

The book is well written and well produced with clearly drawn and annotated text figures. Typographical errors are few and references are given in full rather than in the cryptic format adopted by many publishers.

This book will undoubtedly be consulted by many 'geoanalysts' and environmental scientists but, regrettably, its price may limit its purchase to those workers actively engaged in ICPS analysis or those who are about to do so. Bearing in mind the ever-expanding applications of ICPS in geological and environmental research the authors will no doubt already be looking forward to a second edition.

J. E. THOMAS

Boyd, F. R., Jr., ed. *Explosive Volcanism: Inception, Evolution and Hazards*. Washington, DC (National Academy Press), 1984. xii + 176 pp., 72 figs., 20 photos, 40 maps. Price \$24.50.

Although explosive volcanism has been a major concern of volcanologists for decades, it took the events at Mount St Helens in 1980 and subsequently to convince the wider US scientific community—let alone the American public—that this is a topic in urgent need of further research. The obvious first stage of such work is to summarize what is already known about the subject. This inexpensive but well-produced volume is an admirable attempt to do so by a committee established by the American National Academy of Sciences. The result of their labours is a paper on a relevant aspect of the topic from each panel member and an introductory overview and lists of recommendations edited by their chairman, F. R. Boyd, Jr. This opening chapter is an excellent summary of what we do and do not know about explosive volcanism, leading to crisp recommendations as to what we should do to improve the situation. Its target is 'to aid policymakers in decisions on societal problems that involve geophysics'. What is not specified but becomes clear within minutes of opening the book is that both the policymakers and problems in question are strictly American. Indeed, nearly all the discussion focuses on the conterminous United States; Alaska is hardly mentioned. The value of this report for the rest of the world is therefore indirect, but it is nevertheless substantial, because all the articles are well prepared and carefully written.

The first two papers are concerned with alkaline magmatism in general (A. L. Boettcher) and the tholeiitic flood basalts of the north-western USA in particular (R. W. Carlson). These illustrate another unusual aspect of a book of this nature. Rather than giving balanced (or even unbalanced!) reviews of

the present overall state of opinion on their topics, the chapters are simply vehicles for the authors' own opinions on the matters. Clearly the committee must have thought carefully before taking this rather unusual course. It limits the potential use of the volume for such purposes as teaching but gives it a 'bite' which makes it a good read. The next three articles cover subduction (I. S. Sacks), magma formation and ascent (B. D. Marsh), and volcanism in the geologically recent past and probable near-future in the western USA (R. L. Smith and R. G. Luedke). Three wall-chart maps accompany the last paper, and depict western USA volcanism at 5 Ma intervals for the last 15 Ma. To date, I have found these to be some of the most useful items in the book. The two following papers give a very detailed summary of present knowledge about Yellowstone (R. L. Christiansen, R. B. Smith, and L. W. Braile). The next three look at explosive eruptions in general (T. Simkin and L. Siebert), followed by detailed studies of the phreatic explosions of Kilauea (R. W. Decker and R. L. Christiansen) and the Mount St Helens eruption on 18 May 1980 (J. G. Moore and C. J. Rice). Next S. W. Kieffer gives an invaluable account of the physics of various types of volcanic jet. K. H. Wohletz and R. G. McQueen follow this theoretical approach with an illustrated account of spectacular DIY analogues to phreatomagmatic eruptions, conducted in a disused quarry with mixtures of thermite and water. The final chapter (R. S. Fiske) compares two examples of another sort of potentially explosive interaction—between volcanologists, governments, and the public—during two recent volcanic crises in the Eastern Caribbean. This is a thoughtful analysis of a very serious topic. It should be read carefully by all of us who have to give 'expert' advice on any geological matter potentially involving public safety.

R. N. THOMPSON

Fry, N. *The Field Description of Metamorphic Rocks* (Geological Society of London Handbook). Milton Keynes (Open University Press) and New York (Halsted Press: John Wiley and Sons), 1984. x + 110 pp., 12 figs., 58 photos. Price £5.95.

