BOOK REVIEWS

Deer, W. A., Howie, R. A., and Zussman, J. *Rock-forming Minerals. Volume 1B Disilicates and Ring Silicates*, London (Longman) and New York (Wiley), 1986. xii + 629 pp., 272 figs., 40 tables. Price £65·00.

The original volume 1 of this incredible compendium of mineralogy appeared in 1962 as the first of five volumes, all of which appeared within two years. In the second edition, the original volume 1 which had 333 pages was split into two, 1A orthosilicates (1982) with 919 pages and now 1B (1986) with 629 pages, an expansion of nearly five times. Volume 1B covers the epidote group, lawsonite, pumpellyite, melilites, beryl, cordierite, osumilite, tourmaline, and axinite, all of which were described in the first edition, plus the Ca silicates larnite, merwinite, spurrite, rankinite, tilleyite, and the Ca Na Zr ± Ti silicates låvenite, rosenbuschite–götzenite, endialyte–eucolite and catapleiite. These newly added relatively rare minerals alone receive 74 pages of description.

The sequence of description of each mineral is the now familiar order of a brief opening summary of the physical, mainly optical properties, and the paragenesis followed successively by the crystal structure, the chemistry, experimental synthesis giving limiting reactions and fields of stability, optical and physical properties, distinguishing features (mainly optical), paragenesis and references. The treatment is superb; on the one hand comprehensive and on the other synthesising and authoritative. Thus cordierite covers 130 pages and osumilite 17 pages. A continued feature is the extensive tabulation of representative chemical analyses of minerals, usually not of microprobe origin so that Fe^{2+}, Fe^{3+}, and OH or H_2O are the most reliable values available. The analyses reveal the range of variation established and are certainly the most accessible source of carefully assessed chemical data for the minerals concerned. Thus 50 cordierite analyses are listed, 30 of beryl, 31 of melilite, 24 of pumpellyite, 55 of tourmaline and even the analyst's nightmare mineral, allanite, has 30 analyses listing over 30 constituents.

The particular strength of this series is the detailed consideration given to the range of composition and properties of each mineral, the invaluable summary of the available experimental work and the extensive summary of the paragenesis so that all the most significant occurrences are recorded and the references containing the original information listed. The width and depth of the treatment is well demonstrated by citing the epidote group—179 pages with the experimental mineralogy and petrology of zoisite alone occupying 16 pages and yet there is a clear statement of the distinction of the two optically different varieties which is still a matter of some confusion in some books. Although it is inconceivable that no printing or other errors exist, this reviewer did not recognise any. This is symptomatic of a high quality meticulously prepared publication.

This volume is therefore *unreservedly* recommended. It should certainly be in every earth science and material science library and, not on each petrologist's or mineralogist's shelf, but open on the work bench. With volume 2A (single-chain silicates)—mainly the pyroxenes—already published, the next volume may be slow to appear for there are major problems in presenting either the amphiboles or the feldspars, and the latter have been the subject of J. V. Smith's detailed study. Perhaps temporary refuge will lie in the non-silicates?

B. E. LEAKE

Liebau, F. *Structural Chemistry of Silicates: Structure, Bonding, and Classification.* Berlin, Heidelberg and New York (Springer-Verlag), 1985. xiii + 347 pp., 136 figs. Price DM 163.00.

Though silicates and aluminosilicates constitute by far the major part of the Earth's crust and their use in industry is increasing at a very fast rate, there has been until now no comprehensive treatise on their structural chemistry taken as a whole.

Literature on this subject is abundant but disseminated in many papers and books, most of these latter usually restricted to specific mineral groups such as feldspars, pyroxenes, amphiboles, zeolites, etc., although they frequently offer complete descriptions of the crystal structures. Even if the full description of these are not given in the present text—and, according to its author, that was not its aim—it is particularly welcome in filling an important gap in silicate structural typology: obviously F. Liebau succeeds in showing us the amazing diversity of the silicate world.

After a general study of the silicon–oxygen bond—the paragraph on the covalent model

including also data on five- and six-coordinated silicon—and of the cation–oxygen bond and its influence on the Si–O bond, the author develops its classification as an extension of the Bragg–Naray–Szabö classical one. The reader will be impressed with the clarity of the numerous figures, even if he previously had the occasion to see many of these in the chapter of the *Handbook of Geochemistry* (Springer-Verlag) devoted to silicon. The last chapter is particularly well developed and interesting: it deals with the influence of non-tetrahedral cations on the relations between the different structural units (rings, branched and unbranched chains, layers, etc.) and on the shape of silicate frameworks.

