individual contributions and the way they were organized. For example, why is there no list of the titles of photographs? Why is there no list of localities? Why have individual contributions been allowed to vary so much in the information they provide on context and location? Was it never considered that readers might wish to collect samples of their own of figured material? The so-called subject index (it also contains the names of contributors) is inadequate. Almost all the items listed under USA, for example, are repeated without cross reference under Appalachian.

The Atlas is without doubt a very useful addition to the literature on cleavage. It probably is too expensive for individual purchase, but ought to be in libraries used by structural and metamorphic geologists. It must be much regretted, however, that it is not better designed to aid systematic use. All I can suggest to the new reader is that he gets to know the photographs well enough to be able to impose his own system on them.

R. NICHOLSON

Sunagawa, I., ed. *Materials Science of the Earth's Interior.* Tokyo (Terra Scientific Publishing Company) and Dordrecht, Holland (D. Reidel Publishing Company), 1984. 653 pp. with figs. and plates.

Although data on growth, morphology, and properties of natural and artificially obtained crystals are amply presented in the available scientific journals and in special monographs, geoscientists have always looked for a condensed, comprehensive treatment of such topics, specifically applied to problems arising from studies of processes operative in the Earth's crust and interior. The book edited by and with the participation of the well-known specialist Professor Sunagawa fills such a gap. The book comprises articles by leading scientists in Japan from nine research groups, along three principal lines: experimental studies of the material of the Earth's interior, characterization of materials derived from the Earth's interior; and a theoretical group. The topics of the book are dealt with in seven chapters: silicate melts; crystal growth and synthesis of large single crystals; electron and crystal structures; analysis of thermal and stress histories; solid materials in the Earth's interior; interaction between solid and fluid components; and technical developments. All articles within each chapter are of particular interest, each one backed by numerous references and original contributions. Titles like Structures and some physical properties of silicate melts of geological interest (I. Kushiro), Growth of crystals in nature (I. Sunagawa), High-temperature crystallography of olivines and spinels (Y. Takeuchi *et al.*), Application of transmission electron microscopy to the studies of decomposition and exsolution of minerals (N. Morimoto and M. Kitamura), Ultra-high pressure phase relations of the system MgO–FeO–SiO_2 and their geophysical implications (E. Ito), Petrology of materials derived from the Upper Mantle (K. Aoki), Hydrothermal synthesis and phase relations of the polymetallic sulphide system (A. Sugaki *et al.*), and many others give a cross-section of the content of the book. It would be no exaggeration to say that the latter provides an excellent overview of present-day scientific thought in Japan in this field.

The book is suitably illustrated and much credit is due to the publishers for their fine printing and layout. The book is primarily intended for geoscientists, but it could definitely benefit scientists in fields, such as chemists, physicists, geophysicists, crystallographers, etc. who would like to have an up-to-date idea of the problems tackled for elucidation of the state and the dynamics of materials making up the Earth's crust and interior. As it is said in the preface, it 'will form a good starting point of future development of the science'.

I. KOSTOV

Donnay, G., and Donnay, J. D. H. *The M. A. C. Crystallographic Laboratory Manual.* Montreal (Mineralogical Association of Canada), 1984. 84 pp., 15 figs., 8 photos, 4 charts. Price $15.00 (Canadian).

This is a handbook of practical assignments designed to form part of a course in crystallography for students of mineralogy. It was originally prepared for students of McGill University, and has now been reprinted by the Mineralogical Association of Canada for wider use. The manual contains eleven exercises, covering morphological, structural and X-ray crystallography. The morphogical exercises include the identification of crystal forms from wooden models, the derivation of crystal forms by drawing stereograms, and the use of the Wulff net to study a triclinic crystal. X-ray exercises include the measurement and interpretation of precession, rotation, Weissenberg, and powder photographs.

Each assignment is a substantial exercise which on completion would give the student a good understanding of the topic studied. For example, in the first assignment the student is asked to learn to identify and name all forty-seven crystal forms. Background information and guidance are given with each exercise, including many practical hints

drawn from the authors' long teaching experience in the subject, even down to reminding the student to have a sharp and suitable pencil ready for plotting the sterograms. Many useful graphical aids are incorporated in the handbook, including a large Wulff net and four charts for interpreting single crystal X-ray photographs printed on transparent plastic film.

