uents of seawater by F. Culking is followed by a discussion of the minor elements by E. D. Goldberg. The dissolved gases are treated by F. A. Richards, with a separate chapter on carbon dioxide by G. Skirrow. The nutrients, phosphorous, nitrogen, and silicon, are discussed in separate chapters by F. A. J. Armstrong and R. F. Vaccaro. The dissolved organic constituents are discussed by E. K. Duursma, and the production of organic matter in the primary stages of the marine food chain is described by J. D. H. Strickland. The final chapter presents a more integrated approach to the problem of anoxic basins and fjords by F. A. Richards.

Although the organization of the book makes it satisfactory as a reference work, it is inadequate as a textbook. It fails to show the relationships among the various chemical-physical and biological factors. To train earth scientists to cope with the problems presented by nature, a textbook must be better integrated, for the oceans are ignorant of the narrow specialties suggested by the chapter headings. The book is useful as a series of review articles by experts with an extensive, relatively up-to-date bibliography and a good index.

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Thinkers Incorporated

Bruce L. R. Smith's **The RAND Corporation** (Harvard University Press, Cambridge, 1966. 348 pp. $7.95) is based on a thesis written at Harvard and suffers to some extent from the normal problems of thesis style. But it affords us a welcome, comprehensive study covering the history of RAND up to about 1962. It describes RAND's fortunate beginnings, the roles of important individuals, and the internal organization of the company, and details the effect that one spectacularly successful study (R-266, on deployment and dispersal of air bases) had on Air Force policy. In addition, it deals with significant issues that have been raised about nonprofit advisory corporations: the relationships to the sponsor and to the public, and the problems of competition (real or imagined) with industry and the universities.

But perhaps the most interesting part of the book deals with the problems and prospects of the corporation. There are discussions of optimum size, of the mechanisms of getting individuals of great ability to work on interdisciplinary issues, and, perhaps most surprising, the importance of "selling" the results of its work, in depth and detail, to the group that is paying for them.

Smith obviously believes in the corporation's future (he now works at RAND), but the problems he defines and the future he paints make it appear that to some extent the good old days are over and that RAND is a victim of its own success. And what a success it was! The revolution of strategic thinking in the United States in the 1950's is clearly one of the important RAND accomplishments. The early thinking on missiles and space, the use of quantitative social science, and the development of program budgeting deserve additional laurels. One of the consequences of recognition has been that universities which once scorned strategic thinking as a discipline hired away RAND people, and the Defense Department took others—Charles Hitch, Alain Enthoven, Henry Rowen—to put the new brand of thinking into effect within its own walls. Because RAND was set up initially in the interests of the Air Force, it was affected by the later decline in relative importance and affluence of the Air Force. RAND took on other jobs, and new companies similar to it began attracting some of the spotlight.

One of the issues in government agencies that are trying to develop new programs is whether or not a RAND-type corporation should be set up to do independent advisory work for them. Surely, the argument goes, we need analytical help, and the alternatives of short-term contracts with industry or universities, or in-house operation, seem to have great drawbacks. Therefore, the history of RAND, the most successful corporation of its kind, has many lessons. But whether or not such an organization would be useful in studying transportation, pollution, crime, urban development, or science policy, is not clear. Revolutions of the RAND type do not occur often. The main lesson of this book seems to be that RAND was a happy accident, very dependent on the quality of its staff.

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New Books

Mathematics, Physical Sciences, and Engineering

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Advanced Concepts in Physical Chemistry. Ernest D. Kaufman. McGraw-Hill, New York, 1966. 283 pp. Illus. $9.95.

Advances in Catalysis and Related Subjects. vol. 16. D. D. Eley, Herman Pines, and Paul B. Weisz, Eds. Academic Press, New York, 1966. 301 pp. Illus. $13. Five papers: "The homogeneous catalytic isomerization of olefins by transition metal complexes" by Milton Orchin; "The mechanism of dehydration of alcohols over alumina catalysts" by Herman Pines and Joost Manassen; "Complex adsorption in hydrogen exchange on Group VIII transition metal catalysts" by J. L. Garnett and W. A. Sollich-Baumgartner; "Stereochemistry and the mechanism of hydrogenation of unsaturated hydrocarbons" by Samuel Siegel; and "Chemical identification of surface groups" by H. P. Boehm.

Advances in Free-Radical Chemistry. vol. 1. G. H. Williams, Ed. Logos Press, London; Academic Press, New York, 1966. 303 pp. Illus. $12. Six papers: "The abstraction of hydrogen atoms by free radicals" by A. F. Trotman-Dickenson; "Inorganic hydrogen- and alkyl-containing free radicals, part I, Groups II, III and IV" by N. J. Friswell and B. G. Gowenlock; "Solvent effects in free radical reactions" by Earl S. Huyser; "Vapour phase halogenation of aromatic compounds" by Eduard C. Kooyman; "Free-radical reactions of bridged cyclic compounds" by David I. Davies and Stanley J. Cristol; and "Rearrangement of radicals in solution" by R. Kh. Freidlina.

Advances in Heat Transfer. vol. 3. Thomas F. Irvine, Jr. and James P. Hartnett, Eds. Academic Press, New York, 1966. 325 pp. Illus. $12. Five papers: "The effect of free-stream turbulence on heat transfer rates" by J. Kestin; "Heat and mass transfer in turbulent boundary layers" by A. I. Leont'ev; "Liquid metal heat transfer" by Ralph P. Stein; "Radiation transfer and interaction of convection with radiation heat transfer" by R. Viskanta; and "A critical survey of the major methods for measuring and calculating dilute gas transport properties" by A. A. Westenberg.

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