On Working the Sea

Ocean Engineering. Goals, Environment, Technology. JOHN F. BRAHTZ, Ed. Wiley, New York, 1968. xii + 720 pp., illus. $17.95. University of California Engineering and Physical Sciences Extension Series.

Ocean engineers are so much in demand these days that any textlike book on their field is likely to attract professional readers. In fact, many present-day "ocean engineers" are refugees from other industries whose principal oceanic experience is that they have read one such book. This one is a summary of a 1966 University of California Extension lecture series, but a good share of the text would not ordinarily be regarded either as engineering text material or as necessary background for ocean engineering work. Moreover, since the lectures were delivered by a group of (mostly distinguished) oceanographers, it is highly variable from chapter to chapter. Apparently the content and quality of the book depended somewhat on who was available for lectures on certain dates.

Part 1 of this book is called System Planning—The Goals and the Environment. If indeed the goals are stated, they are obscure, and much of the space is devoted to such matters as "Economic and social needs for marine resources," "Sea power and the sea bed," "The law of the sea and public policy," and "General features of the oceans." These chapters are unfortunately all written by old friends who will take me to task for saying that their contributions are interesting but irrelevant. There is also considerable talk about systems design, technology matrices, and functional analyses which is more appropriate to the New Look than to the Real World.

Part 2, Systems Design—The Technology, is much closer to the mark, and there is a good deal of solid background information on materials selection, instrumentation, and communcations, deep-ocean installations and work systems, and vehicles, structures, and platforms. There are usable numbers, experimental descriptions, and case histories.

One naturally asks, What else should such a book include to fulfill the promise of the title? There is virtually nothing here about shoreline structures or the construction of harbor facilities. Nor is anything said about shipping, pipelines, fishing and fishery-product processing, waste disposal, salvage, or resonance and response problems. The engineers I know spend half their time worrying about costs—for the dollar sign is as much a part of engineering as the slide rule—but the problems of the money game are not mentioned. I was also disappointed not to find a mention of the substantial engineering achievements of the 1961 Phase I Mohole drilling, in which world's records were increased by a factor of ten for depth of water in which drilling was carried out, a ship was held in position without anchors for a month, a turbine drill was used under 12,000 feet of water, and other records were set.

Some of the instruments and machines described have long since become obsolete, and some perfectly nutty schemes for undersea work are illustrated. Nor have the authors indicated that some of the things described were abysmal failures. But the book can be a good reference for a discriminating engineer.

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Russian Epidemiology

Natural Nidality of Diseases and Questions of Parasitology. Proceedings of the 4th conference, Alma-Ata, Kazakhstan, 1959. Translated from the Russian edition (1961) by Frederick K. Plous, Jr. NORMAN D. LEVINE, Ed. University of Illinois Press, Urbana, 1968. xii + 483 pp., illus. $10.95.

The fourth conference on natural nidality of diseases and problems of parasitology of Kazakhstan and the Republics of Central Asia was held in September 1959, and the proceedings were published in Russia in 1961. These have only now been translated, with support by grants from the National Communicable Disease Center and the National Library of Medicine.

"Natural nidality" is a "doctrine" first promulgated by Evgeny N. Pavlovsky in 1939 and developed *in extenso* in his book, *Natural Nidality of Transmissible Diseases with Special Reference to the Landscape Epidemiology of Zooanthroponeses*, published in 1964 in Russia and, in English translation by the translator and the editor of the present work, in 1966 in the United States. In his preface, editor Levine says: "A nidus is a 'nest' or focus of infection, i.e., a place where a disease exists. Pavlovsky pointed out that certain diseases occur naturally in wild life and are transmitted to man by arthropod vectors when he invades their nidus. These diseases are zoonoses. . . . They are well known to western scientists, and research on their epidemiology began long before Pavlovsky enunciated his theory of natural nidality. His concept is not new, but the term is, and it has acted like a slogan to capture the interest of scientific workers."

This translation is flawed by the retention of literal English equivalents of terms and phrases employed by the Russians, the meanings of which are not readily apparent in the context in which they are employed or are specifically different from their usual meaning in English. As Levine further notes in his preface, "The definitions of Russian equivalents of English terms are not necessarily the same as their customary English meanings. . . . Hence, in reading this book it might be worthwhile to refer to the glossary of English equivalents of Russian epidemiologic terms which I prepared as an addendum to the translation of Pavlovsky's *Natural Nidality of Transmissible Diseases.*" While the imaginative reader will recognize "pessimum" as the antonym of "optimum," he may have trouble with terms such as "proepidemicism" or "viroferousness," and he may well fail to equate "transmissible" as applied to diseases with the more narrow meaning of "vector-borne" intended by the Russians.

The conference (and the book) was divided into four sections, from which 111 papers were selected (or available) for publication. The section on Natural Nidality of Diseases contains 25 papers dealing with doctrine, "history," specific diseases such as Omsk hemorrhagic fever, Q fever, leptospirosis, and (in a provocative review by C. A. Hoare) certain protozoan infections of man, and technical aspects of control. In 19 papers on Protozoology, the most emphasis is given to protozoa affecting only lower animals (trypanosomes, bovine anaplasmosis, and theileriosis), although four of the papers deal with toxoplasma. The largest number of papers, 35, were on Helminthology—and these also were mostly concerned with agents affecting only domestic and wild animals (five papers on echinococcosis providing the principal exception). The final 32 papers are grouped under the heading Arachnoentomology but include a few on such nonarachnids as midges, sandflies, and *Anopheles* mosquitos.

