

## BOOK REVIEWS

Wolf, K. H., Editor. *Handbook of Strata-bound and Stratiform Ore Deposits*. Amsterdam and New York (Elsevier Scientific Publishing Co.), 1981. Part III. Volume 8. *General Studies*. xix + 592 pp., 146 figs., 134 tables, Price US \$129.25/DFI. 265.00. Volume 9. *Regional Studies and Specific Deposits*. xiii + 771 pp., 228 figs., 17 pls., 91 tables. Price US \$129.25/DFI. 265.00. Volume 10. *Bibliography and Ore Occurrence Data*. 576 pp., 6 maps, 2 figs., 269 pp. of tables. Price US \$67.76/DFI. 165.00.

The publication of this mammoth work, justifiably claimed to be the most ambitious publishing project so far undertaken in the field of economic geology was completed (if indeed it is complete) with the appearance of Volume 10 last September. Three of the earlier seven volumes when reviewed (*Mineral. Mag.* 42, 304–5, 1978) proved to contain general discussions and regional descriptions going considerably beyond the scope of strata-bound and stratiform ore deposits and of interest to students of the non-concordant mineral concentrations. Part III (which unlike Part I has no separate title of its own) shows similar tendencies particularly in Volume 8, where a 338-page article by K. H. Wolf himself deals with terminology and classification of ore deposits and petrological classification of host rocks. This remarkable academic exercise, undertaken by Wolf at the Laurentian University, Sudbury, Ontario, is without parallel in the history of applied geology and mineralogy in that it brings together in tabular and diagrammatic form, all the classifications that have been in use during the past two decades. The result emphasizes, perhaps unconsciously, how little general agreement there has been from country to country and between rival schools in any one country. There was more, I suspect, at any rate in North America when the classification of Waldemar Lindgren (1917–34) held sway, but this receives only a brief mention, and that in J. D. Ridge's (1962) amended version only. The movement towards recognition of stratiform and strata-bound ore deposits as a separate major class had, in some people's minds at least, an anti-Lindgren element in it. The motivation is neatly summarized by A. C. Brown (in Volume 9, p. 1):

Numerous detailed studies of stratiform copper deposits . . . have rejected the classic igneous-hydrothermal epithermal/teletothermal origin and have instead suggested an origin intimately related to the processes of sedimentation . . . features such as widespread distribution in a sedimentary basin and distribution . . . within narrow stratigraphic limits are cited. However, such features do

not exclude the possibility of diagenetic addition of metals . . .

Brown is by no means alone in admitting the importance of diagenetic solutions, and if we rephrase this in terms of heated formation waters, we arrive at the real alternative to the igneous-hydrothermal hypothesis. Of course true processes of sedimentation form ores like BIF and the palaeoplacers. But I suspect that for most of the rest, the movement of formation waters is of more fundamental importance than the bedded nature of the host-rock receiving the mineralization, whether on the sea-bottom or after consolidation. Thus the creation of two megaclasses of ore deposit: (i) stratiform/strata-bound and (ii) non-stratiform/discordant seems to me regrettable. The huge effort that has gone into the writing, editing, and publication of the Handbook could better have been devoted to a comprehensive Handbook of Metalliferous Mineralization.

Volume 8 is thus particularly welcome for its wide scope. Wolf wisely refrains from advocating yet another classification, though he indicates some of the lines to be considered, especially the need for adequate transitions from class to class. I. B. Lambert and D. I. Groves follow with a descriptive model of early Earth evolution and metallogeny, stressing as typical of Archaean mineralization BIF, volcanogenic sulphides, baryte, the Ni-Cu-Pt-Cr suite associated with ultrabasics, and the gold-quartz veins. Two interesting papers by P. Lazhika complete this volume, one dealing with ore-types and examining in detail the Mississippi Valley type; and the other considering the impact of recent global tectonic theory on the older conception of two neat metallogenic domains, the mobile belts and the platforms. The volume is very well illustrated, though the quality of the drawings varies; one particularly welcome feature is K. H. Wolf's article makes available to English language readers many diagrams in the European literature, and not least the admirable models of H. Borchert, who had a great gift for this sort of illustration.

