Book Reviews

New Series in Physics

Studies in Statistical Mechanics. vol. 1. J. De Boer and G. E. Uhlenbeck, Eds. North-Holland, Amsterdam; Interscience (Wiley), New York, 1962. x + 350 pp. $13.75.

This is the first volume in a series of studies on statistical mechanics. The editors emphasize that, by the term *studies*, they mean not only summaries of recent research in the field but also critical accounts of the older classical material that constitutes much of the existing body of knowledge in the subject. The idea is a good one. Such studies can do much to bridge the gap between the customary textbooks and the research literature, and in this volume the editors have included, as part A (approximately one-third of the book), E. K. Gora's translation from the Russian of N. N. Bogoliubov's well-known *Problems of a Dynamical Theory in Statistical Physics*. This translation, which was partially supported by the Geophysics Research Directorate (Air Force Cambridge Research Center, Air Research and Development Command), has been out of print for some time. Although another translation (AEC-tr-3852) of this classic work is presumably available from the Office of Technical Services, I feel that the Gora translation is scientifically much more accurate and that its inclusion in this volume is fully justified.

Part B, on the theory of linear graphs with applications to the theory of the virial development of the properties of gases, was written by G. E. Uhlenbeck and G. W. Ford. Here is an excellent account of the application of topological methods to the problem of the equilibrium classical statistical mechanics of gases, which can be highly recommended to all serious students of the subject. Graphic methods in recent times have been successfully applied to quantum statistical mechanics and to nonequilibrium statistical mechanics. It is to be hoped that future volumes in this series will contain accounts of these interesting topics. It is not clear from the text when Uhlenbeck and Ford's article was written. Apparently there are no references to literature later than 1956.

Part C, written by H. Mori, I. Oppenheim, and J. Ross, is a good account of the Wigner distribution function and its application to transport theory. The article was essentially completed in 1959 and is therefore a little out of date. Although at present it is not known which bricks will pave the road to nonequilibrium statistical mechanics, those related to the Wigner distribution function methods seem to be as good contenders as any. The authors modestly present their account as a personal one—one which is not intended to be exhaustive or critical.

Part D, by M. Dresden, "A study of models in nonequilibrium statistical mechanics," is devoted to a study of certain simplified models in statistical mechanics. Historically, models have been studied because the study of real systems was beset by insurmountable mathematical difficulties, but the study of models is by no means mathematically trivial. Although some basic difficulties in statistical mechanics have been clarified by this approach, the method does not appear to get at the roots of the problem. Dresden's article is well written, but here again, it is not clear from the text when it was written. The latest citation appears to be dated 1958.

The book has a good index. Unfortunately the price is somewhat high.

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Geology of Australia

The Geology of Queensland. D. Hill and A. K. Denmead, Eds. Melbourne University Press, Melbourne, Australia, 1961. xiii + 474 pp. Illus.

This volume, the third in a series of geologic summaries of Australian states published by the young and vigorous Geological Society of Australia, was written for the centenary celebration of Australia's second largest state, Queensland. Its timeliness could hardly have been foreseen by the editors: the book preceded, by about 1 year, the discovery of the continent's first commercial oil field, the Moonie, in southeastern Queensland.

Queensland covers about 750,000 square miles, and its geology is complex. The slow growth of geological knowledge in earlier decades was succeeded by an unpredictably explosive expansion of exploration and geological mapping during the last 20 years. In these circumstances the most unusual, and perhaps the most valuable, aspect of the book is its extensive utilization of previously unpublished information. More than 4 pages of a 20-page list of references are filled with titles, including depositories, of unpublished reports. In addition, there are liberal quotations from "personal communications" throughout the text.

Fifty-two geologists cooperated in this venture, and this multiplicity proves to be both a strength and a weakness. On the one hand, the volume is as authentic a piece of regional geology as any that has been compiled in recent years for any area of comparable size; on the other, the text appears disjointed in many places, and overall synthesis and historical perspective are lacking.

The book opens with an excellent, though all too short (19 pages), chapter (by D. Hill) on the geological structure of Queensland. The remaining contributions, about 150 in all, are arranged according to divisions of geologic time from Precambrian to late Cenozoic, with two additional chapters headed "Laterites" and "Clays." Within each period the treatment is on a regional basis, and the material is presented in the form of eight to twelve individual contributions, many of them written by joint authors (with divided responsibilities). Each contribution describes competently and precisely the rocks of one restricted area, but for individual

periods there is no summary of geological events or of the evolution of the major structural pattern.

As a result, one notices striking inequalities in the treatment of some major geologic features. Thus, while there is a well-written, coherent chapter on the Precambrian belt of northwest Queensland, which contains the important Cloncurry and Mount Isa mineral fields and the Mary Kathleen uranium deposits of more recent discovery, information on the Yarroo Basin, one of the major Paleozoic structures of Queensland, must be gleaned from perhaps a dozen separate contributions scattered through some 80 pages of text.

