BOOK REVIEWS

Granitoid Rocks (first edition). By D.B. Clarke. Chapman & Hall, 29 W. 35th Street, New York, N.Y. 10001-2299, U.S.A., 1992, CAN$56.50 hardbound (ISBN 0–412–29170–3).

The debate on the nature and origin of granites has been with us for two centuries, with some important questions being resolved through the crystal–liquid experimental studies of Tuttle and Bowen in the mid-fifties. Since that time, as evidenced by the volume of literature, there has been an increasing interest in all aspects of granite genesis through a broad range of approaches and techniques. However, it remains the province of a select few with breadth of knowledge, field experience, dedication and ability to distil the essentials from the vast volume of literature into a timely, topical, logical, interesting and thought-provoking summary. *Granitoid Rocks* by D.B. Clarke is one of those examples.

Being written by a specialist for an audience more advanced than first- or second-year undergraduate level, the book is extremely relevant for the serious student or researcher, is a reference text for the professional teacher, and has much for the general geologist. It is a well-presented study of granitoid rocks, suitably illustrated and annotated, with insetting used to highlight points of importance. One small criticism is the use of unfamiliar abbreviations, which necessitate a degree of backtracking and probably do not save much space anyway.

In style, it lacks the formality of comparable texts, even to the extent of occasional folksy insights and cartoon-like figures. Sections are sufficiently concise to maintain interest, while at the same time providing ample reference material for the more serious reader without becoming bogged down in detail. The spirit of inquiry is a constant theme throughout the book. The clever use of questions to open discussions, as for example, "Why study granitic rocks?" as an opening question in Chapter 1, is a reminder to us all to think about the subject material and not expect the text to supply us with all the answers. Subject coverage is topical. While duly acknowledging historical aspects of the "granite problem", Clarke concentrates on approaches and techniques more relevant to the present. Finally, the book cannot conceal the author's genuine enthusiasm and background knowledge of granitoid rocks, his ability to simplify arguments, to organize and present ideas, and his knack of posing pertinent questions that invite the reader to press on; it offers a choice of options for most processes, helpful hints for field and laboratory procedures, field case studies as examples of petrogenetic interpretation, and an integrated picture of the South Mountain Batholith, Nova Scotia, gained first-hand.

On classification and occurrence of granitoid rocks (Chapter 1), schemes requiring measurable parameters such as mineralogy or chemistry are described, as are other less-well-defined schemes relating to tectonic setting and genetic aspects of source rock-type. So-called alphabet granitoid rocks (S–I–A–M) are critically appraised; it is concluded that while they were useful concepts in their day, it is time, as the author puts it (p. 215), "...to thank S–I–A–M for the ride, and abandon this old, and too often repaired, vehicle for new ways of thinking about the genetic types of granitoids". I sympathize with this view, but concede that the terms are firmly entrenched in the literature, and usage will decrease only as more relevant classifications become fashionable.

Field observations (Chapter 2) are presented in a systematic and logical fashion covering features outside the pluton, at the contact and within the granitic body. Enclaves are included in this section, and possible models for their origins discussed, although, considering the research interest they are currently generating, my preference would have been toward a more expanded discussion and critical appraisal.

Chapters 3, 4, and 5 cover microstructure, mineralogy and chemistry, including geochronology and isotopes. The approach is fresh and invigorating. Each section is prefaced by the problems faced, and by probing questions, a witticism and a home truth or two. The gallery and dialogue of chemical diagrams (Fig. 4.6) are particularly helpful. In all, the general presentation is a first- class account of what could have been tedious stuff.

In Chapter 6, the role of experimental petrology and its part in firmly establishing a magmatic origin for granitoid rocks is discussed, together with the importance of more recent experiments and direction that they are taking in relation to the sequence of crystallization in magmas, melting behavior as a function of major physical and chemical parameters, element partitioning, and the physical properties of silicate melts.

