applications to the Dirac equation and fermion annihilation and creation operators.

The third chapter (43 pages) expounds the theory of group representations again mainly by stating definitions and theorems without proofs. Among the more unusual worthwhile sections of this chapter is a short but good discussion of inner and outer Kronecker products. As examples the character tables of some groups of interest in mathematical physics are discussed briefly. This material is continued in the fifth chapter (26 pages) which deals mainly with the relations between the representations of a group and its subgroups; part of this material is also presented in the language of 'little groups'. A section on projective representations is also included.

Chapter IV, by far the largest (114 pages), presents applications in the fields of molecular vibrations, wave guide theory, quantum mechanics, crystallography and crystal dynamics. The illustrations are presented in adequate detail. The chapter also includes a short discussion of the three-dimensional rotation group and double point groups. The applications are continued in chapter VI (22 pages) where the representations of space groups and the connection with energy band theory is discussed.

Chapters VII and VIII (42 pages) give the theory of symmetric groups and its application to molecular, atomic and nuclear structure. There is a brief mention of crystal field theory; it is also shown to what extent selection rules are derivable by group theoretic arguments.

One appendix gives the explicit form of the multidimensional irreducible representations of several point groups; another contains an excellent and rather extensive survey of the Lorentz groups.

The book contains 213 numbered references as well as extensive bibliographies at the end of most individual chapters; the latter are, however, of only limited usefulness since no specific reference to them is made in the text. This is a serious drawback since anybody who would like to know where additional discussion, especially of theory, can be found faces an almost insuperable task.

The terminology and notation is admirably clear, though on occasion a trifle over-elaborate. The index is excellent.

In spite of the title, a significant portion of the book deals—quite justifiably—with infinite groups. In view of this, it would have been helpful if the theoretical section would point out clearly which theorems have to be abandoned or at least modified when the transition from finite groups is made.

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Mineralogy. An Introduction to the Study of Minerals and Crystals. By E. H. KRAUS, W. F. HUNT and L. S. RAMSDELL. Pp. 686, with 736 figs. New York, Toronto, London: McGraw-Hill Book Co., Inc., 5th edition, 1959. Price 70*s*.

The previous edition of 'Mineralogy' appeared in 1951 and had 664 pages and 735 figures. The suitability of this book as a textbook for university courses in the U.S.A. has been demonstrated by its continuation into a fifth revised edition, and by evaluations of earlier editions by American reviewers: a reviewer in England can add little of value in this context. However, apart from an expected emphasis on American mineral localities, the book can be equally suitable outside of its home country as a basis of an introductory course with a bias towards practical and economic aspects of mineralogy. For the newcomer to mineralogy its wide perspective is admirable: there are chapters on crystal morphology, crystal optics, physical and chemical properties of minerals, crystal structure and X-ray diffraction, chemical crystallography, chemical analytical methods, gemstones, rock and mineral formation; and, as its *raison d'être*, about two thirds of the book is devoted to the description and tabular classification of minerals. With as wide a scope as this it is inevitable that some aspects are treated only cursorily, but a bibliography leads to more specialised texts.

Readers of this journal will look with particular interest at the crystallographic chapters and will perhaps wonder whether retention of the Weiss symbols, in addition to the universally used Miller indices (e.g. $na : b : \infty c$ and $hk0$), is really warranted by the claim that they are easier for beginners. The chapter on optics is remarkably good for such a condensed treatment, the only important omission being a statement or a graphical representation of the sequence in the Newton scale of interference colours. The crystal structure and X-ray section gives a reasonable selection of the relevant concepts and methods but in parts is a little too compressed to be clear to a beginner. In the main part of the book the principal crystallographic, physical and chemical features, the occurrence, associates, and industrial uses of the most common minerals, are described. In the section on silicates, considerable use is made of recent structural knowledge and coverage of the different minerals is well balanced except for chlorites and clay minerals. Chemical variation among the chlorites is barely mentioned, and the clay minerals illite and montmorillonite warrant but do not get, equal treatment with kaolinite. The chapter on gemstones is beautifully concise and informative, and the determinative tables (167 pages) are clearly set out.

The fifth edition is considerably revised. In the introductory chapters two new sections are on crystal chemistry (in chapter 13) and on magmatic processes (in chapter 14). More important, the descriptions and classification of minerals are revised in many places by being based on the most recent editions of 'Dana's System of Mineralogy' (1944, 1951), and Strunz's 'Mineralogische Tabellen' (1957). In the X-ray section there are better illustrations of rotation and Weissenberg photographs. Additional minerals and varieties mentioned in this edition are autunite, boehmite, borazon, Brazilian emerald and indicolite, gummite, illite, piedmontite and wad. Minor errors are practically non-existent, but something has gone wrong with the entries for nepheline (or nephelite) in the index; the index is, however, more comprehensive than in the previous edition.

This book is well produced, and it is well worth the price to anyone with a general interest in the Earth Sciences.

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