Excepting Hoare's presentation, which

takes a worldwide perspective, the papers are almost exclusively concerned with Asian Russia. They are typically brief, almost abstract in form. Their heavy emphasis on pure zoonoses contributes to the fields of comparative medicine and veterinary parasitology. For those interested in diseases important to man outside of Russia there is little meat, and the collection of papers is important chiefly from the standpoint of medical intelligence; that is, it provides a miscellany of minor factual information and illustrates the scope of interest of, and approaches taken by, a segment of Russian epidemiologists as of 1959. This volume probably should be available in university biomedical libraries, but only readers with highly specialized interests will wish to add it to their personal collections.

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Physics Summer School

Fundamental Problems in Statistical Mechanics II. Proceedings of the second NUFFIC International Summer Course, Noordwijk, the Netherlands, 1967. E. G. D. COHEN, Ed. North-Holland, Amsterdam, 1968 (U.S. distributor, Interscience [Wiley], New York). ix + 338 pp., illus. $11.

This book records the proceedings of a summer school on statistical mechanics held in 1967. It is a successor to a volume containing the proceedings of a summer school held five years earlier. The contrast is interesting: whereas the first school was largely backward-looking, reviewing progress made chiefly in the previous 10 to 15 years, the recent school was far more "up-to-date" and forward-looking. In particular this volume will be valued because of the introductory accounts by Hugenholtz and Ruelle of the so-called C* operator algebra approach to the treatment of statistical systems of infinite extent. This rigorous approach, developed with much fanfare in the last few years, avoids all consideration of the "thermodynamic limit," in which finite but ever larger systems must be discussed. For physicists not versed in modern mathematical terminology the original papers have been hard going. The lectures by Hugenholtz and Ruelle will ease the way, although one regrets that a more extended expository review of all this work was not presented so that nonexperts could more easily assess its significance.

Another new and fundamental area concerns the "divergencies" which have been found in the theory of the transport coefficients of a fluid. Extensive efforts by many research schools had finally led to agreed-upon formal expressions for the density corrections to the thermal conductivity, viscosity, and other properties of a dilute gas. Unfortunately, once a serious effort was made to actually evaluate these higher-order terms (mainly by Cohen and his collaborators) it was discovered that some of the integrals involved were logarithmically divergent. As is explained by Cohen in his lectures, the origin of these divergencies—essentially in multiple collisions in which one or more of the collisions occurs indefinitely far from and later than the earlier ones—is now understood. It is believed that, in contrast to the equilibrium properties of a gas, for which a Taylor series in powers of the density ρ exists (the virial expansion), the correct expressions for *non*equilibrium properties must include terms such as $\rho^2 \ln \rho$, which are not analytic at $\rho = 0$.

The subject of phase transitions and critical phenomena, which has been under increasingly active investigation, is the topic of the lectures by Kasteleyn and Kac (and a shorter note by Jancovici on theories of freezing). Kasteleyn presents a clear and succinct review of many of the recent developments, but in the proceedings as a whole one misses accounts of some of the beautiful work of Griffiths, Dobrushin, Minlos and Sinai, and others on the rigorous proof of the existence of phase transitions, and of the deep thermodynamic analyses of Griffiths, based on convexity properties, which concern the equation of state of a system near a critical point. This, however, is a carping point: one should indeed be grateful for this excellent and well-produced collection (although typographic errors are rather abundant). Potential readers or browsers should note, in addition to the topics singled out above, the general introduction by Uhlenbeck and the contributions by Glauber on photon statistics, by Casimir on Bose-Einstein condensation, by Waldmann on gases with internal dynamics, and by van Kampen on classical plasmas.

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Tooth Decay

Art and Science of Dental Caries Research. ROBERT S. HARRIS, Ed. Academic Press, New York, 1968. xx + 428 pp., illus. $17.50.

This book gives a picture of the present state of dental caries research and of the activity of a number of highly productive workers in this field. It will be an essential part of the library of persons doing dental research and should be read by any dentist who wants to follow advances in science which touch on his art.

During the last decade quantitative bacteriological studies on animal caries, begun at Harvard by Shaw and Keyes, and similar quantitative studies on man, by Stralfors and by Krasse in Sweden, have converged, notably in the work of Gibbons, to give a great increase in the understanding of the bacteria producing dental caries in man. This work is described in Harris' book by the bacteriologists involved in it. The description of the progress of the research and the techniques used is excellent. Because of the specific nature of the polysaccharide-producing microorganisms concerned there is a real prospect of very much improved prophylaxis if the discoveries are exploited. Moreover, the new bacteriology of caries appears relevant to the other important dental condition, periodontal disease.

The bacteria causing caries establish themselves in a "plaque" adhering to the enamel surface and leach out the enamel salts by altering the surface concentration of hydrogen, phosphate, carbonate, and possibly calcium ions. There results a very specific change in the enamel which can be duplicated by exposing enamel in vitro to sterile inorganic solutions. The highly characteristic change can be observed in sectioned enamel with the polarizing microscope and correlates very well with the nature of the penetration of the enamel, the pathways by which the enamel was originally mineralized, and the known activities of the microorganisms involved. The information essential to the understanding of the biochemistry of this aspect of caries is more readily available in the English, Swedish, and German literature than in publications in the U.S. and U.S.S.R. The coverage in the present book tends to be American in approach.

The clearly written articles on the design of conclusive experiments are particularly valuable because, with the understanding of mechanisms now