No book on granites would be complete without reference to concentrations of minerals that have economic significance (Chapter 7). Elements that commonly occur in granitoid-rock-related mineral deposits ("granophile" elements) and the processes of concentration are discussed. Various physical and chemical mechanisms of deposition and enrichment through the stages of magma development, interaction with fluids (pegmatitic), vapor (hydrothermal), supercritical aqueous (pneumatolytic) and aqueous (weathering) fluid are detailed with respect to granitic host-rock. Styles of mineralization, structurally favorable sites and exploration techniques are briefly discussed.

In Chapter 8, a framework is developed whereby observational data (*input*) based on the techniques outlined in the first six chapters are drawn together to provide the basis of petrogenetic modeling (*output*). Case studies of investigations involving a wide variety

of granitoid rocks are outlined, each carefully summarized in table form. The approach taken in this chapter is unique, and it emphasizes two points: 1) systematic observational data are important in developing internally consistent petrogenetic models, and 2) interpretation represents the end product of the study. Therefore, it is necessary to stop and think about the data.

Finally, Chapter 9 looks at the changing role of igneous petrology, the advances in observational and analytical techniques, data-processing capabilities, and future approaches to problem-solving relevant to petrogenesis of granitic rocks.

This is a thoroughly thought-provoking book, the impact of which would probably be lost if it were longer. D.B. Clarke has succeeded in filling a niche in petrology of granitoid rocks, and has the rare ability to make the book spring to life. At the price, it represents good value for money, and is a recommended purchase for any serious student of geology and any researcher interested in the current status of petrology of granitoid rocks.

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Ophiolites and their Modern Oceanic Analogues. Edited by L.M. Parson, B.J. Murton, and P. Browning. Geological Society of London, Special Publication 69, 1992, 325 pages. $US92 (ISBN 0–903317–69–9).

The editors state in their preface that studies of oceanic structure and evolution are hampered by the difficulties of sampling the crust in the third dimension. There have been advances in remote sensing of surface features, but few advances in the study of subsurface features. Studies of ophiolites provide information about deeper structure and crustal composition that cannot be obtained from the deep sea. Structures that have been identified in active mid-ocean spreading ridges, such as ridge-axis discontinuities, can be used to complement studies of ophiolites. I found this collection of eighteen papers to represent an interesting stage in the evolution of ideas about ophiolites.

The collection of papers has been divided by the editors into three broad categories: tectonics, geochemistry and petrology, and analogous settings. Because of the diversity of topics covered, there is something here for everyone interested in the study of ophiolites. The papers are too numerous and diverse in content to be discussed thoroughly in a short review. I will discuss a few of the papers to give the potential reader some idea of the content.

The two opening papers concern interpretation of the Josephine ophiolite (California and Oregon) and the Semail ophiolite (Oman) in light of studies of oceanic structure. Alexander & Harper interpret the Josephine ophiolite in terms of slow-to-intermediate rates of spreading in a suprasubduction-zone environment. They discuss the high degree of structural extension, in contrast with the Oman and and Bay of Islands ophiolites, which probably formed at fast-spreading centers. A notable feature is the setting out of criteria to recognize oceanic faults as opposed to post-ophiolite emplacement-related faults.

MacLeod & Rothery studied the along-strike variation (*ca.* 500 km) of the sheeted dike complex of the Semail ophiolite. They identified several discontinities along this inferred spreading axis, which they attributed to propagating rifts and overlapping spreading centers. They conclude that the Semail spreading axis was segmented on a scale of 50–100 km, comparable with a fast-spreading axis such as the East Pacific Rise.

Searle used sidescan and swath bathymetric data to discuss the origin of oceanic lithosphere at mid-ocean ridges. Rusby used long-range sidescan sonar, magnetic, bathymetric, and gravity data to interpret the tectonics of the Easter microplate, southeastern Pacific. Karson & Winters report on studies in the MARK area of the Mid-Atlantic Ridge at 23°N latitude, and define a number of discrete spreading cells along the ridge axis.

