criteria for distinguishing mineralized granitoid complexes and supra-ore from sub-ore primary halos are of particular interest. The remaining chapters on secondary dispersion, the scope and objectives of exploration, and statistical methods provide little new information, although they give an insight into 'the state of the art' of Russian exploration geochemistry. The methods of chemical analysis and data processing appear considerably less advanced than those of many Western countries with reliance placed on simple statistics such as ratios of elements that are readily determined by optical spectrographic methods. The emphasis on geochemical theory rather than advanced technology makes the text of particular value to exploration scientists working in developing countries.

The book is attractively bound and well presented although it suffers from poor diagrams, a lack of photographs of equipment, terrain, or procedures, and the use of units of concentration of the type $1{,}5.10^{-4}$ for the clarke for beryllium, for example. A general criticism is also the lack of quantitative information on the mineral deposits discussed. The theoretical sections of the book are presented confidently and clearly, however, and the editor's former experience with *Geochimica et Cosmochimica Acta* has clearly stood him in good stead. The book is an advanced rather than introductory text and is recommended to practising economic geologists, exploration geochemists, researchers, and senior students.

JANE PLANT

Wolf (K. H.), editor. *Handbook of Strata-bound and Stratiform Ore Deposits.* Amsterdam and New York (Elsevier Scientific Publishing Co.), 1978. Part I. *Principles and General Studies.* Volume 1. *Classification and Historical Studies.* x + 338 pp., 74 figs. Price U.S. $47.75/Dfl. 124.00. Volume 2. *Geochemical Studies.* xvi + 363 pp., 107 figs. Price U.S. $47.75/Dfl. 124.00. Volume 5. *Regional Studies.* xi + 319 pp., 72 figs. Price U.S. $47.75/Dfl. 124.00.

The seven volumes of this ambitious and expensive commercial venture not being available in the normal way for review, this article deals only with the two volumes of Part I, and with the volume containing contributions on mineralized regions in the British Isles. The post-Second World War period has seen important new developments in the understanding of stratiform deposits (concordant with the enclosing strata) and strata-bound deposits (those confined in or controlled by bedded wallrocks but nevertheless displaying discordant features;—the term is due to the late C. F. Davidson), and editor Wolf justifies his volumes as a means of bringing together a widely scattered literature, as generating new ideas, and as part of the present age of specialization. There has been a determined attempt by some Continental investigators, particularly in France (the gitologists), Austria, and Germany to see as many metalliferous deposits as possible as normal products of sedimentation or early diagenesis. No doubt this is correct in the cases of the unenriched jasperoid iron ores of the Pre-Cambrian, or the chamosite–siderite or minette ores of the Phanerozoic; but for the base-metal deposits in platform limestones, fluid-inclusion thermometry and chemistry have shown it to be incorrect in virtually every case investigated. Lithostatic or other metamorphism can rarely if ever be invoked to explain temperatures of formation, normally in the range 90–180 °C in these deposits; the interesting article in Volume 1 by A. J. Bernard and J. C. Samama stating the French position fails to deal with this problem. On the other hand, where sea-bottom vulcanicity has prevailed, the necessary conditions of temperature and brine-circulation have often been achieved to produce concordant base-metal concentrations among volcanogenic sediments. The application of this conception to major sulphide deposits in metamorphic terrains by Haddon F. King (who contributes to Volume 1 an account of Australian ideas), Chris Oftedahl, and David Williams has been particularly fruitful. There have been attempts to apply a similar concept to the platform limestone environment but these have been far less successful and today many workers prefer to appeal to deep formation brines, expelled from major sedimentary basins or mineralized by solution of evaporites, as the active agents, or else to hark back to the magmatic hydrothermal hypothesis that the stratiform/strata-bound school of thought was designed to kill off. As far as strata-bound deposits go, the problem of most interest to the economic geologist is the mechanism by which specific beds in the wallrock strata controlled the emplacement of oreshoots that are plainly recognizable as epigenetic. Having regard to this, one may justifiably question whether the concentration on a class of strata-bound deposits to the extent of producing a seven-volume handbook really advances the discipline of metalliferous geology as a whole. Certainly, the existence of the band-waggon has attracted adherents; but what possible reason can there be for including the Cu–Zn–Pb veins of the English Lake District, or the Bunmahon veins in Eire; there is not a strata-bound deposit among them in any meaningful sense. It is not surprising that it was necessary to include P. Gilmour's good article on transitional deposits.