This book ends with an abundant and up-to-date bibliography (more than 680 references), a table of ionic radii, a subject index and a formula index with more than 1500 natural and artificial compounds.

Concerning the 'pièce de résistance', most mineralogists will probably find this classification very interesting from a theoretical point of view but probably not from a practical one; it is not always easy to remain afloat amongst the different parameters like 'directedness', 'linkedness', 'connectedness', 'branchedness', etc. and it is not certain that, according to the author, 'sechser', 'zehner' or 'zwolfer' periodicities are 'widely accepted' terms. Fortunately the reader is invited to use the shortened form '24 er' in place of 'vierundzwanziger'! Also, perhaps 'the structural formula of a substance should contain as much information about its structure as necessary . . .', but most probably a mineralogist will not be enthusiastic to enter the formula of chesterite as $(Fe,Mg)_{17}\{\boldsymbol{uB},2^1_\infty\}[^2Si_4O_{11}]\{\boldsymbol{uB},3^1_\infty\}[^2Si_6O_{16}]_2(OH)_6$ in his computer: he will prefer the more classical $(Mg,Fe)_{17}Si_{20}O_{54}(OH)_6$ . . .

Anyhow, in spite of the arcana of this classification, and even if many minerals were not considered (what about silico-carbonates like tundrite, silico-phosphates like britholite, etc.?), this book constitutes a mine of information on the crystal chemistry of silicates: chemists and mineralogists alike should give it a careful perusal.

F. CESBRON

Dunham, K. C. and Wilson, A. A. *Geology of the Northern Pennine Orefield. Volume 2. Stainmore to Craven* (British Geological Survey Memoir, HMSO, London), 1985. x + 247 pp. 36 figures, 25 tables. Price £15·00.

The North Pennine orefield is one of the classic lead mining districts of the British Isles extending from the Roman Wall on Whin Sill at its northern extremity to the Craven Limestone Uplands in the South. This memoir is restricted to the southern part of the orefield from Stainmore to Settle and Craven in the South, more commonly known as the Askrigg block.

The text is organised into fourteen chapters. The introductory chapter provides an extremely detailed and fascinating account of the mining history of this once prosperous mining area. The next four chapters (2 to 5) provide an equally detailed review of the stratigraphy of the area whilst chapter 6 discusses the structure and tectonic history of the whole region.

The general characteristics and major structural and stratigraphic controls to lead–fluorite–baryte mineralization in the district are reviewed in Chapter 7 followed by a discussion of the origin and age of the deposits and on the nature and source of the mineralizing fluids. Chapters 8 to 13 provide a comprehensive catalogue and meticulous description of individual mineral deposits, veins and vein systems throughout the region. The final chapter summarises the future prospects for lead, zinc, fluorspar, barium minerals and copper ore in the area.

The memoir is liberally illustrated with informative maps, sections and photographs and the text is well-organised and clearly written. The 13-page locality and subject index is quite outstanding though I would like to have seen a comparable author index, or at least a reference list, at the end of the memoir. Overall, however, this is a first-class publication. The authors are to be commended for upholding the fine tradition of the British Geological Survey in this excellent review. It will prove indispensable to anyone with an interest in the geology, mineralization and mining history of the area and provides a useful reference source for anyone interested in carbonate-hosted epigenetic, $Pb–Zn–CaF_2–BaSO_4$ mineralization elsewhere in the world.

A. H. RANKIN

Nesbitt, R. W. and Nichol, I., Editors. *Geology in the Real World—the Kingsley Dunham volume.* London (Institution of Mining and Metallurgy), 1986. xvi + 493 pp. Price £28·00.

Sir Kingsley Dunham's contribution to British geology in the broadest sense has been profound and so it was fitting that in April 1985 (the year of his 75th birthday) former Durham students should organise a meeting in his honour.

This volume contains the text (47 papers and 4 abstracts) of the presentations made at this meeting. The first of these is an address by Sir Kingsley himself; it has the same provocative title as that of