The paper by Taylor, Murton & Nesbitt reports systematic variations in Ti, Y, and Zr in volcanic rocks from back-arc through arc to trench in western Pacific arc systems, *e.g.*, the Izu–Marianna arc. This paper and the following paper, by Kostopoulous & Murton, on the OIB (oceanic island basalt) component in boninite genesis, contain the highest number of acronyms of all of the papers in this volume, including SSZ (suprasubduction zone), BABB (back-arc basin basalts), and IAT (island-arc tholeiite).

Keller & Fisk compare the chemistry of 100,000-year-old volcanic rocks of the Banfield Strait with the nearby Jurassic–Cretaceous ophiolites of southern Chile. They conclude that the Banfield Strait marginal basin is at the same stage of development as was the marginal basin now preserved as the Sarmiento ophiolite of southern Chile.

Smellie & Stone describe the early Ordovician Ballantrae Complex of southwestern Scotland. They identified boninite lavas within the island-arc tholeiite sequence, which are analogous to those found in modern island arcs of the southwestern Pacific and some ophiolites. This observation, coupled with other field and geochemical observations, lead to the interpretation of a complex history for the ophiolite.

Ballantyne describes the petrology and geochemistry of the mafic and ultramafic plutonic rocks of the Halmahera ophiolite of eastern Indonesia, which he considers to be the on-land analogue of the present-day Marianna forearc.

Other papers include: ophiolitic chromitite (Roberts), mobility of REE in hydrothermal zones (Valsami & Cann), peridotites in Cyprus (Laurent), plagioclase lherzolites in the Mid-Atlantic Ridge (Giradeau & Mercier), deformation and transform faults in the Troodos ophiolite (Allerton & Vine), whole-rock geochem-

istry in an ODP hole (Brewer *et al.*), volcanic plates overriding oceanic crust, Hawaii (Borgia & Treves), and ophiolites in the Banda arc and Brooks Range (Harris).

The book represents an up-to-date coverage of a broad range of topics in ophiolites and analogous oceanic rocks and structures. It is particularly appropriate for the library of specialists in the field. It could be used in graduate seminars where the emphasis is on the broad topic of igneous petrology and related structures in ancient and modern oceanic environments. I found the quality of presentation, including figures, to be high. Many special volumes contain figures that were apparently drafted for presentation as 35-mm slides. Such is not the case in this volume. One of my few queries is the suitability of four pages of tabulated electron-microprobe data on spinel. Considering the current level of prices for books, including soft-cover editions, I do not find the price for this volume to be out-of-line.

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Optical Mineralogy: Principles & Practice. By Colin D. Gribble and Allan J. Hall. Chapman & Hall, 29 West 35th Street, New York, N.Y. 10001, U.S.A., 1993, 303 pages. CAN$124.95 (hardcover), CAN$53.50 (paperback). ISBN 0–412–04081–6 (hardcover), ISBN 0–412–04091–3 (paperback).

The book begins with a description of a microscope suitable for petrological examination of minerals in transmitted light, and an outline of properties of transparent and translucent minerals in thin section. A parallel description illustrates a reflected-light microscope suitable for mineragraphic examination of opaque and translucent minerals in polished section. Properties of minerals in reflected light are then defined, thus giving equal emphasis to identification of silicates and nonsilicates.

Gribble and Hall have chosen to concentrate on a basic understanding of petrographic and mineragraphic principles, but explain in considerable detail transmitted-light crystallography (chapter 4) and reflected-light theory (chapter 5). In this reviewer's experience, these chapters should be understood by students prior to identification of minerals, since accurate identification of minerals requires understanding of indicatrix theory and crystallography.

A separate chapter describes the silicate minerals, starting with a brief outline of classification based on crystal chemistry. Descriptions of optical properties for individual minerals are accompanied by unusually large block diagrams showing orientation of optic axes and optic axial plane for each mineral related to its physical features, and brief notes on occurrence and conditions of formation. Marking of most important mineral properties with an asterisk is an excellent idea for students. Selected photomicrographs are clearly reproduced. It is a pity, however, that in the chapter on silicate minerals, certain headings are carried beyond their relevant groups or phases (*e.g.*, dumortierite heading on p. 73 carries through to p. 77 and epidote). There are, however, very few typographical errors.