Many facts of great scientific and economic interest are first reported in this volume—for example, the discovery of very large bauxite deposits in Cape York Peninsula and of marine Miocene below the coral formations of the Great Barrier Reef. A more detailed table of contents and a fossil index would be most helpful. All in all, this book is a mine of authentic information on stratigraphy, regional tectonics, and economic geology.

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A Point of View

The Inspiration of Science. Sir George Thomson. Oxford University Press, New York, 1962. x + 150 pp. Illus. $4.

This short book might be described as an attempt to provide for the layman some insights into both the content and the methods of physics, but scientists will also enjoy it. Sir George Thomson, co-winner in 1937 of the Nobel prize in physics and son of the great J. J. Thomson, is admirably equipped to write about the scientific enterprise—about science as it actually happens rather than about science as it is seen from outside. With brevity, and yet with clarity, he writes of those experiments of his father and others which gave us our modern picture of atomic and nuclear structure. He traces the changing concepts of time, space, energy, and mass from Ptolemy through Galileo and Copernicus to Newton and then on to Lorentz and Einstein. Other chapters describe the discoveries of x-rays and cosmic rays, the discovery of noble gases, and the recognition of the particle-like nature of photons and the wavelike nature of electrons. To cover all these topics in a small book requires oversimplification, of course, but Sir George manages to simplify without seriously misleading his readers.

Fortunately, the book is more than a brief treatment of well-known discoveries and ideas. Discoveries are used as springboards for pithy comments about what physicists, and scientists in general, actually do. Sir George has no doctrinaire approach to *the* scientific method, but rather he discusses the role of luck, the role of persistence, "science as an art," the importance of the interplay between experiment and theory, and many other factors which both delight and bother the working scientist.

In addition, there are brief but often trenchant sketches of 11 great men of the past century in physics: Maxwell, J. J. Thomson, Aston, Millikan, Rutherford, Lorentz, Einstein, Rayleigh, C. T. R. Wilson, Planck, and Davisson. Sir George's boundary conditions in choosing these men from among the many giants were two: no living physicist could be included and all must be men whom Sir George knew directly or "through a lively family tradition." It is surely to be hoped that he has deposited somewhere in safe hands equally illuminating accounts of the many other great physicists he has known but who do not yet meet his first condition.

One hesitates to quibble over prose style, but there are many passages which show evidence of overhasty editing. On page 37, for example, there are two: "Though J.J. (Thomson) was trained as a mathematician, he did much theoretical work and retained his skill in mathematical analysis to an advanced age," and "Present-day theory regards these [magnetic and electric lines of force] as merely convenient mathematical fictions, but they certainly are convenient and are proving especially so today in the study of how very hot gases can be contained by magnetic fields so as to produce a fusion nuclear reaction, the problem of Zeta." (The "problem of Zeta" is mentioned nowhere else in the book.) At times, one wonders if the book was first a series of lectures on the BBC and whether the printer set the type directly from recorded tapes.

A perhaps more important quibble must be made with respect to the statement (page 60) that "Though Aristarchos of Samos had suggested in about 250 B.C. an arrangement with the sun at the center, this had been forgotten and when Copernicus put forward his famous theory he was making an original discovery." In an early manuscript for his *De Revolutionibus*, Copernicus mentioned Aristarchos by name, and in the final draft he went to considerable length to cite various ancient authorities who believed that the earth was moving. According to Thomas Kuhn (in *The Copernican Revolution*), Copernicus also probably knew at least some of his more immediate predecessors, especially Nicholas of Cusa. In any event, the "discovery" of Copernicus was not that the earth moves around the sun, but rather that a heliocentric system could be worked out that would be mathematically simpler than the geocentric system but just as precise in its predictions of apparent planetary positions. Indeed, Sir George goes on to point out this fact.

The book can be recommended to intelligent laymen, to scientists, and to those who persist in writing about *the* scientific method. If the publishers would kindly bring it out as an inexpensive paperback, this would be a good book to ask undergraduate students to buy, read, and keep.

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Cosmic Dust to Galaxies

Advances in Astronomy and Astrophysics. vol. 1. Zdenek Kopal, Ed. Academic Press, New York, 1962. x + 366 pp. Illus. $10.

This first volume of the new series *Advances in Astronomy and Astrophysics*, edited by Zdenek Kopal, contains five papers on a variety of subjects ranging from micrometeorites to the dynamics of galaxies. The first part of the paper, by D. W. Parker and W. Hunter, on meteorites and cosmic dust, is in the nature of a review, but most of their paper consists of a very detailed description of their methods of studying cosmic dust. This very difficult research field promises exciting dividends in the next few years, particularly when material can be collected from recoverable satellites. L. Perek's comprehensive paper on the distribution of mass in oblate stellar systems is based both on velocity dis-