Book Reviews

The Prospects of Nuclear Power and Technology. Gerald Wendt. Van Nostrand, Princeton, N.J., 1957. 348 pp. $6.

The United Nations Conference on the Peaceful Uses of Atomic Energy, which was held in Geneva in 1955, viewed the world energy situation with unprecedented breadth of outlook and completeness. Representatives of the United Nations submitted papers which described the energy situation in the world and which projected energy demands into the distant future. Representatives of individual nations described these situations with respect to energy resources in their own countries and attempted to evaluate the potential applicability of atomic energy. Representatives of the nations which possess the more highly developed nuclear technologies described, in some detail, their programs for the development of this new source of energy.

In *The Prospects of Nuclear Power and Technology,* Gerald Wendt has done an excellent job of abstracting the lengthy reports of this very unusual conference and of putting them in a form which should be readable and interesting to scientist and nonscientist alike. Unlike many popularizers of science, Wendt appreciates the realities of both the economics and the technology of nuclear energy, with the result that he does not give the reader the view that atomic energy is going to revolutionize his life overnight. At the same time he correctly emphasizes the fact that, in the long run, atomic energy will be essential to the survival of civilization and that the time is close at hand when it will be essential to the survival of certain specific energy-short areas of the world—for example, Japan.

Wendt discusses briefly, simply, and completely the technical aspects of producing nuclear power. He then discusses in some detail the energy needs of the world, giving special emphasis to the special problems of countries such as India and Japan, in contrast to those of Great Britain and the United States. This discussion is followed by detailed accounts of the applicability of atomic energy in many specific areas of the world, with particular emphasis on the economic factors that are involved.

The second part of the book, representing about half of the total, is devoted entirely to a discussion of the technological aspects of the problems involved in the production of nuclear power. What is the situation with respect to mineral resources? How are nuclear fuels and reactor materials produced? How do nuclear reactors work? What are the problems of waste disposal? All of these questions are discussed in detail, clearly, yet with no "talking down" to the reader.

Those of us who are asked from time to time to recommend, to nonscientists, reading matter concerned with the peaceful uses of atomic energy should be grateful to Gerald Wendt for having written this book. I, for one, will recommend it highly and will urge my colleagues to do likewise.

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Faune de France. 60, Bryozoaires. Part I. *Entoproctes, Phylactolèmes, Cténostomes.* Marcel Prenant and Geneviève Bobin. Lechevalier, Paris, 1956. 398 pp. Illus. F. 5000, paper.

No single up-to-date monograph exists which is completely adequate for identification of recent bryozoan fauna of Western Europe, particularly of France and the Mediterranean region. Marcel Prenant and Geneviève Bobin intend to alleviate the need but, because bryozoan literature is considerable and taxonomy is controversial, they find it necessary to extend the project beyond one volume.

The first volume covers 25 families, 40 genera, and 119 species, 11 of which are fresh-water species and 108, marine. These 119 species fall into the following taxa: class Entoprocta, 38 species: class Ectoprocta: subclass Phylactolaemata, nine species; subclass Gymnolaemata, suborder Ctenostomata, 72 species. Of these 119 species, 77 are already known in French waters and 35 more can be expected to occur there. Of these 77 reported species, 25 are entoprocts, eight, phylactolaemata, and 44, ctenostomes.

Subsequent volumes will deal with the remaining and far more numerous marine ectoprocts of the suborders Cheilostomata and Cyclostomata.

No new species are erected. Deviations from traditional bryozoan classification are minor. Only one emendation was made, that to the ctenostome group Paludicellina, into which were placed the Benedeniporidae and the Lobiancoporidae, which the authors have elevated to family rank from previous subfamily status. Other authors had considered these subfamilies as belonging to the Alcyonidiidae. Complete synonymy and morphological, statistical, developmental, ecological, distributional, and historical data are given for each species, wherever such data are available or wherever it is prudent.

Of the monograph's 398 pages, 57 are devoted to an extensive bibliography, about 28 pages, roughly, to very detailed keys to genera and species, 49 pages to the Phylactolaemata, 161 pages to the ctenostomes, and 102 to the entoprocts. The 11 fresh-water species occupy about 59 pages.

The illustrations (151 figures) are simple, large, clear, and adequate for purposes of identification. Each of the 119 species is illustrated. Most of the figures include several sketches each, and 39 are full plate size, or nearly so.

The classification that is followed is conservative and traditional—that of Marcus and of most other established bryozoologists—and is at variance with classifications proposed by Cori, Hyman, and others who separate the entoprocts from the Bryozoa.

The increasing interest in the Bryozoa makes such a species compendium necessary.

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Vapour Phase Chromatography. Proceedings of the symposium sponsored by the Hydrocarbon Research Group of the Institute of Petroleum, London, 30 May–1 June 1956. D. H. Desty, Ed. Academic Press, New York; Butterworths, London, 1957. 436 pp. Illus. $12.

Vapour Phase Chromatography is the proceedings of the symposium sponsored by the Hydrocarbon Research Group of the Institute of Petroleum, held in London 30 May–1 June 1956. It comprises 36 contributions on a wide variety of researches in gas chromatography, all by well-qualified authors. Nearly all of the

contributions are of high quality, and much new information is presented. Most of the papers originated in laboratories in the United Kingdom, but a few present work conducted in the Netherlands, Canada, the United States, France, Czechoslovakia, New Zealand, and Hungary. Fundamental aspects of gas chromatography, including thermodynamic treatment, and factors affecting efficiency and choice of solvents are the main themes in six of the papers. Another half-dozen papers are devoted to experimental evaluation of new supports, liquid phases, detectors, and the like.