The nonsilicates are classed according to chemical groups such as carbonates, oxides, hydroxides, phosphates, sulfates, and sulfides, but not opacity of phases. The format for individual mineral descriptions is similar (as far as possible) to that for silicates, and an informative but brief paragenesis is given.

Useful appendices include a visual guide to ranges of index of refraction, 2V variation of nonopaque biaxial minerals, and properties of ore minerals. Arrangement of the first two appendices in alphabetical order of mineral groups presupposes that the student has some idea of mineralogy and appearance of minerals under the microscope. Arrangement according to increasing index of refraction and 2V may be more suitable for beginning students and would facilitate for them the identification of an unknown mineral. A table of standard mineral abbreviations also would have been helpful for the beginning student. Placement of a birefringence chart on the back cover overcomes the problem of constant reference to a less robust foldout.

This book gives up-to-date information on the main rock-forming minerals, with an even treatment of subjects. It provides a useful collection of data, but is neither as comprehensive nor as detailed as the newly revised edition of *The Rock-Forming Minerals* (Deer, Howie and Zussman; see volume **31**, p. 249 for a review), which assumes a working knowledge of petrological and mineragraphic practice, and includes detailed chemistry of individual minerals and mineral groups. The book will be useful at an undergraduate level in teaching basic principles of optical mineralogy, and also as an accessory volume in a specialist's professional library, although most obscure minerals are omitted, and optical data for common rock-forming minerals are elsewhere readily available.

Well-presented diagrams and microphotographs enhance its use for teaching at the undergraduate level, but the printing is not as dark as in most publications, even though print face is easy to read and paper quality is good. This book replaces teaching and reference texts such as *Optical Mineralogy* by Kerr, but with constant use, the paperback version will readily deteriorate, and the hardback version is expensive.

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Chaos – From Theory to Applications. By Anastosios A. Tsonis. Plenum Press, 233 Spring Street, New York, N.Y. 10013, 1992, 274 p. $US59.50 hardbound (ISBN 0–306–44171–3).

Fractals and Chaos in Geology and Geophysics. By Donald L. Turcotte. Cambridge University Press, New

York, 1992, 221 p. $US54.95 hardbound (ISBN 0–521–41270–6).

The first Short Course ever offered by the American Geophysical Union took place at the spring meeting in Baltimore in 1991. The topic was Fractals and Chaos, and the instructors were Donald Turcotte and Anastosios Tsonis. Now both instructors have published books on the subject. The two books differ greatly in their style and content, and may be considered to be complementary rather than competitive.

Turcotte's book really has no competition, since it is the first book to deal comprehensively with the application of fractals and nonlinear dynamics in the earth sciences. One half of the book (103 pages) is devoted to fractals. The emphasis in Turcotte's book is on applications rather than on the theory: in the section on fractals, Turcotte describes applications to topography, fragmentation (at all scales, from clay to continental blocks), earthquakes, and ore grade. In the second half of the book, nonlinear dynamic models are constructed for earthquakes, mantle convection, and reversals of the earth's magnetic field. Not that theory is slighted: the theory of fractal clustering and self-affine fractals (including various types of Brownian noise) are covered in Chapters 6 and 7, the basic theory of dynamical systems and the logistic map are described in Chapters 9 and 10, the Lorenz equations in Chapter 12, and the Renormalization group and self-organized criticality in Chapters 15 and 16.

Tsonis's book is devoted to nonlinear dynamics: only a single chapter is devoted to fractals. It is also much more theoretical and compact than Turcotte's book. Tsonis's chapter on fractals, plus a few pages in later chapters, introduces essentially all the theory on fractals to be found in Turcotte's book (unfortunately, neither author gives an extended discussion of the important topic of multifractals). Tsonis begins with two chapters devoted to the mathematical and physical background, then gives a thorough theoretical treatment of attractors and bifurcations. His examples are mainly the now classic ones of nonlinear dynamics: the Lorenz, Rössler, and forced pendulum attractors, and the logistic and "standard" (circle) map. In applications, the main emphasis of the book lies in the detection and reconstruction of chaotic attractors by the analysis of time series. Here, Tsonis describes not only the now classic Grassberger–Procaccia method, but several other more recently proposed techniques. Since the analysis of times series is likely to be the application of most interest to earth scientists, this section of the book will appeal to those carrying out active research in the field. The applications described are, however, mostly to synthetic or experimental data. The only examples in the earth sciences to be analyzed in detail are climatic time series.

