in the same area, do not compete directly in food and feeding habits.

Sea-Birds is disappointing as a reference work. Related items of data are inextricably scattered throughout the book, and after reading them once, I found that the index, which is systematic and not alphabetical, was of little help in finding the items again. Both the vernacular (more or less local) nomenclature and the technical (apparently up-to-date) nomenclature are used confusingly and without explanation. Without previous knowledge of the subject, it would sometimes be difficult to know exactly which bird is being referred to.

However, it is a book that should stimulate interest and be enjoyed by any bird-minded reader to whom sea-birds are relatively little known. Its appeal is enhanced by many excellent portrait photographs of the diverse species and of their colonies. Furthermore, in browsing through its pages, a serious student of sea-birds can hardly fail to find data and ideas of value, especially where these are firsthand and not gleaned from the literature.

J. T. NICHOLS
American Museum of Natural History, New York

The Structure of Metals and Alloys. Wilhelm Hume-Rothery and G. V. Raynor. Monogr. and Rept. Ser. No. 1, Institute of Metals, London, ed. 3, 1954. viii + 363 pp. Illus. + plates. $5.50.

This is really a new book, although it is called the third edition of Hume-Rothery's book, which was first published in 1936 as a brief book of some 120 pages (second edition in 1944). Hume-Rothery and Raynor are now the authors, and the text is about 3 times the size of the second edition. Whereas the first edition was addressed both to the research man and the practical metallurgist, the new edition is a survey of the modern approach to metallurgy, and as such it should help the practicing metallurgist to understand the electronic background and its consequences.

A brief chapter on the structure of the elements is followed by a chapter on atomic radii and some physical properties of the elements, these chapters are followed by some 70 pages on primary metallic solid solutions and some 40 pages on intermediate phases and alloy systems. Part 6 (some 50 pages) "The structure of the alloys of iron" is entirely new, and the last part, "Imperfections in crystals and deviations from the ideal lattice," has been considerably enlarged and brought up to date to give the main ideas of the theory of dislocations and their applications.

Both authors are well known, not only for their scientific research in the field, but also for their success in bringing the background of modern physics to the attention of the practicing metallurgist. An introduction to the *Electron Theory of Metals* by Raynor is Monograph No. 4 of this series, and Hume-Rothery has contributed in Monograph No. 3, *The Atomic Theory for Students of Metallurgy*. In 1948, Hume-Rothery also published, in the form of a dialogue, a discussion of the modern approach to metallurgy, entitled "Electrons, atoms, metals, and alloys." I am mentioning these monographs by Raynor and Hume-Rothery because I feel that the study of the present book would gain considerably if some of the background available in the other two books were available to the reader. I do not think that the mathematics that is used in the others is such that the practicing metallurgist would be frightened away, and it would help considerably in understanding the large amount of material that has been put together in this new work, which is entirely nonmathematical and more or less descriptive.

Therefore, it might be well to recall the cautious advice from the preface of Raynor's *Electron Theory of Metals*.

> The reader will not finish this monograph, therefore, with the feeling that he can immediately do research in metal physics. Nor will he necessarily be able to understand, without assistance or interpretation, probable future advances. He will, it is hoped, be more at ease with some of the more modern ideas, and the way they are being applied. He should have some idea of what has been achieved by their use in metallurgy, and in what directions future progress is likely.

The amount of material is so large and the number of references is so extensive that it should be possible for the reader to find out about almost any of the modern concepts that are of importance in present-day metallurgy. The book can be recommended for the physicist who wants to understand the problems of the metallurgist and the metallurgist who wants to become acquainted with the approach of modern physics to his problem.

KARL LARK-HOROVITZ
Department of Physics, Purdue University

Linear Operators. Richard G. Cooke. Macmillan, London; St Martin's Press, New York, 1953. 454 pp. $10.

The theory of discrete and continuous eigenvalue expansions associated with Hermitian linear operators in Hilbert space has long been recognized as one of the mathematical disciplines fundamental to quantum mechanics. Five of the seven chapters of Cooke's book are devoted to an exposition of this important mathematical theory; the remaining two chapters contain brief discussions of various related topics.

Chapter 2 gives a somewhat hurried statement of the physical applications of the pure mathematics of the remainder of the book, treating several standard problems (harmonic oscillator, perturbation theory, anharmonic oscillator) from both the Heisenberg and the Schrödinger points of view, and giving a more careful description of the continuous spectrum than is ordinarily found in "physical" analyses.

Aside from Chapter 2, the first part of the book is organized around Chapters 4 and 5 and around the idea of giving a large number of different proofs of