papers make fascinating reading; for many of us, though familiar with the main threads of the subject from textbooks, have never seen the original papers in which the ideas were first presented. There are extracts from the works of Haüy and Bravais, Friedel and Fedorov, in which the idea that the principal faces of crystals are those having a high reticular density of lattice points was developed. But it was realized that other influences would have to be taken into account: the detailed arrangement of atoms in complex structures, the distribution of electrical polarity, the different surface properties of the opposite faces of polar crystals. It only became possible to discuss these in the post-Bragg era, as in the extension of the Bravais principle of high reticular density by Donnay and Harker, who took into account the motif of the space group as well as the Bravais lattice, and the 'periodic bond chains' introduced by Hartman and Perdok as a rough way of estimating the relative attachment energies on different faces. Meanwhile, in the pre-Bragg era there were side-glances at other properties of crystal faces, particularly the surface energies, by Gibbs, Curie and Wulff, who developed the idea of an equilibrium form of minimum surface energy; but only in principle, for until structures were settled by X-ray diffraction there was no basis for the estimation of surface energies.

Consideration of the distribution of forces in perfect crystal structures is still not enough; imperfections, especially screw dislocations, influence the relative growth rates of different faces, and certain solvents and dissolved foreign substances may give rise to quite different crystal habits. Papers by Frank and others on dislocations are included, but although solvent and foreign solute effects are mentioned in general discussion papers by Wells and Buerger, no papers attempting explanations of these effects in terms of structure are included. In contrast to this serious omission, it is surprising to find a section *Morphology in phase space* dealing with Brillouin zones: an inclusion of questionable relevance to the theme of this collection.

Readers may differ in opinion about omissions or inclusions of papers, whether on grounds of relevance or (especially in the case of some recent papers) doubts whether the significance of contributions is great enough to entitle them to be regarded as 'benchmarks'; but on the whole this is a useful collection of papers which covers the subject fairly well, from a mineralogist's point of view. Those concerned with molecular crystals are less well served, for the relation between crystal shape and molecular shape is not considered at all. As Bernal used to say, chemists quite rightly recognize three classes of crystals — needles (flat molecules), plates (long molecules) and chunks (compact-shaped molecules). Perhaps one hardly expects to find this in a book in a geological series. But why not? Hydrocarbons are important minerals which are prominent in our thoughts at the present time.

The price is very high; this is a book for libraries, especially those concerned with the history of science, rather than for individuals.

C. W. BUNN

The Royal Institution
21 *Albemarle Street*
London
England

Neutron scattering in chemistry. By G. E. BACON. Pp. 186, Figs. 119, Tables 15. London, Boston: Butterworths, 1977. Price £12·50.

A review of this book, by Lynne L. Merritt Jr, has been published in the February 1978 issue of *Acta Crystallographica*, Section B, page 700.

Crystallographic computing techniques. Edited by F. R. AHMED, with co-editors K. HUML and B. SEDLÁČEK. Pp. 502, Figs. 134, Tables 93. Copenhagen: Munksgaard, 1976. Price Dkr 336.00.

This book contains the proceedings of the International Summer School on Crystallographic Computing, which was held in Prague, Czechoslovakia, 28 July–5 August 1975. It covers three main topics: *A*: structure solving methods; *B*: computational aspects of protein crystallography; *C*: miscellaneous crystallographic computer applications and techniques.

Papers in part *A* give chiefly an exposition of the traditionally successful symbolic addition and multisolution methods: the historical development and basic principles of direct methods, containing an interesting note on the computation of cosine invariants (J. Karle), the practical aspects of the symbolic addition procedure with many examples (I. L. Karle), the programming aspects of this procedure (Ahmed & Hall), a clear treatment of the *MULTAN* system (Woolfson) and the description of an automatic system based on the multisolution method (Andrianov & Tarnopol'skii). For the expert crystallographer it is a convenient survey of formulae, procedures and examples to have at hand.

Of the more recent developments in direct methods this book contains a remarkable contribution by Main, who introduced into *MULTAN*, as a systematization of older theories, a procedure that makes use of molecular structure. Apart from this there are some preliminaries on entirely new methods that we may expect in the near future: magic integers (Woolfson), matrix methods (Main) and a heuristic theory on the concept of neighborhoods (Hauptman).

A number of papers in both sections *A* and *B*, cover the subject of partial structure, phase refinement and phase extension in proteins. Sayre's method (Sayre), the maximal-determinant method (Tsoucaris) and the methods that modify the electron density (Gassmann, Simonov, Collins *et al.*) all seem to show a capability of improving the resolution of protein electron-density maps, starting from about 2·5 Å resolution.

Section *B* contains papers on protein crystallography which are also very informative to the general crystallographer: data collection (Bassi), the handling of protein data (Dodson), isomorphous replacement (Dodson, Kartha, Ashida) and anomalous scattering (Srinivasan). The increasing importance of Patterson search procedures, especially for the larger protein structures and viruses, is reflected in papers by Tollin, Blow, Bricogne, Colman *et al.* (see also, for ordinary structures, a paper by Kutschabsky and Reck on the convolution-molecule method in section *B*). The use of molecular structure and of non-crystallographic symmetry, which have always been the basic ingredients of these