The manual is a rigorous and authoritative guide to elementary crystallography but, being a laboratory manual, it does not concern itself with the theory of the subject. The student is assumed to already have a thorough understanding of such matters as symmetry, indexing, and the reciprocal lattice. For this reason the usefulness of the book will largely depend on whether it is used in conjunction with a course similarly structured to that for which it was originally written. Certainly many of the individual exercises could profitably be adopted by other crystallography instructors, but most courses taught in geology departments would probably place greater emphasis on the X-ray powder method than is done here. The instructions that accompany the X-ray assignments make it clear that the original students were provided with actual X-ray films to measure, but for cheapness of reproduction only xeroxed copies are given in the manual. A student without access to X-ray laboratory facilities could probably follow the exercises adequately using these reproductions, but hopefully any teacher adopting the handbook for class use would try to provide the student with appropriate crystals and access to X-ray equipment.

A. HALL

Shams, F. A. ed. *Granites of Himalayas, Karakorum and Hindu Kush.* Lahore (Institute of Geology, Punjab University), 1983. xxviii+427 pp., 164 figs. Price Rs 400.00 ($50).

This volume, commemorating the 100th anniversary of the University of the Punjab, contains twenty-four papers on the geology of the Himalayan mountain belt and especially its granites. There are contributions from both sides of the Himalayas and from Europe and Japan, so that the volume brings together the results of all the major research teams working in this fascinating but inaccessible region.

The granitic rocks of the Himalayas are very diverse in age (Precambrian to late Tertiary), petrography (peraluminous to peralkaline) and mode of occurrence (migmatites to high-level dykes and sills), as might be expected in such an extensive and complex mountain range. Notable characteristics are the frequent occurrence of tourmaline-bearing granites and the apparently common sill-like form of the granite bodies in some areas. The papers in this volume cover all aspects of granite petrology from field relationships to chemical and isotopic composition. (Abstracts of each paper appear in the September issue of *Mineralogical Abstracts*: 85M/3361-3384.) It is remarkable that such a remote area as eastern Tibet should have been more vigorously subjected to isotopic age determination than some parts of the British Isles, but reliable age determinations have played a vital role in clarifying the geology of the Himalayan region. Because of their geologically recent development, the Himalayas may prove crucial in studying the origin of granites in orogenic collision zones, and this volume will be an essential source of information for future workers in the region.

A. HALL

Harmon, R. S., and Barreiro, B. A., eds. *Andean Magmatism: Chemical and Isotopic Contraints.* Nantwich (Shiva Publications Ltd.), 1984. x+250 pp., 91 figs. Price £25·00 (hard), £12·50 (paper).

This book developed from an informal symposium at the Spring 1983 meeting of the American Geophysical Union held in Baltimore, Maryland. Ten papers are included on the volcanic rocks of the Andes, with six papers on the plutonic rocks of this area of South America [MA 85M/1684-1699] and should be read in conjunction with the recent thematic issue of the *Journal of the Geological Society* on Geology of the Andes [MA 85M/0906-0917]. The tectonic setting is outlined by R. S. Thorpe and this is followed by papers containing a wealth of isotope and trace-element data for rocks ranging from the Austral Volcanic Zone of the Andes (49°-55° S) to those of the Northern Volcanic Zone in southwestern Colombia. The Peruvian Andes are covered by a series of papers by W. S. Pitcher and M. P. Atherton (Liverpool), by S. B. Mukasa and G. R. Tilton (Santa Barbara) and D. J. Kontak, A. H. Clark, and E. Farrar (Queen's University, Kingston, Ontario). The geochemical characteristics of magmatism in the southern Andes are discussed in detail by D. S. Bartholomew and J. Tarney.

Altogether this is a highly pertinent series of papers representing a rapid and economical publication of this state-of-the-art symposium which all igneous geochemists and petrologists will want to have available.

R. A. HOWIE