Operation of columns at high temperatures has been very effective in extending the scope of gas chromatography to separation of mixtures of high-boiling compounds. Two papers on this subject are included. Other papers describe experimental work dealing with continuous large-scale (semiworks) separation of nearly pure acetylene from partially burned methane, use of the process to study kinetics of reactions, separation of the isotopic modifications of hydrogen, control of refinery processes, separation of fatty acids and alcohols, chlorinated and fluorinated compounds, and determination of isopropyl nitrate in heavy oil. Two papers review the relative merits of the several methods of detection, another describes use of a gas-density balance for detection, and two are concerned with the hydrogen-flare detector.

Much useful information appears in the prepared and extemporaneous discussions. Included are descriptions of a new pipette for sample introduction, separation of alkylated diphenyls, and improvements in the use of a hydrogen-flare detector.

I found an extraordinarily small number of typographic errors. The illustrations are uniformly good, and the printing is clean and sharp. Good quality coated paper was used, and the book is sturdily bound.

This volume can hardly be classified as simply a textbook on gas chromatography. It is an excellent presentation of recent researches in the field, at several prominent laboratories.

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Handbuch der Physik. vol. XX, *Electrical Conductivity II.* S. Flügge, Ed. Springer, Berlin, 1957. 491 pp. Illus. DM. 112.

Volume XX of the *Handbuch der Physik* deals with electric conductivity in semiconductors, in ionic crystals, in glasses, and during electrolysis in liquids. The subjects dealt with are very different, but, in general, the articles are well written and give an excellent account of the present status of the field described.

The article on semiconductors, by O. Madelung, is the longest (245 pages) and the most complex. It is well organized and well written. The article is good in that it is self-contained; for example, the behavior of semiconductors having isotropic Fermi surfaces and under conditions of isotropic electron scattering is considered first. Then the situation which occurs when the constant energy surfaces are anisotropic and the scattering is anisotropic are considered. Similarly, one first considers problems in which the electron and the hole distributions are in local equilibrium and only later are problems considered in which local deviations from the equilibrium state are important. There is, however, one section which I believe is out of its proper place. The article ends with a section on special semiconductors. In many ways this would be useful at the beginning, since one would then see, at the beginning, that many semiconductors—in fact, probably most—have a rather complicated band structure for an understanding of which the complex treatment given for conductivity is useful and indeed necessary. The literature cited is very completely surveyed through 1955, and references for the first few months in 1956 are given. The discussion of the various subjects is, in general, full and careful, and all possible subjects are considered. The description of the cyclotron resonance experiments is perhaps a bit brief, but the references are complete. This review appears at a good time, since one has the feeling that most of the important phenomena in the field are at least qualitatively understood.

The second article, by A. B. Lidiard, is an excellent survey of the present status of ionic conductivity. The article gives careful theoretical consideration to the types of defect which are responsible for ionic conductivity in the alkali halides and the silver halides. If one compares the article with the book of Mott and Gurney (*Electronic Processes in Ionic Crystals,* Oxford University Press, 1940) it is clear, first, that the theoretical calculations in the field have been carried a good deal further, in a quantitative sense, than they had been before World War II; in addition, certain phenomena are discussed and treated theoretically which were not considered before the war; for example, the alternating-current phenomena and the deviations from the Einstein relation connecting the ionic conductivity and the diffusion constants. It is also clear that the quantity and quality of experimental data have increased greatly, so that the improved theoretical treatment is justified. The description of all these changes is given by Lidiard in a very clear and concise fashion. The article confines itself mainly to the alkali halides and the silver halides, whereas a brief mention of the extent of the present knowledge concerning other materials, such as oxides and sulfides, would be welcome. The article is carefully and clearly written and will be useful both for those who have followed recent developments and for the uninitiated.

The third article, by J. M. Stevels, is on the electric properties of glass; both the direct- and alternating-current properties are described. It is clear that in this field, in contrast to the two cases considered in preceding paragraphs, the theoretical development is at a very early stage. The experimental situation is clearly presented, and various qualitative ideas concerning interpretation are discussed.

The last article, by E. Darmois, is a survey of electrochemistry. It considers the phenomena which occur in electrolytic solutions. The major new developments in this field since 1935 are the development of polarographic analysis, by Heyrovsky, and the increasing use of electrolytic polishing and etching. These developments are rather briefly discussed.

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The Theory of Groups. vols. 1 and 2. A. G. Kurosh. Chelsea, New York, 1955. 272 pp.; 308 pp. $4.95 per volume.

The Theory of Groups (in two volumes) is a translation by K. A. Hirsch of the second Russian edition of *Teoriya Grupp.* A German translation of the first edition was published in 1953 by the Akademie-Verlag, Berlin. However, the second edition differs so much from the first that it is virtually a new book.

The theory of groups is one of the most active areas of modern mathematical research, and an up-to-date textbook has been needed for some time. This book fulfills that purpose admirably. Approximately one-quarter of the book deals with the elements of the subject and does this from the modern point of view, without unnecessary assumptions of finiteness. In fact, the theory of finite groups is deliberately omitted from the whole book, and the author mentions the need for a separate textbook on the subject. The translation is excellent, and the translator has added many useful appendixes in addition to extending the bibliography to include relevant research work of the last few years.

Each volume is in two parts. Part I of volume I consists of chapters I, II,