

aforementioned and other diseases to certain parts of the world. References are made almost solely to demographic findings in Britain; to-day, when so much effort is being made to develop international studies and control of disease, a broader approach to disease incidence would be of undoubted value.

The limited attention paid to the causes and mechanisms of congenital anomalies is regrettable in view of the growing awareness of their importance. Likewise, more attention could have been directed to the biochemical basis of many pathological processes, if only to illustrate the progress which may result when resources of more than one scientific discipline are directed towards individual diseases. In this regard, too, an early chapter on modern investigative methods applied to pathology would have been most interesting and helpful, and would have eliminated the need for digressions frequently interjected in the text whenever techniques pertaining to particular topics are explained.

The printing and production of the book are excellent. Line drawings might have been useful to clarify certain topics; closer correlation of clinical and other macro- with micro-photographs would assist the reader. Many of the illustrations would have been made more valuable by more detailed legends; also, at least a few symbols to clarify allusions to items in illustrations would undoubtedly assist the uninitiated.

In this book a welcome attempt has been made to compare, correlate and contrast the causes and range of pathological reactions in man and beasts. The scope of such a project is most ambitious, albeit desirable. But when an attempt is made to encompass so vast a field, experts in certain areas are likely to detect flaws in approach and in details. None the less, there is little doubt that this work has much to offer to students of and workers in human, veterinary and experimental pathology.

T. GILMAN

## FERROMAGNETISM

### Ferromagnetismus mit einem Beitrag

Quantentheorie und Elektronentheorie des Ferromagnetismus. Von Dr. rer. nat. Eckart Kneller, von Prof. Dr. rer. nat. Alfred Seeger und Dr. rer. nat. Helmut Kronmüller. Pp. xx+792. (Berlin, Göttingen, Heidelberg: Springer-Verlag, 1962.) Dm. 126.

### Microwave Ferrites and Ferrimagnetics

By Dr. Benjamin Lax and Kenneth J. Button. (Lincoln Laboratory Publications.) Pp. xv+752. (New York and London: McGraw-Hill Book Co., Ltd., 1962.) £6 8s.

IN 1939 there appeared one of the most remarkable books in the history of scientific literature, Becker and Döring's *Ferromagnetismus*. It had been made possible by active and fruitful research along two distinct and often not very closely related lines. Theoretical work by Heisenberg, Bloch, Slater and Stoner had led to a fairly clear understanding of the circumstances in which ferromagnetism might be expected to occur. Experimental studies on single crystals and their interpretation by Akulov and Becker made it seem likely that all the phenomena of technical magnetization could be accounted for by the strain theory of Becker and Kersten. This book represented the high-water mark of the strain theory and with its aid the authors accounted for technical magnetization in all its varied aspects in one comprehensive flourish of the pen.

Ten years later, and despite the intervention of a major war for five of them, Becker and Döring's book was largely and irrevocably out of date. Néel had exposed serious errors of omission in the original formulation of the strain theory that cast several doubts on its validity. New experimental techniques had appeared; microwave experiments led to the discovery of ferromagnetic res-

onance, neutron diffraction had raised the status of antiferromagnetism from a speculative suggestion to an established fact, and the development of new materials such as ferrites with their potential application at high frequencies meant that the dynamic characteristics of magnetic materials would need to be understood far more precisely than hitherto. Henceforth, to try and do for ferromagnetism what Becker and Döring had done in 1939 would need not merely scholarship but stamina and a strong nerve.

In his preface to Prof. Kneller's new book Prof. Köster describes the difficulty which faced him in finding an author not merely able but willing to undertake this gigantic task. His labours were not in vain for this new work has qualities not to be found in the existing books on the subject. It is magnificently comprehensive; there can scarcely be a reference, let alone a topic, which is not covered. The early sections include excellent accounts of antiferromagnetism and ferrimagnetism, thermodynamics, anisotropy and magnetostriction, often in considerable detail, and although these are treated from an experimental angle the appropriate mathematical details are given where necessary. All these sections are preparatory to the main account of magnetic domain structure and the theory of magnetization processes in static and alternating fields. Nothing is omitted and the treatment is authoritative.

The courses of technical and intrinsic magnetization have always gone their own ways, largely independent of each other. It is therefore no surprise to find a section described as "Quantum and Electron Theory of Ferromagnetism" included as a supplement and being the combined work of two additional authors. This section—a mere thirty pages long—is really too brief to be anything more than a résumé of existing theories.

There are a few small defects. In the first place the book is already somewhat out of date. This stands out most clearly where the properties of the compound Au<sub>2</sub>Mn are discussed without reference to its helical magnetic structure. The absence of a section devoted to the magnetic properties of the rare earth metals, although in line with the author's approach, is nevertheless a serious omission in a book with such an all-embracing title. Theoretical treatments are often given in full but without critical assessment and without guidance as to the range of applicability of the final result. Finally, despite an excellent subject index printed both in German and English the absence of a cumulative name index sometimes makes a topic unnecessarily difficult to locate. These are, on the whole, minor blemishes. No comparable book contains anything like as much information between its covers and this should rapidly become the standard work on the subject.

No slight is intended on Prof. Kneller's excellent book by describing Lax and Button's *Microwave Ferrites and Ferrimagnetics* as a *tour de force*. It is prefaced by a fifty-page history of the development of ferrite materials and their microwave applications. Thereafter the subject is developed *ab initio* with no concession to chronology. The early sections on antiferromagnetism and ferrimagnetism are masterly. Ferromagnetic resonance is treated with a wealth of detail which includes spin-waves and magnetostatic modes, relaxation processes, non-linear effects and instabilities. This is by far the most comprehensive review of ferromagnetic resonance phenomena which has yet appeared. The sections on wave propagation in ferrimagnetic materials, measuring techniques and microwave devices take up rather more than half the book, which, as the back cover is approached, becomes increasingly addressed to the microwave engineer.

It is an awesome fact that most of this book deals with developments which have occurred over the past ten years. In its seven hundred pages there is not a single reference to Becker and Döring yet, somehow, one feels that no injustice has been done. It is the story of Siegfried and the Wanderer all over again.

E. W. LEE