mental concepts of 'good' and 'bad' crystals are introduced, the discussion is, unfortunately, sometimes confusing. It is implied (pp. 32, 33) that the disordered atoms within a closed surface surrounding a dislocation line *can* be replaced by 'good' material, although the imperfection is not thereby removed. But if the dislocation remains, so does the bad material near its line, so that the replacement postulated has not, in fact, been carried out. Indeed, it seems to the writer that this replacement cannot be made when the imperfection is a dislocation. All that can be done is to set up a one-to-one correspondence between atoms in an ideal crystal and those of the real crystal in regions where the latter is *good*. The repeated use in Chapter 7 of proper names as adjectives to distinguish different kinds of imperfect dislocation is rather clumsy, especially when they occur in hyphenated pairs. The remainder of Part II, describing applications to grain boundaries, becomes increasingly more difficult, since the reader is being led to the frontier of advance in a selected field. A similar diversity in level of difficulty marks the many stimulating problems scattered throughout the text and collected at the ends of the chapters. This diversity is in some ways an advantage as it makes the book of interest to a wide circle of readers. It also ensures that the conscientious student using the book as a text in a self-taught course, as Dr Read plans, will be well grounded in dislocation theory if he survives all the problems.

Readers will need to bear in mind that in this textbook no particular effort has been made to trace historical origins, so that current references are sometimes incomplete. There is, however, a comprehensive bibliography of general works on dislocation theory at the end of Chapter 1.

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Spezielle Mineralogie auf geochemischer Grundlage. By F. MACHATSCHKI. Pp. vii+378 with 228 figs. Vienna: Springer. 1953. Price S. 215; DM. 36·00; $8·60; S.fr. 37·00; 61s. 6d.

The genetic approach to mineral classification revealed in this book follows in general pattern that developed in Angel & Scharizer's *Grundriss der Mineralparagenese* (1932)—a pioneer effort to which Machatschki himself pays tribute in his preface.

In the short introduction and in the appendix, the method of treatment of mineral formulae is set out rather on the lines introduced by the author himself in 1932. The coordination of atoms or groups is indicated by superscript numbers, polyatomic anions represented in square brackets and structures based on chains, sheets and networks prefixed by ∞^1, ∞^2 and ∞^3 respectively, the formula itself being followed by an abbreviation indicating the system of crystallization.

These very useful devices serve to present a condensed picture of the chief structural features of minerals. There follows a brief chapter on geochemistry, the first minerals to be described therein being somewhat surprisingly the gases of the atmosphere and water and ice of the hydrosphere.

The scope of the main portions of the book can be summarily indicated by the headings of the chief sections: the primary magmatic minerals roughly in their supposed order of crystallization; the epimagmatic minerals, including the pegmatitic-pneumatolytic and the hydrothermal; the minerals of weathering and sedimentation including clays, lateritic products, evaporites and organic minerals; and following thereon the minerals of metamorphism.

A special section (74 pp.) is devoted to the ore minerals.

It is evident that difficulties would be met in following such a scheme to its logical conclusion, and the author deliberately departs from it on occasion without, however, seriously detracting from the unity of his approach.

In the section on ore minerals the geochemistry of the single elements concerned is presented as an introduction to the description of the individual minerals, a scheme which might well have been attempted in some other sections of the book, as, for example, in the treatment of the pegmatitic-pneumatolytic minerals.

In the appendix a crystallochemical mineral system is set out in tabular form, minerals being classified in orders and families, the formulae of the species being indicated in the manner already set out in the introduction and supplemented by other pertinent data.

A few errors in the text have been indicated in a sheet of corrigenda supplied with the book. A number remain which have escaped attention. A few minerals have been allotted erroneous formulae, as in the case of sapphirine, kornerupine and ideal nepheline, and the localities of some rarer minerals are not always correctly indicated.

In all, Professor Machatschki has produced in this book a live and stimulating mineralogical classification and description on genetic lines; it provides a worthy successor to the volume of Angel & Scharizer, incorporating the more important advances of the intervening years, and should be welcomed by mineralogists and petrologists alike.

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Organic Crystals and Molecules. By J. M. ROBERTSON. Pp. xi+340 with 132 figs. Ithaca: Cornell University Press; London: Geoffrey Cumberlege. 1953. Price $5·00; 32s. 6d.

This book is based on a course of lectures given at Cornell University in the autumn of 1951 during tenure of the George Fisher Baker Non-resident Lectureship in Chemistry.

The first two chapters give an account of the geometry and symmetry of crystals, based on the historical development of this field. The theory of X-ray diffraction is dealt with in the next chapters and includes Fourier methods, the phase problem, and the refinement of atomic parameters.

