LETTERS OF THE WORKING GROUP ON MANGANESE FORMATION OF INTERNATIONAL ASSOCIATION ON THE GENESIS OF ORE DEPOSITS

REPORT

ON THE FIRST SCIENTIFIC MEETING OF THE WORKING GROUP ON MANGANESE FORMATION, HELD ON 1ST SEPTEMBER 1970, IN KYOTO INTERNATIONAL CONFERENCE HALL, KYOTO, JAPAN

Chairman: GY. GRASSELLY.
Co-Chairmen: M. NAMBU and A. KATO.

Programme of the Scientific Meeting:

Some Problems and Trends in Manganese Ore Researches. An Introductory Talk. By GY. GRASSELLY.

Zonal Arrangement of Minerals at the Granitic Contact with the Manganese Ore Deposit in Nodatamagawa Mine, Iwate Prefecture, Northern Japan. By M. YOSHII and T. KOMURA.

Origin of the Manganese Ore Deposits of Mysore State, India. By C. NAGANNA.

Manganese Minerals from Janggun Manganese Mine, Korea. By SOO JIN KIM.

Jurassic Manganese Ores of Hungary. By J. CSEH NÉMETH, GY. GRASSELLY, E. NEMECZ and Z. SZABÓ.

On the Leaching of Manganese Produced by the Interaction of Basic Volcanic Materials with Sea Water. By I. M. VARENTSOV.

Role of Manganese Minerals in the Migration of Elements. By GY. GRASSELLY and M. HETÉNYI.

The lectures submitted for the present scientific session can be divided into two groups. Lectures of the first group are dealing with geological, genetical problems of particular manganese deposits and the second group comprises lectures devoted to dissolution, migration, accumulation of manganese and to problems of adsorption properties of manganese compounds.

GY. GRASSELLY in his Introductory Talk gives a special stress to the complexity of the problems of manganese ore researches what involves the necessity of introducing methods of investigations having already been successfully applied in other fields as well as developing the already applied techniques. He mentions that although more and more, very accurate data are available thanks to up-to-date methods rendering great amount of information, the difficulties in being oriented in this amazing amount of information are also increasing. To overcome these and similar difficulties in the field of

manganese ore researches — as far as it is at its disposal — is one of the aims of the IAGOD WGMF, promoting the development of connections between researchers working in similar fields in different countries, mutual information or exchange of substances to be investigated.

The second part of the Introductory Talk, restricted by time, length and the field of interest of the author himself, shortly summarizes researches yielding very promising results lately in manganese ore researches, and in which fields further researches, model-experiments can bring further result as well. The importance of the pH and the redox potential is especially emphasized by the author. Not less promising field — according to the author — is the study of genetical correlations between conditions of formation, the formed manganese compounds (modification) and the minor element content. Perhaps similarly important is for the metamorphism the study of thermal stability conditions of different manganese compounds and conditions of their transformation.

In connection with model-experiments it is to be emphasized that these methods can only bring results when the experiments are not far from reality, are not alienated from nature but the laboratory results compared constantly with reality step by step are giving deeper and deeper insight to connections hidden in the very self of processes.

An interesting picture of the zonal arrangement of minerals found on the granite contact of manganese ore in Nodatamagawa mine is described by M. Yoshii, and T. Komura. Their information is even more interesting, since — as they write — a sharp contact between manganese site and granite intrusion as experienced here, is rather rare. After a description of the three zones — mostly based upon optical methods and illustrated by photos — they outline their theory of the process of formation of contact minerals. Characteristic minerals of Zone 1: quartz, dannemorite, spessartine; of Zone 2: alkali feldspar, dannemorite, quartz, pyrophanite and apatite; of Zone 3: plagioclase, biotite, dannemorite, hornblende, potassium feldspar, manganese-bearing pyroxene, quartz and apatite. As the authors describe, the amount of Mn continuosly decreases from Zone 1 towards Zone 3. As the authors write, upon the effect of grandiorite intrusion the whole site suffered thermal metamorphism and the originally supposed carbonate and oxide manganese ores had been recrystallized into silicates and other minerals — in the contact zone mostly into rhodonite.

C. Naganna in his paper deals with the origin of manganese deposits in Mysore State, India. Series of explorations carried out for years together with his co-workers brought him to suppose the syngenetic origin of manganese ore sites in Mysore State — the old Fermor-division called it "lateritoide manganese ore" — and these ores have been described in a similar manner by several other authors. This paper well illustrates that older, widely accepted statements can be modified, corrrected, our knowledge widened by manysided experiments carried out upon a unique conception, based upon great amount of data and comparing different deposits. Besides textural differences there are also variations in the mineral distribution and occurrence in depth of ore types distinguished by the author, and all these reasons justify the differentiation of the types. The syngenetic origin is very successfully proved by the author on analyzing the manganese formation and host rocks relation. It would be very useful if the author and his co-workers find possibility in the future

to investigate the correlations between the distribution of ore types and minor element content.

Soo Jin Kim in his paper describing manganese ores of the Janggun mine in Korea makes use in the study of manganese minerals formed by supergene oxidation of manganese carbonate of the possibilities rendered by the most diverse methods of investigations and describes three trends of supergene minerals.

A paper by J. Cseh Németh *et al.* deals with geological relations of Jurassic sedimentary manganese ore deposits in Hungary, and makes comparison between the two most important mines, Úrkút and Eplény. According to the authors the main amount of manganese was accumulated in the Liassic in the sedimentary basin as finely layered chemical sediment. Different oxide minerals — mostly cryptomelane, pyrolusite and in the oxide-carbonate transitional zone greater amount of manganite — were formed by oxidation of the carbonate. Besides, in some places, primarily deposited oxide minerals can also be considered. According to the authors moving away from the carbonate-oxide transitional zone some territorial distribution can be found, the amount of minerals of greater oxidation state is increasing.

I. M. Varentsov in his lecture treats the interaction of the basic volcanic substance and sea water and by model experiments he gives a picture of the extent of the leaching of manganese, at the same time investigating the dissolution of Fe, SiO_2 and P. In the discussion it is very interesting that he compares the extent of Mn and SiO_2 leaching zones and concludes that in the case of some granules the depth of zone where the leaching of Mn takes place is 7—15 times greater than the leaching zone of SiO_2. Besides several other factors, by all probability, the differences in the mobility of some components play an important in this. The model experiments and calculations support the view that although the origin of total excess pelagic manganese cannot be interpreted by leaching basaltic rocks only, it is a fact that a considerable amount of manganese can be dissolved from the lavas. I suppose that very interesting results could be obtained by repeating the above model experiments in artificial sea water aerated to different extent, or in sea water with different CO_2 content and at the same time, measuring the changes in the concentration of the solution as well as those in the redox potential.

Gy. Grasselly and M. Hetényi in a paper study the adsorption ability of natural and artificial manganese compounds towards different ions and point out on the one hand the role of factors influencing adsorption and on the other emphasize that these adsportion processes of not exclusively but at least partly are responsible for the sometimes very remarkable minor element content of different manganese deposits. One point of the work requires some amendment, since authors after submitting the manusript carried out additional measurements, and the IR spectra of cryptomelane samples untreated and treated by Pb-salt solution exhibited some differences what confirms that in the case of Pb adsorption we are having a chemosorption. A further suggested step would be to make clear by experiments the sometimes very remarkable difference between the adsorbed amount of Co and Ni.

Prof. Dr. Gyula Grasselly,
Chairman of the Scientific Meeting
of the Working Group on Manganese
Formation of the IAGOD