In the first chapter the most important results of the dynamical theory, necessary for the understanding of topographic contrast, are presented in a short (and sometimes a little self-willed) way, not entirely free from minor mistakes and misprints.

The second chapter presents the most frequently used experimental techniques, especially the Lang technique. The reader will find not only the formulae for the estimation of optimum resolution, but also practical instructions for the adjustment of the crystal, the handling of the photographic plates, the conditions for optimizing exposures, *etc.* In a little less detail the Berg–Barrett method (in reflexion and transmission) and the double-crystal method (with symmetrical and asymmetrical reflexions) as well as most recent techniques (rapid high-resolution and direct-viewing topography, moiré topography, interferometry, topography with synchrotron radiation) are treated.

The following chapter shows how contrast on X-ray topographs can be interpreted by means of the dynamical theory. After considering wave fields in a perfect crystal which may produce *Pendellösung* fringes, the adaptation of the fields to a slightly distorted lattice is studied. The results of this consideration are then applied to the contrast of lattice defects such as dislocations, precipitates, stacking faults, twin and domain boundaries, growth bands, *etc.*

Chapter 4 gives some examples of a more detailed analysis of dislocations and planar defects, *i.e.* the determination of Burgers vectors, the study of dislocation movement and other properties of defects by means of X-ray topography.

The last three chapters are closely related to crystal growth. Topographical examples for aqueous-solution, hydrothermal, and flux growth are given, together with topographs from natural crystals such as diamond, quartz, calcite, topaz, mica and others. Finally melt growth, solid-state and vapour growth are considered.

For beginners in X-ray topography the greatest value of this book lies obviously in the two chapters on experimental techniques and on contrast, and in the numerous citations (about 600) which follow each chapter.

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Space structures: their harmony and counterpoint. By ARTHUR L. LOEB. Pp. xviii + 169, Figs. 136, Tables 16. Reading, Mass.: Addison-Wesley, 1976. Price (cloth) $19.50, (paper) $9.50.

A crystallographer is generally introduced early to the geometry of three-dimensionally periodic lattices and the symmetry associated with them. These open up such a wide field of interest and complexity in their application to actual atomic arrangements in crystals that he may never stop to think of any more general geometry of structures – or, indeed, recognize the existence of 'structures' which are not crystal structures. If he does, he may assume (as did the reviewer before reading this book) that specialist mathematical knowledge is needed. Here, however, he is given a chance to learn otherwise. The basic concepts are very simple. The structures considered are closed figures having vertices, edges, faces, and cells (dimensionalities 0, 1, 2 and 3 respectively); it is the *numbers* of these elements which are important, irrespective of straightness of edges, planarity of faces, or magnitudes (or even equality) of lengths and angles. 'Space is not a passive vacuum' says Dr Loeb in his *Introduction*, 'but has properties that impose powerful constraints on any structure that inhabits it... This book deals with the nature of these geometrical constraints, as well as with quantitative means of expressing them'. From obvious axioms – for example, that an edge ends in two vertices, and a face separates two cells, while a vertex may terminate any number of edges – the arguments are developed step by step, with the help of abundant diagrams and simple logic, to reach out into a variety of fields.

An idea of the book's scope may be given by mentioning some of the topics which most appealed to the reviewer. The requirements for rigidity in a polyhedron are obtained by considering degrees of freedom (formally very like the chemist's). While ordinary single-surfaced polyhedra count as two-dimensional structures, three-dimensional structures are shown to include curious figures such as the hyper-octahedron, which has internal vertices, edges and faces slung inside an ordinary octahedron; the model pictured almost tempts one to try making it for oneself! The enumeration of all regular two-dimensional structures gives as a by-product a proof that an infinite tessellation of regular pentagons is impossible even on a non-planar surface. The conversion of polyhedra into one another, and the generation of new kinds of polyhedra, result from the processes of duality (replacing faces by vertices and *vice versa*), truncation (replacing edges and vertices by faces), and stellation (replacing edges and faces by vertices). Among the semi-regular structures in particular, some fascinating patterns are found, notably the semiregular tessellation of pentagons, the quadrilateral hexacontahedron, and the snub cube. The names themselves are an entertainment – but why is the familiar rhombic dodecahedron disguised as the *rhombohedral* dodecahedron? Dirichlet domains in two dimensions are explained by comparison with medieval maps of parishes, each round its church; or with the school districts in Cambridge, Mass. But the relation of three-dimensional Dirichlet domains in a lattice to Brillouin zones is curiously never mentioned.

The later chapters on lattices are the least satisfactory. Though Dr Loeb knows well that a crystal structure is not the same thing as a lattice, his discussion assumes that it is always directly derivable from its lattice, and ignores the facts that most structures have numerous independent atomic position parameters, and that it is the presence and character of atomic interactions rather than mere contiguity of atoms which determine the significance of polyhedral edges. The definition of coordination polyhedron on p. 132 would not be generally acceptable; attempts to associate it with the lattice create confusion even for the rock salt structure. Nevertheless, the discussion in these chapters of the space-filling properties of polyhedra is of interest for its own sake, as well as for its probable relevance to metals and intermetallic structures; and, though not directly applicable to other structures where the important groupings of atoms are neither regular nor semiregular polyhedra, for these also it may very well serve to stimulate thought.

The book is well written and attractively produced. It is a worthwhile addition to any library, or to one's own bookshelf.

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