The second part of the book—the analysis of some organic molecular structures—covers in its successive chapters: early X-ray work; the structures of condensed-ring hydrocarbons—which show such striking agreement between observed and quantum mechanical values of their bond lengths; molecular arrangement and hydrogen-bonded structures; complex structures; macromolecules

and biological applications, including both X-ray analysis and electron microscopy.

The most outstanding feature of the treatment is its authority and extreme lucidity to the non-specialist.

Extensive reference to the original papers is given. One appreciates the critical warnings concerning 'limitations which are not always fully appreciated'. The initiator of the phthalocyanine synthesis rightly stresses the power of the heavy-atom technique and especially that of the isomorphous-substitution method. Perhaps the usefulness of the Patterson method could have been valued a little more optimistically. A chapter like that on the condensed hydrocarbons naturally gives evidence of the author's monumental work.

The Baker Lectures have been enriched by an excellent volume.

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Twinning and Diffusionless Transformations in Metals. By E. O. HALL. Pp. ix+181 with 97 figs. and many tables. London: Butterworths. 1954. Price 30s.

All the leading topics within the field of twinning in metals are surveyed in this monograph: geometrical aspects; the homogeneous twinning shear, and concomitant heterogeneous atomic movements, for the various metal structures; experimental methods for determining twinning elements, including Cahn's work on α-uranium; data relating to the formation of twins under stress and by heat treatment; dislocation mechanisms for the growth of deformation twins; the situation at grain boundaries; recent Russian work on the possibility of nucleation by classical elastic stress concentrations. There are preliminary sections on general crystallography, stereographic projection, techniques for the preparation of metal single crystals, and plastic deformation by slip and by kinking. Finally there is a long chapter devoted to martensite transformations (referred to by the author as diffusionless transformations), including Frank's dislocation analysis of the γ–α interface. The book includes several useful tables, in particular the three summarizing the crystallography of slip, twinning, and martensite reactions respectively; these would prove more convenient for reference and comparison if grouped at the end together with appendices. The author's extensive reading of the subject is reflected in the very full lists of both antique and modern references, some of them not readily accessible, which are provided at the end of each chapter.

The chapter on theories of twin formation, concerned almost wholly with dislocations, is something of a disappointment. Only two paragraphs each are devoted to the important papers by Cottrell & Bilby, and by Millard & Thompson; these papers make difficult reading, and could bear the clarification and critical exposition which one looks for in a specialized monograph. The earlier part of the chapter is taken up with an account of the theory of dislocations, beginning *ab initio* and moving rapidly through a variety of topics very indirectly connected with twinning. This material is not required by the research worker, is likely to prove indigestible to the student, and is in any case treated much more satisfactorily elsewhere. Similar considerations are applicable to the first chapter, dealing with the structure of crystals and with the stereographic projection. No useful purpose can ever be served by a hurried treatment of standard material, and the book could be immensely strengthened by eliminating such material and concentrating more fully on later developments.

The various figures meant to illustrate atomic movements have been taken over directly from the literature, but it must be said that they are largely incomprehensible. This defect could have been to some extent remedied by cutting down the excessive number of atomic sites and projections included, and by distinguishing clearly between points arising from a lattice and those arising from its associated basis. People would do well to realize that very carefully thought-out methods of representation are required if twinning diagrams are to succeed in their object.

Compared with slip, or even with the martensite transformation, twinning is a comparatively mysterious phenomenon, and no definitive account of it can be given at the present time. In the circumstances any book on the subject can amount to little more than a loosely strung series of facts and speculations, awaiting the ideas which could render a more unified approach possible. Meanwhile the monograph by Dr Hall is to be welcomed as providing a compact review of our present state of knowledge, useful to the research worker as a book of reference and yet suitable for the post-graduate student as a gateway to a subject both difficult and fascinating.

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Bau und Bildung der Kristalle. By F. RAAZ and A. KÖHLER. Pp. iv+185 with 166 figs. Vienna: Springer. 1953. Price 31s.

It is very difficult to understand for whom this book is intended or what purpose is served by its publication. Within the short space of 180 pages an enormous field is covered, but so superficially that the treatment can be of no value to the trained crystallographer. On the other hand it can have little appeal to the general reader because specialized and relatively advanced ideas are freely introduced without adequate explanation or discussion, and in an order difficult to justify on any rational basis. Thus the book opens with an account of morphology and symmetry in which Miller indices are employed, although these are defined and explained only at a later stage. An account of lattice geometry follows and half a page is devoted to space-group theory (the Schoenflies notation is adopted and in the diagrams unconventional symbols are used for the symmetry elements). A brief introduction to X-ray diffraction is followed by an account of the crystal chemistry of the silicates; only after this are simpler structures such as rocksalt, diamond and fluorite considered. Then comes an account of crystal optics (6 pages) in which pleochroism, ray surfaces and dispersion are the topics selected for discussion. Piezoelectricity is considered next and the rest of the book