Volume 9 returns to the concordant deposits and contains authoritative articles on timing of mineralization in stratiform copper deposits (A. C. Brown); oolitic ironstones (M. M. Kimberley); the nature and origin of Archaean volcanic-associated Ni-Fe-Cu sulphide ores (D. I. Groves and D. R. Hudson); the significance of pyritic black shale in the genesis of Archaean nickel sulphide deposits (T. Hopwood) and sedimentary-hosted submarine-exhalative lead-zinc deposits (D. E. Large). Abstract (by R. A. H.) of these papers will be

found in *Mineralogical Abstracts* 33, 18, 1982, but the general comment may be made here that those papers dealing with nickel-bearing deposits recognize that processes of magmatic differentiation leading to volcanism in one case, and including contamination with metal-enriched shale in the other were necessary to the generation of nickel deposits in Archaean time, while in the cases of sea-bottom copper, lead and zinc deposits diagenetic additions or additions of hydrothermal fluids to the marine basin, such as I advocated for the Kupferschiefer twenty years ago (Dunham, 1964) still appear to be necessary. A case is made by B. Lehmann and H.-J. Schneider for recognizing as strata-bound the tin deposits at two mines in Germany, and Poland, and at the Sullivan Mine, British Columbia, and also at Rooiberg, South Africa, but all of these show features transitional to normal igneous-hydrothermal origins, perhaps in part exhalative. Finally this volume includes three very useful papers for the inclusion of two of which the editor makes an apology. All seem entirely relevant to the subject in hand; they include a discussion of metalliferous deep-sea sediments by M. A. Meylan and others; and by U. Förstner, one on recent heavy-metal accumulation in limnic sediments, and the other on trace metals in fresh and mine waters.

Volume 10 contains (i) a supplementary bibliography of strata-bound and stratiform ore deposits covering the years 1974–8; (ii) a tabular summary, compiled by P. Laznika, of the deposits on a worldwide scale, listing metal, locality, minerals, orebodies, stratal relationship, age, environmental facies, deformation/metamorphism, lithology, genesis, tonnage, grade, and reference. Altogether 1472 orefields or individual deposits are listed, but it is admitted that classification of some are controversial. The localities are indicated on outline maps; (iii) a bibliography related to these data; (iv) references and subject indexes. As a test of the accuracy and usefulness of the data summary, a few British examples were scrutinized. The Furness–South Cumbria hematite field (pp. 212–13), if typical, leaves much to do be desired. The gangue minerals quartz and dolomite are not mentioned, the ore is described as ‘conglomeratic’ (whereas it is in fact brecciated *in situ*), the lithology of the wallrock is put down as *ironstone* (it is of course limestone) and the genesis is stated to be ‘residual infiltrated’ (there is no warrant of any kind for a residual origin). The authority is stated to be my 1952 paper; it is inaccurately quoted and in any case was long ago superseded by Rose and Dunham (1977). A little further down the page, the essential difference between the Frodingham ironstone and the other British Jurassic sedi-

mentary ores, namely that it contains primary goethite oolites, is missed. One looks in vain for any mention of the Northern Pennine Pb/F/Ba Orefield; yet one of the first descriptions of stratal control of discordant ore-shoots, perhaps the first of all (Forster, 1809) came from this field, production from which is of the same order as a medium-sized Mississippi Valley field. The bibliographies in this volume, lengthy as they are, are far from complete and do not even cover many items listed in the first seven volumes. Perhaps, in an effort to make the case for separating stratiform/strata-bound deposits, too great a task has been attempted.

Nevertheless, Editor Wolf and his colleagues must be congratulated on an undoubted *tour de force*. Although I cannot help doubting whether it was worth it to bring together such diverse deposits as the cumulate chromites, the Kupferschiefer, the Witwatersrand palaeoplacers and the bauxite soil-mantle, it is true that one aspect of geological science has been given a Handbook in the tradition of the great German chemical treatises. Perhaps Dr Wolf, now consultant at the Directorate of Mineral Resources, Jeddah, Saudi Arabia will now consider restoring the balance with an encyclopaedia of the non-stratiform, non-strata-bound mineral deposits?

#### REFERENCES

- DUNHAM, K. C. (1964) Neptunist concepts in ore genesis. *Econ. Geol.*, **59**, 1–21.  
 FOSTER, W. (1809) A treatise on a section of the strata from Newcastle-upon-Tyne to the mountain of Cross Fell in Cumberland, with remarks on mineral veins in general. Foster: Newcastle, 151 pp.  
 ROSE, W. C. C., and DUNHAM, K. C. (1977) Geology and hematite deposits of South Cumbria. *Mem. Geol. Surv. GB*, 170 pp.

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Cabri, L. J., Editor. *Platinum-Group Elements: Mineralogy, Geology, Recovery*. CIM Special Volume 23. The Canadian Institute of Mining and Metallurgy, 1981. v + 267 pp., 158 figs. and 3 colour plates. Price \$40.

This is a very welcome contribution to the mineralogy and geochemistry of the platinum-group elements. The editor has assembled a team of seven authors, but as he is involved personally in seven of the eleven chapters the book very much reflects his outlook on the subject. The large page format, the numerous tables, diagrams, and illustrations immediately impress the reader with the quantity of data collected together on a relatively young topic in mineralogy.