Tsonis's book, with its largely theoretical approach, competes directly with a large number of other texts – some already appearing in their second edition. My first impression was that the book suffered in the comparison with several other texts, but as I read further, I found that Tsonis's approach to the theory was original and produced insights that had not previously struck me. Read Turcotte's book for an introduction to the subject and its geological applications. Then Tsonis's book would be useful as a concise statement of nonlinear dynamics theory, particularly for a reader interested mainly in time series.

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The Colours of Opaque Minerals. By A. Peckett. John Wiley & Sons, Chichester, England, and Van Nostrand Reinhold, New York, 1992, 471 pages, US$124.95.

Episcopy, an unfamiliar term for reflected-light microscopy, is now enshrined in our language. Is it a pun made by the late Roy Phillips, Peckett's predecessor at Durham. The Greek roots are sound, the meaning is obvious, but I suspect a play on words: Durham is a cathedral city, the seat of the bishop (Gr. *episkopos*). How better to link the scientific and the geographic than by giving us the concise term *episcopy*?

For most of us, the fun ends there. Peckett's book is a treatise for the serious student of ore minerals, not for anyone seeking a quick fix on how to identify ore minerals, or even for the practitioner who wants mainly to understand the ins and outs of the CIE color system. Indeed, color is only one subject treated in a book whose not-at-all catchy title might have been "Reflected-light phenomena of ore minerals – their optical, electronic, crystallographic, and crystallochemical bases." These bases are presented in detail, usually by way of advanced mathematics and physics. The writing is amazingly clear and graceful; understanding what is written is not easy, at least for this reviewer. I believe that the book is the most comprehensive one available in English on reflected-light optics applied to ore minerals. Teachers, graduate students, and professionals devoted to understanding what they see under the ore microscope will be amply rewarded by their attempts to master the contents of the book. Most undergraduates at North American schools will find the fare too rich for digestion.

Peckett modestly states that his book is based on notes left by the late Roy Phillips and N.F.M. Henry. Readers who knew those men will see shadows of them in this book, but the work is unique, going well beyond the best we had in print (Galopin & Henry 1972) and the best that Phillips gave us in his conversations. However, the gross simplification of optical theory that Phillips felt was in his grasp is not available in any book.

But what has Peckett given us? His book has three general sections, each 50–60 pages long. The first is on the nature of light and color – historical review, the human eye, subjective color problems and defective color vision (fascinating, as he explains and illustrates these subjects), the CIE color system and its chromaticity diagram, other quantitative approaches, light sources

and filters. The second section, entitled Light and Crystals, deals with polarization states, oscillator models, the propagation of electromagnetic waves, "quantum leaps", chemical bonding, molecular orbital theory, ligand field theory, and band theory of metals and semiconductors. Ignore this section at your peril; Peckett makes use of it here and in subsequent sections. The third section, on reflected light, presents the Fresnel, Drude (Beer), and Koenigsberger equations and their application in the two-media reflectance method of determining n and k, reviews tensor properties and the relative permittivity tensor, and considers the propagation of light in anisotropic media, the reflectance and color of oriented mineral sections, polarization colors, and extinction angles. These three general sections set the stage for a fourth section, 225 pages of mineral data.