*The Field Description of Metamorphic Rocks* by Norman Fry is a long overdue and very necessary addition to the present range of texts dealing with metamorphic geology. The text is aimed at final year undergraduates, although it will interest a much wider group than this, and concentrates entirely on the description of metamorphic rocks in the field rather than their study by laboratory

techniques. It thus concerns itself with the directly observable mineralogy and texture of metamorphic rocks without recourse to paragenesis, metamorphic facies or the complex terminology associated with these subjects, and is blessed by a complete absence of triangular (or other) phase diagrams. The book does use the concept of metamorphic grade and loosely defines various grades in terms of  $P$ - $T$  conditions, an approach which may find disfavour with some protagonists of metamorphic facies description.

The text is published as a robust pocket sized ( $17.9 \times 11.5 \times 0.8$  cm) edition which is intended for use in the field. It is written in a clear concise style with a commendable use of clearly defined terminology. The numerous well-prepared diagrams, field sketches, and photographs of the various textures and features described, together with a final chapter of reference tables and checklists, which is cross referenced with the main body of the text (and additional blank pages for the readers own notes, diagrams, etc.) make this a very valuable field tool for geologists inexperienced in working in metamorphic terrains. This book will also serve another important role because it provides a very simple introduction to metamorphic rocks, as they are encountered in the field, something lacking in many standard texts on metamorphic petrology.

This well-written and well-produced little text will, I am certain, become standard reading for most geology undergraduates, it will also interest many geologists who do not regularly work in metamorphic terrains and will be particularly useful to engineering geologists and civil engineers who are often concerned with describing the fabrics of metamorphic rocks without being concerned about their origins.

M. E. JONES

Hahn, T., ed. *International Tables for Crystallography, Vol. A: Space-group Symmetry*. Dordrecht, Holland and Boston, USA (D. Reidel Publishing Company for The International Union of Crystallography), 1983. xvi + 854 pp. Price Dfl. 385 (US \$165, £80).

This is the first volume of a third series of *International Tables* and deals with crystallographic symmetry in direct space. Comparison with the corresponding volume 1 of the 1952 edition of *International Tables for X-ray Crystallography* (IT1952) is inevitable, though the present volume is not a revision but a completely new compilation. It is just over fifteen times the price of IT1952 and has roughly half as many pages again. As a book, the new volume is above average in quality with first rate printing but it doesn't quite match the high

standard of its predecessor: the paper is not so heavy nor the binding quite so strong. A significant advance is the use of computer production to typeset the main space-group tables starting from the generating symmetry operators.

Some of the changes in the new volume result from the experience gained in using the old. The symmetry elements and equivalent positions of the cubic space groups, which were always difficult to visualize, are now illustrated in admirably clear diagrams. The confusion arising from alternative choices of origin or unit cell is also relieved by including additional entries where such alternatives exist.

But there have also been changes in overall content to match developments in crystallography. For the first time sub- and super-group information is included in each space group entry to facilitate comparison of crystal structures, e.g. in structural transformations or order-disorder transitions. The major omissions from the new 'Int. Tab.' are the tables of geometrical structure factors and electron density formulae, the need for which the computer has largely eliminated.

Part II, *Symmetry in Crystallography*, is new. It deals with the mathematical theory behind the use of the space-group tables. Symmetry is endlessly fascinating and there is something here to appeal to every crystallographer, whether it is the elegance and rigour of the mathematics, a different view of an old concept or some new use of established principles. Much attention is paid to matrix notation, recognizing both its usefulness and its increased use in crystallographic computing.

The explanatory chapters are models of scientific exposition, especially those in Part II, where the authors have wisely used examples to ensure that the meaning is clear however complicated the mathematical notation. But in Part I, *Tables for Plane Groups and Space Groups*, some chapters concentrate too much on explaining and justifying the notation and the content of the tables, and do not altogether succeed in passing on an understanding of symmetry itself, which is what the beginner needs most.

Like its predecessor, the new 'Int. Tab.' will imperceptibly influence our thinking as we use the extra information and new ideas it places at our disposal. Every mineralogical institution which takes crystallography and crystal structures seriously will require a copy. For the specialist crystallographer who wants his personal copy, there is a reduced price for prepaid orders of Dfl. 215 (US \$90, £45) advertised in *Acta Crystallographica*.

J. E. CHISHOLM