.

Marxism. The unity of theory and practice. Alfred G. Meyer. Univ. of Michigan Press, Ann Arbor (© 1954), 1963. 191 pp. Paper, \$1.75.

Matthew Fontaine Maury, Scientist of the Sea. Frances Leigh Williams. Rutgers Univ. Press, New Brunswick, N.J., 1963. 742 pp. Illus. \$10.

Gregor Mendel, and Heredity. Robert N. Webb. Watts, New York, 1963. 120 pp. Illus. \$2.95 (juvenile book).

Methods of Information Handling. Charles P. Bourne. Wiley, New York, 1963. 255 pp. Illus. \$12.95.

Middle East Oil Crises and Western Europe's Energy Supplies. Harold Lubell. Johns Hopkins Press, Baltimore, Md., 1963. 253 pp. Illus. \$8.75.

The Minds of Robots. Sense data, memory images, and behavior in conscious automata. James T. Culbertson. Univ. of Illinois Press, Urbana, 1963. 480 pp. Illus. \$10.

Minerals. And how to study them. Edward Salisbury Dana. Revised by Cornelius S. Hurlbut, Jr. Wiley, New York (© 1949, ed. 3), 1963. 331 pp. Illus. Paper, \$1.45 (reprint).

The Mushroom Hunter's Field Guide. Revised and enlarged. Alexander H. Smith. Univ. of Michigan Press, Ann Arbor, ed. 2, 1963. 312 pp. Illus. \$6.95.

Narcotics: Nature's Dangerous Gifts. A revised edition of *Flight from Reality* (1949). Norman Taylor. Dell, New York, 1963. 224 pp. Illus. Paper, \$1.65.

The Natural Philosopher. vol. 1. Daniel