

## BOOK REVIEWS

BURNS (ROGER G.). *Mineralogical Applications of Crystal Field Theory*. London and New York (Cambridge University Press), 1970, xiii+224 pp., 67 figs., 2 pls. (1 coloured). Price £4.00 (U.S. \$13.50).

This is one of the first titles to appear in the new Cambridge Earth Science Series, and it augurs well for the success of the series that the publishers have produced an attractively laid out book with an abundance of clear illustrations of generous size. The price is reasonable, although it is difficult to see why American readers should be expected to pay \$13.50 for a book that sells at \$9.60 in the U.K.

Three introductory chapters cover basic crystal field theory, energy level diagrams, spectra of transition metal compounds, and selection rules. There is also a brief discussion of experimental techniques used in measuring absorption spectra, and of the interpretation of absorption spectra to yield information on oxidation state, coordination, and site preference of transition metal ions.

The central section of the book is devoted to a comprehensive and particularly well illustrated account of mineral spectra. At this relatively early stage in the development of the subject it is perhaps unfair to expect definitive interpretations of the spectra, and the reader should remember that energy level diagrams such as figures 5.3, 5.5, and 5.8 may yet suffer considerable revision. The same reservation applies to a number of interpretations offered in the text, e.g. it is scarcely likely that  $\text{Fe}^{2+} \rightarrow \text{Al}$  charge transfer will occur at energies similar to those required for  $\text{Fe}^{2+} \rightarrow \text{Fe}^{3+}$  charge transfer, as implied on p. 69.

The remainder of the book is best described as a set of essays on transition metal geochemistry. The subjects include the crystal chemistry and thermodynamic properties of transition metal compounds, trace element geochemistry, and the application of crystal field theory to the properties of the mantle and to sulphide mineralogy. These essays are well worth reading, although some of the arguments again need to be approached with a degree of scepticism, especially the treatment of trace element distributions in § 8, and that of spin-pairing transitions in § 9.

Those who are familiar with the author's previous work in this field will discover relatively little that is new in this book, but they will none the less find it invaluable both for its extensive bibliography (to the end of 1968) and as a source of data on mineral spectra and properties. This book should certainly be bought by all earth science libraries, and it will doubtless become recommended reading for the majority of postgraduate and advanced undergraduate students of mineralogy and geochemistry.

R. G. J. STRENS

NICOLINI (P.). *Géologie des concentrations minérales stratiformes*. Paris (Gauthier-Villars), 1970. 792 pp., 193 figs., 41 tables and maps, 39 photos. Price 190F.

At the outset the author tells us how he has come to add a new word to the French language (I translate): Impelled by the heads of European schools: G. C. Amstutz

at Heidelberg, P. Routhier and J. Lombard in Paris, and A. Bernard at Nancy, classical metallogeny has been rejuvenated to the point where a term is required to designate this new discipline: *the Gîtologie*. The word is not capable of satisfactory translation into English, and it may be doubted whether the anglicized version gitology will prove acceptable; though gitologist might survive to describe the members of the group whose rigid belief it is that most if not all stratiform deposits of non-ferrous metals originated contemporaneously with the sedimentary rocks series which enclose them. In the main, the English-speaking world, and most of the Russian, finds that most such deposits are clearly not original sediments but were emplaced by fluids diffusing through permeability channels such as the intergranular pore spaces in sandstones, or dissolved palaeoaquifers in limestone, often aided by metasomatism.

Logically, the book gives a good account of sedimentological evolution; covering basin analysis, lithofacies, palaeogeography, transport, ancient climates, biological aspects of the environment. The development of the environment of ore deposition is then considered; diagenesis receives 61 pages of discussion, metamorphism and granitization are mentioned, and various types of sedimentary successions are described. Next, events external to the sedimentary environment are dealt with: tectonism, the cover-rock/basement conception, and here magmatism (including the formation of volcanosedimentary series) receives just eight pages of treatment out of 472 so far. The vast gulf that exists between the thinking of the gitologists and that of the Canadian ore geologists could hardly be better illustrated.

There follows a discussion of methodology—beloved of French authors—and classification. The facts having been interpreted, it is now time to apply them to the search for minerals. Here the conception of the metallotect, which might be defined as the sum of the conditions required to form an ore deposit, is introduced. The organization of a mineral exploration is described.

This is a strangely unbalanced book. The accepted syngenetic stratiform deposits, the 'minette' and chamosite-siderite iron ores, and the evaporites receive no attention, and manganese deposits get little enough. The work is directed towards the copper, lead, and zinc deposits in sediments. No doubt a few such deposits were formed on the sea-bed, where hydrothermal fluids escaped into the sea; indeed it seems reasonably certain that this is happening now in the Discovery and Atlantis II deeps in the Red Sea. But these are special cases, not the rule, and to argue that copper, lead, and zinc ore formation is part of the normal sedimentary cycle leaves me quite unconvinced.

K. C. DUNHAM

BRAITSCH (O.). *Salt deposits: their origin and composition*. Minerals, rocks, and inorganic materials: Monograph series of theoretical and experimental studies, 4. Transl. from the German by P. J. Burck and A. E. M. Nairn. Berlin, Heidelberg, and New York (Springer-Verlag), 1971. xiv+297 pp., 47 figs. Price DM 72.00.

The original German text for this important book by Professor Otto Braitsch was published in 1962. It is regrettable that it has taken nine years for this translation to