of multicomponent phase equilibria using the method of free-energy minimization to combine data on fictive $Al_2O_3$–$MgSiO_3$ with data for $MgSiO_3$–$FeSiO_3$, and a paper by the late Roger Strens, with Mao and Bell, discusses the optical spectra of a meteoritic fassaite and of blue titanian omphacites. Other papers in Part III are concerned with the monoclinic–triclinic inversion as a high-order phase transition in alkali feldspars (Merkel and Blencoe), Gibbs free energies of formation for the aluminium hydroxide phases (Hemingway).

In all, eleven papers are presented of which only those in Part I really hang together; the rest of the volume more represents the variability to be found in normal journals.

R. A. Howie

Whittaker, E. J. W. *Crystallography: an Introduction for Earth Science (and Other Solid State) Students*. Oxford and New York (Pergamon Press), 1981. xii + 254 pp., 211 figs. Price (Hardback) £13·50, (paperback) £8·35.

This book corresponds with a one-term course concerned with the external forms of crystals intended for first-year students in Earth Sciences at Oxford, and to a one-term course for second-year students concerned with diffraction and the internal symmetry of crystals.

The text covers the topics important in an introductory course (Part I) (symmetry elements, stereographic projections, Miller indices, zone relationships, morphology of the seven systems and a systematic treatment of the thirty-two classes) with an economy of effort possible only for a very experienced practitioner.

Part II is particularly directed at earth science and other solid state students in the sense that because the crystal structures of all the main mineral groups have already been determined, the problem of finding trial structures does not arise for them, and is not examined in any detail, whereas a knowledge of the density and space group can give a great deal of information about the structures of crystals of known chemical composition. The author does deal with the reciprocal lattice, and with the taking and measuring of powder patterns, and also with rotation and oscillation patterns, having long ago recognized their particular value in teaching and in research. He has, rightly in my view, excluded moving-film methods from this introductory text.

The author starts from the premise that any understanding of minerals requires an understanding of crystal structure, and that this in turn requires an understanding of the concepts of morphological crystallography from which it arose. He also states that a number of novel features in the book have been developed by him in response to the difficulties and attitudes of students who are unlikely to have a primary interest in crystallography. Whether this is realism or defeatism is arguable, but one such successful innovation is the stereoscopic representation of some symmetry operations in fig. 3.2, and it seems a great pity that more stereoscopic drawings were not included. Another innovation is a start in reducing the number of special names used for faces of various forms $\{hkl\}$. Is it really still necessary to be able to count in Greek to describe the morphology of crystals?

In connection with one of the most important innovations, the omission of the Schoenflies notation, there is one small addition which would have increased the usefulness of the book in equipping the student to understand original papers dealing with known mineral structures, and that is a discussion of the reorientation of unit cells in relation to the 'standard setting' used in the International Tables for Crystallography. Although (p. 29) the unit cell vectors *a*, *b*, *c* are defined so as to constitute a RHS system, the importance of adhering to a RHS system does not seem to be sufficiently emphasized; there is no help for a student discovering that olivine is usually described in the space group *Pbnm*, which, since it is a non-standard setting of *Pnma*, does not at first sight seem to occur in the International Tables. This might be thought (erroneously) to provide an excuse for retaining the Schoenflies notation, and its final exclusion is alone enough to make this one of the first modern texts in the field, much to be commended.

The sections on irregularities, textures, and morphology revisited seem tantalisingly perfunctory, since, as the author well knows, many of the most challenging crystallographic problems lie in these areas, but in general the exposition is clear, the diagrams are good; there are problems and a glossary, and the approach is sufficiently analytical to enable students to make calculations detailed enough to inspire confidence in the power of crystallographic methods. It is thoroughly recommended.

H. Judith Milledge

Prince, E. *Mathematical Techniques in Crystallography and Materials Science*. Berlin, Heidelberg, and New York (Springer-Verlag), 1982. viii + 192 pp., 28 figs. Price DM 55.00 ($25.60).

In his preface the author says that he has endeavoured to write not a textbook but a reference book—a vade-mecum for active research workers.