The mineral data are from the literature, supplemented by Peckett's illuminating comments. Minerals are arranged chemically by supergroups and groups, *e.g.*, R_mX_n minerals (supergroup) containing Cu arsenides, Cu sulfides, Ag_2X minerals, pentlandite group, and more. A brief comment on the supergroup or group precedes some of the descriptions of representative minerals. About 100 minerals or groups are treated. The descriptions include formula, space group, cell dimensions, cell content Z, atomic coordinates, coordination polyhedra (bond lengths and bond angles newly calculated), card number in the JCPDS powder data file, reflectance curves (given for about two-thirds of the minerals), quantitative color data, qualitative color observations, discussion, and references, including some to recent issues of *Mineralogical Abstracts*. Workers who lack ready access to the original literature may find this fourth section of the book particularly useful; for it, there are separate indexes to mineral names and formulae. Other workers will regard the discussions as more valuable, for in these the author relates structure, crystal chemistry, bonding, and other fundamental properties to the reflected-light properties of the minerals. We see in the discussions just why Peckett has developed so extensively the solid-state relations given in foregoing sections of the book. Somewhat to my surprise, the discussions rely heavily on atomic structure and crystal chemistry; molecular orbital and ligand field theory are infrequently applied.

A 25-page appendix on mathematical topics provides us with a refresher course on complex numbers, matrix algebra (including eigen values and eigenvectors), vectors and vector analysis, orthogonal transformations and transformation matrices, and covariant and contravariant metric tensors. If your math is as rusty as mine, you will turn often to this appendix when you face the formidable calculations required to understand many topics developed in the general sections of the book. Peckett notes that an HP15C calculator is a useful substitute for the pencil, paper, and mental anguish of hand calculation. Unfortunately, the HP15C is no longer made, and suppliers' stock in the United States is exhausted. Therefore, one must turn to one or another of the mathematical software programs, such as Mathcad or Mathematica, for use on a personal computer.

References, numbering about 500, conclude the book. They not only document the work, they are worth browsing for general information. Browsing, with a jog of the memory, is made easy because the text page of the principal citation is given for each reference.

The text is illustrated by about 140 line drawings, all excellent, and eight color plates. Except for the photomicrographs in color, the plates are beautiful, well worth study to see how one's own eyes respond to the quirks of color vision. The captions for all illustrations are amply informative.

Peckett's book deserves the adjective great. Those who can profit from it should try to master the contents. Few reflected-light phenomena are left unexplained. These few include anomalous anisotropism in cubic substances, the noncoincidence of the intensity of reflection pleochroism or polarization colors with the directions of principal vibration of some substances of lower symmetry, and optical phenomena occurring beyond the limits of the visible spectrum. Peckett has given us so much, yet we ask for more!

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Introduction to Clay Minerals. By B. Velde. Chapman & Hall, 29 West 35th Street, New York, N.Y. 10001, USA, 1992, 198 pages. US$39.95 paperback (ISBN 0–412–37030–1).

In introducing an abstruse topic such as clay mineralogy to the general reader, an author is confronted with the possibility either of proceeding at depth with fundamental principles and thereby laying a basis for further study, or of adopting a broader, more shallow approach in the hope of bringing the reader's awareness to the importance of the subject. In this instance, the author has opted for the latter approach.

The book comprises six chapters of variable length, with the first containing a number of definitions in addition to a brief account of the origin and distribution of clays, a subject that is dealt with at some length later in the book. The various techniques used for the identification of the clay minerals are mentioned in Chapter 2, and a selected list of references is included for those seeking further information. In chapter 3, the longest in the book, the composition and crystal structures of the various clay minerals are described under two headings, "swelling types" and "non-swelling types". This is an unfortunate use of terms, in that it could give the reader an impression that clays containing minerals such kaolinite, illite and palygorskite do not expand when moistened. "Expanding" and "non-expanding minerals" would have been less ambiguous;

however, apart from a few minor issues, the section appears well done.

Chapter 4, dealing with the origin and occurrence of clay minerals, is the second longest and appears to extend well beyond that which one would expect in a general introductory text. Moreover, geologists and pedologists may take issue with several of the statements made in this section. A brief account of the uses of clays and clay minerals is given in chapter 5, with specific mention of the adsorption of organic compounds in a range of industrial processes and also in the production of catalysts, particularly for the petroleum industry. The chapter concludes with the value of the various clay minerals in the manufacture of ceramics. The final chapter, although relatively short, contains an up-to-date account of clays in the adsorption of industrial pollutants, including nuclear waste materials. There is an index, but regrettably, apart from the brief list at the end of chapter 2, the book is devoid of references to assist readers seeking further information.