Volume 1, after K. H. Wolf's introduction, contains a long article, also by him, on conceptual models in geology that goes considerably beyond the scope of the stratiform ores and will be of interest to the general reader. This volume also contains, in addition to the reviews of Australian and French ideas, a chronological account of the American attitude to syngenesis in ores, presented with suitable scepticism by J. D. Ridge.

Volume 2 would do great credit to any general work on metalliferous geology as a whole. W. Mercer deals with the minor element geochemistry of sediments, E. K. Duursma and C. Hoede with diffusion; Ed. Roedder with fluid inclusions; J. D. Saxby and P. A. Trudinger, respectively, with the role of organic matter and microbiological processes; P. Fritz with oxygen and carbon isotopes; V. Köppel and R. Saager with U-, Th-, and Pb-isotopes; and D. J. Vaughan with the sulphides of Cu, Zn, Pb, and Fe.

Volume 5 commences with an article by R. Höll and A. Maucher on the Eastern Alps, where the lead-zinc, magnesite, and siderite deposits are of most interest. These authors significantly remark: 'We understand under the term "sedimentary ore" every ore deposited—mechanically or chemically—upon or within a sediment contemporaneously with the deposition and/or lithification of this sediment, independent of the source of the metals and the ways and means of (their) transport . . .' No doubt veins injected into sedimentary rocks many millions of years after the conclusion of sedimentation could be regarded as part of the ultimate lithification process, but for my part I could not possibly accept this definition, which looks very like a face-saver. R. I. Thompson and I. Panteleyev follow with a review of the Canadian Cordillera, particularly interesting for its descriptions of the mineralization of the Belt-Purcell supergroups of late Pre-Cambrian age. A. A. Ruitenberg's article on the volcanogenic deposits of the Appalachians also deals with real stratiform sulphides, here in their metamorphic and tectonic context. The final contribution in the volume deals with Southern Africa and is by C. R. Anhaeusser and A. Button. These authors are quite definite that their term of reference is non-magmatic deposits, even though some volcanogenic deposits in greenstones are included.

Turning now to the British Isles, T. D. Ford on the southern Pennines and Mendip hills is the first of three papers. This strikes me as the best of the several reviews of the North Derbyshire orefield undertaken by this author, and in this area of rather poorly documented old mines it is difficult to see that much more could be said. Ford espouses unequivocally the notion of mineralization by brines expelled from the North Sea basin. At present, unfortunately, the stratigraphical evidence is lacking that would prove that there was a deep Carboniferous–Permian basin where the North Sea now is. To account for the mineralization at around 100 °C, 6 or 7 km thickness of sediment in the basin would be required to yield the heated brines. Parts of the basin may take the Carboniferous rocks to a depth of this sort now, but that is the result of later Mesozoic movements, later than Ford's postulated late Permian and Triassic epochs of mineralization. P. R. Ineson follows with a compilation of research on the northern Pennines, north Wales, and the Lake District. He is too modest in saying that the deposits are insignificant on a world scale; individually they may be, but the Pennines have yielded as much lead as one of the great Mississippi Valley orefields, which no one regards as insignificant. His account of the northern Pennines, though it does reasonable justice to the zonal, geophysical, wallrock alteration, and deep-boring investigations carried on since the Second World War, is weak on stratigraphy and structure in so far as these were the factors controlling the emplacement of the oreshoots. On the theoretical side he tries to be all things to all men by attempting the reconciliation of genetic hypotheses ranging all the way from surface water to mantle juices. I am sure that this is not possible. Unlike his fellow authors in this volume, Ineson has incorporated eight diagrams from other publications, without acknowledgement to the authors concerned; apart from copyright implications this is an objectionable practice that deserves censure. I also read with some surprise that I made a study of the aerial distribution of minerals (p. 201).

The Irish base metal deposits, which can properly be regarded as lying within the same shelf limestone province as the Pennine, Halkyn-Minera, and Mendip deposits, are dealt with in a valuable article by A. M. Evans in which he convincingly demonstrates that with the possible exception of the upper orebody at Silvermines, they are not strata-bound in any meaningful sense of the word and certainly not stratiform. The deposits, few but large, were decidedly less sensitive to wallrock stratigraphy than those of Alston, Askrigg, or north Derby. Evans makes the most eloquent case for an origin from magmatic, rather than formation water. Here then is one of seven massive volumes, every genetic possibility from pure sedimentary to pure juvenile is expounded. That is a fair reflection of where the great class of strata-bound deposits stands. I ask again, is it worth distinguishing such a category?

KINGSLEY DUNHAM