observers, rigorous experimenters, and logical and imaginative thinkers, such as R. Hertwig, Maupas, and Jennings, among those no longer alive. But it also includes a very large amount of nonsense. This in considerable measure stems from observers, often excellent observers, who are innocent of the rigorous basis, experimental or logical or both, required for drawing sound conclusions and who commonly appear to be unaware that their conclusions are not obvious consequences of, or even identical with, their observations. Perhaps Wichterman conceived his task to be primarily to inform his reader of what the literature contains, not to sit in judgment on it. That he is capable of analysis, synthesis, and judgment, however, is repeatedly shown in the book (for example, the discussions of the status of autogamy and of taxonomy). It is greatly to be regretted that a similar approach was not consistently followed throughout the book and in all its details. Nevertheless, the book is a mine of information which will doubtless prove interesting, stimulating, and fruitful to investigators and students as it has already to the reviewer.

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Low Temperature Physics: Four Lectures. F. E. Simon *et al.* New York: Academic Press; London: Pergamon Press, 1952. 132 pp. Illus. $3.50.

These four nonmathematical lectures, by outstanding research experimentalists in the field of low temperature physics, were originally given at the Royal Institution, London, in the winter of 1950 as a short course for young students preparing to specialize in the field and as a general survey for those whose interest in low-temperature physics is less direct.

The style of the lecture is maintained by all four writers. Useful bibliographies and references have been appended. As the publication followed some two years after the lectures were given, reports on work of more recent date than 1950 are included, notably on the achievement of nuclear alignment at low temperatures in 1951 (see lecture 2).

The first lecture by F. E. Simon, Professor of Thermodynamics in the University of Oxford, is a general survey. In it he surveys the general principles of attaining low temperatures and the significant role played in such considerations by the third law of thermodynamics, which he describes as the most important guiding principle in low-temperature research. He makes a brief outline of the importance of the zero point energy in the behavior of liquid helium and of electrons in metals, and sketches the significance of low-temperature research to our understanding of many of the thermal, mechanical, and magnetic properties of matter, including those concerned with the general phase diagram of fluids. Although this general outline of necessity is short, it is well balanced and serves as an excellent background for the three succeeding lectures.

The second lecture by N. Kurti, also of the University of Oxford, is on the temperature range below 1° absolute. In it the author justifies the separation of this particular range of temperature from other ranges of low-temperature research mainly on the grounds that it is approachable generally only by magnetic cooling methods. He then describes the method of magnetic cooling using paramagnetic salts, giving interesting practical information and giving some data on the properties of the salts themselves. A longer section is devoted to the possible techniques to be used for future nuclear magnetic cooling, for obtaining temperatures still lower than those reached using paramagnetic salts. To date, however, such nuclear cooling has not been achieved. The lecture gives a satisfactory general introduction to the extensive work that has been done in the temperature range below 1° K during the past two decades.

The third lecture, entitled "Liquid Helium," by J. F. Allen, Professor of Natural Philosophy in the University of St. Andrews, gives a nonmathematical description of the main properties of the fluid. The phase diagram and the significance of the zero point energy are first discussed, and then the main transport and film properties of the superfluid phase are presented and discussed in the light of the current two fluid model of the liquid. In such a brief outline many interesting features, as, for example, that of second sound, could be treated only lightly; nevertheless, no items of fundamental importance have been omitted. The lecture should stimulate its readers to further study of the many interesting facets of the problem of liquid helium.

Superconductivity forms the subject of the fourth lecture by K. Mendelssohn, also of the University of Oxford. The author has compressed the more significant results of over 40 years' work by a great number of investigators on the phenomenon of superconductivity into one very readable lecture. He outlines the salient experimental features of superconductivity, namely the distribution of the effect among elements and alloys, the magnetic properties, the magnetic penetration depth, heat conductivity, etc. He devotes a larger section to the thermodynamics of the effect and the resulting thermal data that can be obtained therefrom and another to interesting transition phenomena such as time effects. It is not surprising that with so much compression of material, only a cursory statement is made of the theoretical problems involved.

All four lectures maintain an even level among themselves and are presented in a manner easily assimilable by nonspecialist students. For a quick glance at many of the important and active branches of current low-temperature research, they form an accurate and authoritative introduction. Moreover, the bibliographies and references accompanying each lecture serve as useful guides for more detailed study.

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