The book is reasonably priced and well written. Although directed more to geology, it could form a useful introductory text in liberal arts courses and the like at the undergraduate level.

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Fundamentals of Crystallography. By Carmelo Giacovazzo, Hugo L. Monaco, Davide Viterbo, Fernando Scordari, Gastone Gilli, Giuseppe Zanotti and Michele Catti, edited by C. Giacovazzo. IUCr Texts on Crystallography **2**, International Union of Crystallography and Oxford University Press, New York, 1992, 654 pages, CAN$74.50 paperback (ISBN 0–19–855578–4).

This is a revised and extended English-language version of a 1985 textbook in Italian (*Introduzione alla cristallografia moderna*, Edizioni Fratelli Laterza, Bari), and is part of a series of books sponsored by the International Union of Crystallography (IUCr). The book includes chapters on: 1. Symmetry in Crystals (by Giacovazzo), 2. Crystallographic Computing (by Giacovazzo), 3. The Diffraction of X-rays by Crystals (by Giacovazzo), 4. Experimental Methods in X-ray Crystallography (by Monaco), 5. Solution and Refinement of Crystal Structures (by Viterbo), 6. Ionic Crystals (by Scordari), 7. Molecules and Molecular Crystals (by Gilli), 8. Protein Crystallography (by Zanotti), and 9. Physical Properties of Crystals (by Catti).

As stated in the *Preface*, "Recently, the demand for a compact book that gives a comprehensive account of the modern crystallographic subjects has increased. This volume should therefore be a useful and handy textbook for university courses that cover crystallography, fully or only partially. It should also be useful at the more advanced level required for doctorate studies as well as for experienced researchers." In a discipline that has had a pivotal role in the development of science in this century and that is replete with excellent specialized textbooks, these are weighty ambitions. With the sponsorship by the IUCr and the fast-approaching centennial of the discovery of X rays by Wilhelm Röntgen, a comprehensive textbook on crystallography might be a fitting celebration of the application of diffraction methods to the atomic structure of matter.

On the positive side, the text is well written, rigorous and lucid; there are few typographical errors and grammatical lapses, and standard classroom explanations for difficult concepts of the discipline are adopted. The treatment of individual topics is adequate for a teaching text, although too concise for the specialist. Selected modern aspects of crystallography, such as synchrotron radiation, Rietveld refinement, refinement using molecular dynamics, and protein crystallography, are discussed. Chapters 4, on experimental methods, and 5, on solution and refinement of crystal structures, are excellent, and chapters 2 on crystallographic computing and 3 on diffraction of X rays by crystals are good. With a revised chapter 1, these chapters would form the basis of a good textbook on X-ray crystallography. Unfortunately, chapters 6 to 9 have the appearance of "add ons".

Fundamentals of Crystallography gets low marks for layout, concept and content. It has been printed with a 7 cm outside margin and a very narrow inside margin. Perhaps the tight binding is to frustrate photocopying, but it has the undesirable result that the information content on most pages is on a curved surface. Thus, this textbook is not "handy" as promoted, but rather bulky and cumbersome. The wide margin contains figure captions and miniaturized figures. It is not decorative and appears to serve no useful purpose other than that of a student notepad.

Fundamentals of Crystallography is really just another textbook on X-ray crystallography. It does not provide a comprehensive overview of modern aspects of the broader discipline of crystallography at the classroom level. The treatment of diffraction methods in general, Fourier transforms, electron and neutron diffraction, order–disorder, modulated structures, intercalated materials and synchrotron-radiation applications is disappointing. Students interested in solids, stereochemistry, and surface-related phenomena will be disappointed as well. There is little in this textbook specifically for earth scientists: powder methods are not considered in depth, and chapter 6 on ionic crystals (including oxides and silicates) will not inspire a new generation of mineralogical crystallographers. However, this is 654 pages of definitions, theory, formulae, explanations and contemporary practice, and as such will make a valuable addition to my library of textbooks on crystallography.

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