

The cell dimension of the major component is slightly greater, and that of the minor component slightly less, than that of vaesite (a 5.652, on a specimen, B.M. 1957, 579, from Katanga, Congo); it is evident that the octahedral covalent radius of Cu is nearly the same as that of Ni, and appreciably greater than those of Fe and Co. The major component, to which the name villamaninite must properly be attached, clearly has the composition $(\text{Cu,Ni})\text{S}_2$, as assigned by Schoeller and Powell; the minor component is probably to be interpreted as a ferrian (and perhaps cobaltian) vaesite, and if this is true the Cu:Ni ratio in the villamaninite must be still higher than the 1.9 found by analysis of the mixture. It is hoped to make an examination of the two phases separately with the Castaing micro-probe when facilities are available.

*Department of Mineralogy,
British Museum (Natural History),
London S.W. 7*

M. H. HEY

- HIBSCH (J. E.), 1928. Mineral. Taschenbuch, 2nd edn (Wien), p. 65.
 PALACHE (C.), BERMAN (H.), and FRONDEL (C.), 1944. Dana's System of Mineralogy, 7th edn (New York and London), vol. 1, p. 290.
 RAMDOHR (P.), 1937. Zentr. Min., Abt. A, p. 289.
 SCHOELLER (W. R.) and POWELL (A. R.), 1919. Nature, vol. 104, p. 326.
 ——— 1920. Min. Mag., vol. 19, p. 14.
 SIMPSON (E. S.), 1932. Key to Mineral Groups, Species and Varieties (London), p. 80.
 THOMSON (E.), 1921. Univ. Toronto Studies, Geol. Ser., no. 12, p. 39 [M.A. 1-260].

An X-ray study of manganese oxide minerals from Sandur, Mysore.

MANY manganese oxide minerals in the Sandur area, Bellary District, Mysore, India, were reported by Fermor (1909), but without detailed mineralogical study. Mukherjee (1959) made an X-ray study of the ore samples collected by Fermor and confirmed the presence of pyrolusite and cryptomelane with amorphous admixture, also ramsdellite.

The present author has undertaken a mineralogical study of the manganese ores of Sandur, and as a part of this investigation X-ray photographs were obtained in a powder camera of diameter 114.592 mm, using Fe radiation with a manganese filter. The X-ray diffraction data agree well with the values of Ramdohr (1956), and confirm the presence of pyrolusite, cryptomelane, and ramsdellite, already reported from Sandur; but they also reveal the presence of manganite, hydrohausmannite, jacobsonite, braunite, psilomelane, and lithiophorite, all of which are new

to this locality, and of woodruffite, hitherto not recorded from the Indian manganese deposits.

Acknowledgements. The author sincerely thanks Dr. J. Konta under whose supervision this work was carried out. His thanks are also due to Prof. M. S. Sadashiviah for kindly making the ore samples available. A scholarship offered by the Governments of Czechoslovakia and of India for the investigation of this problem is gratefully acknowledged.

Petrological Institute,

Charles University, Prague¹

C. NAGANNA

FERMOR (L. L.), 1909. Mem. Geol. Survey India, vol. 37.

MUKHERJEE (B.), 1959. Min. Mag., vol. 32, p. 332.

RAMDOHR (P.), 1956. Symposium del Manganese XX Congreso Geologico International, Mexico, Tom. 1, p. 19.

¹ *Permanent address:* Department of Geology, Karnatak University, Dharwar, India.

BOOK REVIEWS

MUELLER (W. M.), editor. *Advances in X-Ray Analysis*. Volume 4. Plenum Press (New York), 1961. viii+568 pp. Price \$15.00.

This book reports thirty-eight papers, with discussion, presented at the Ninth Annual Conference on Application of X-Ray Analysis, held at the University of Denver, Colorado, in August 1960. It covers a wide range of industrial and research applications, mostly of little or no direct mineralogical interest.

Four papers deal with diffraction apparatus, e.g. counter and furnace attachments for a Weissenberg camera; eleven papers describe straightforward applications of, mainly powder, diffraction methods to identification and simple structural problems, &c., e.g. reinvestigation of the lower titanium oxides; two papers describe application of computers to the interpretation of data on preferred orientation in polycrystalline materials and to deriving the radial distribution curve for amorphous materials (the latter describes changes in the structure of amorphous silica-alumina cracking catalysts on heating in steam); three papers describe applications of X-ray absorption measurements to the control of industrial processes. Fourteen papers are devoted to apparatus and methods in X-ray fluorescence analysis, including two papers on rock and cement analysis respectively.

As a memento of the occasion, the book is excellent, and this is