

instance 'pits', 'anisotropy', 'cellular texture', 'native iron', are followed by a 'text-card' with a more detailed description of the sections concerned in English and German. The price is DM 0.75 per photo-card, DM 0.45 per text-card. These prices are reduced by 10% for University departments and academic staff, by 15% for students.

The great value of this unique publication is self-evident and does not need further appraisal. Ore-microscopists will welcome the card index as a high-quality source of reference, and university staff will find it a great help in teaching. Economic geologists and mineralogists will appreciate the straightforward and clear approach, which provides an excellent introduction for research workers less well acquainted with the subject matter. Ore dressing workers and metallurgists will be able to use the card index for the solution of their problems without having to go into details of ore mineralogy. The authors should be warmly congratulated on this first part of a very fine piece of work.

A. F. H.

MENDELSON (F.), editor. *The Geology of the Northern Rhodesian Copperbelt*. London (Macdonald & Co. Ltd.), 1961, xvi+523 pp., 185 figs. Price 84s.

Twenty-three authors have contributed to this comprehensive volume. Part 1 provides a general account of the physiography, stratigraphy, structure, metamorphism, and ore deposits of the Copperbelt together with a history of mineral exploration and an account of the methods employed. Part 2 gives detailed descriptions of the individual deposits. In addition to synthesizing the considerable volume of published work on the subject the authors draw extensively on material from unpublished company reports.

The ore bodies occur in a variety of host rocks—shales, quartzites, impure dolomites—belonging to the Lower Roan Group of the Katanga system. The common primary sulphides, which are moulded onto and replace the rock-forming minerals, show the paragenetic sequence pyrite–chalcopyrite–bornite–chalcocite. Covellite, digenite, linnaeite, carrollite, cattierite, pyrrhotine, melonite, scheelite, molybdenite, uraninite, brannerite, and coffinite are reported in subordinate amounts. The remarkable zonal distribution of the principal sulphides and its relation to facies changes is described and discussed but it is made clear that the details have not yet been fully established for all deposits.

Supergene alteration is extensive and persists to considerable depths.

Malachite, cuprite, chrysocolla, tenorite, native copper, and cupriferous vermiculite are among the minerals produced. While the effects of leaching and oxidation are readily recognizable the extent of secondary sulphide enrichment is much less obvious. Chalcocite and covellite are clearly in part supergene: how far bornite has a similar origin is uncertain.

In the discussion of the origin of the deposits more attention is paid to the close association of ore with sedimentary features of the host rocks and to the lack of obvious structural controls, both suggestive of a syngenetic origin, than to the mineralogical and geochemical characteristics, which seem more easily explicable in terms of hypogene mineralization. However, the conflicting evidence from different mines is clearly set out and the contributors are not unanimous in the conclusions they draw. There is evidently scope for much further research, particularly in the study of the Katanga basin on a regional scale and to establish the extent of supergene sulphide enrichment in individual deposits.

J. H. T.

RAMDOHR (P.). *Die Erzminerale und ihre Verwachsungen*. 3rd edn. Berlin (Akademie-Verlag), 1960, xi+1089 pp., 637 figs. Price (bound) DM 88.00.

The appearance of three editions at 5-year intervals is an indication of the importance of this work for the now rapidly extending study of polished sections. This third edition makes its welcome appearance almost at the same time as the 'Festband' (Neues Jahrb., Abh. 94, 1960) offered to the distinguished author on his 70th year.

The book has been substantially enlarged (by about 200 pp. and 94 figures) while retaining fairly closely the arrangement of the 2nd edition. The general part (249 pp.) begins with a classification of the ore-deposits according to their geological origin (29 pp.): A, meteorites; B, magmatic series (abyssal-volcanic); C, sedimentary series (including mechanical aggregates, chemical precipitates, coal and oil, oxidation and cementation zones, together with a paragenetic table of ore-minerals (6 pp.); D, the metamorphic series (38 pp.). Ore minerals are perhaps more sensitive to metamorphic alteration than the silicates, and the study of these changes will no doubt play an increasing part in the interpretation of polished sections. This section provides a review of the extensive material already available, with an outline of the logical development of these studies; special importance is attached to examples of progressive