

NOTE ON THE ORIGIN OF THE
MAGNETITE DEPOSITS OF
MAYURBHANJ STATE, ORISSA

THE magnetite deposits of Dhalbhum (a subdivision of the Singbhum District of Bihar) and Mayurbhanj attracted considerable attention from Geologists after the presence of the valuable metal vanadium in these ores was proved by Ray¹ and later confirmed at the Imperial Institute. Dunn and Dey² described briefly the petrographical characters of the basic and ultrabasic rocks with which the ore bodies are associated, and discussed their genesis. According to them the magnetite deposits are due to the breakdown of the previously crystallised iron-rich olivines and pyroxenes by the action of the residual solutions, the MgO of which replaced the FeO of the ferromagnesians by base exchange. The authors are of the opinion that the 'alteration of the titaniferous pyroxenes and olivine was quite capable of supplying all the iron and perhaps titanium, which then separated out as titanomagnetite'. A necessary corollary of the enrichment of the residual solutions in FeO by the above process is considerable alteration of the associated rocks, such as serpentinisation, uralitisation and chloritisation of ferromagnesians, saussuritisation and chloritisation of feldspars, albitisation of feldspars, etc.

During the past three years the writer of the present note has been making a thorough and systematic study of the basic and ultrabasic rocks of Mayurbhanj and so far as the latter area is concerned his observations do not confirm the above explanation. No doubt the rocks have undergone deuteric alterations in many places but the magnetite deposits do not show any genetic association with altered rocks. The gabbro rocks range from anorthosites to norites. The chief minerals of these rocks are plagioclase feldspars of the composition of labradorite, orthopyroxene of the Bushveld type and ordinary orthopyroxene (both enstatite and hypersthene), clinopyroxene, hornblende, olivine, biotite, apatite, quartz and magnetite. Magnetite is of two generations,

the later and more important deposition was clearly the last mineral to crystallise as has been noted by Dunn and Dey.

It may be noted in this connection that orthopyroxene of the Bushveld type which consists of lamellar intergrowths of clinopyroxene in orthopyroxene host has been noted by the writer of this note for the first time in these rocks. This mineral has not been recorded in any of the orthopyroxene bearing rocks of India, as the intergrowths, which are due to exsolution of diopside, are destroyed during recrystallisation. Magnetite of the second generation is widely disseminated in these rocks and not only fresh rocks are more common than altered rocks but also magnetite deposits, both small and large, do not show any associational relationships with the altered rocks. Certain rocks may be described entirely as 'magnetite-rich facies' of the anorthosites. The study of thin sections reveals that the magnetite has replaced feldspars and pyroxenes in these gabbros. It fills up the interstices between the already crystallised minerals and encroaches upon their margins, sometimes entirely replacing them.

The mode of occurrence of the magnetite and its widespread distribution in fresh rocks indicate that it is of primary magmatic and high temperature metasomatic origin as has been recently suggested by Alling³ for the Adirondack magnetites. Moreover the gabbro rocks are rich in MgO as is to be expected from their richness in early crystallised pyroxenes, but this is against the requirement of the theory of base exchange.

Primary micropegmatite has been noted in the gabbro in a few localities far away from the exposures of Singbhum granite and granophyre, the micropegmatite of which, at least in this area, is of secondary cataclastic origin. This, together with the unmetamorphosed nature of the striped orthopyroxene bearing gabbro, points to its younger age compared to the age of the granite-granophyre.

The detailed and full account of these rocks will be published shortly when the evidences

for the above conclusions will be fully discussed and the petrology of the rocks fully described.

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¹ *Proceedings of the 19th Indian Science Congress*, 1932, 212.

² *Transactions, Mining and Geological Institute of India*, 1937, 31; *Memoir Geological Survey of India*, 49, Part 1, 215-216.

³ *Economic Geology*, 1939, 34, p. 166.

A MARGOSA TREE WITHOUT THE BITTER PRINCIPLE

At Kothanur village, 13 miles to the northeast of the Kollegal town in the Coimbatore District, there is a big banyan tree (*Ficus bengalensis* Linn.) which has a spread of nearly three-fourth acre enclosing within its trunk a large margosa tree (*Azadirachta indica* A. Juss.) of about 60 feet in height and 18 inches in diameter. The margosa overtops the banyan at its summit. The aerial roots of the banyan tree would have entwined the margosa tree to start with, as is commonly met with in combinations of the banyan with other species and after many years' growth would have formed a natural graft with the main stem of the margosa. The enclosed portion is about 10 feet in height and the trunk of the margosa tree cannot be seen to this height from the base. At this height a stout aerial root of the banyan tree is found to grow into a hollow in the trunk of the margosa tree caused by some decay in its heartwood; to all appearances the basal portions of both the trees have fused into one another. Evidently stem fusions have taken place in many places between the margosa tree and the banyan tree helped by the pressure exerted by the banyan.

The peculiarity of this margosa tree is the absence of the bitter principle in its leaves. The writer tasted them and some specimens of leaves brought by him to Coimbatore were declared by all who tasted them to be without the bitter principle found in margosa leaves.

The only plausible explanation for this peculiar phenomenon is that in many places the vessels and the sieve tubes of the margosa may have fused with those of the banyan as a result of "grafting" and the sap of the banyan is influencing the sap of the margosa.

Many seedlings of margosa from seeds fallen from this tree are growing under the parent tree; the leaves of these seedlings are normal and contain the usual bitter principle. The natural inference is that the absence of the bitter taste in the leaves of the margosa growing in combination with the banyan is not a genetic modification but merely the influence of the sap of the banyan on that of the margosa. Here is probably an extraordinary case of the influence of an unnatural stock (the banyan tree) on a scion (the margosa). It is interesting to note that such grafts could take place in nature between two widely different families of plants, i.e., between banyan, a member of *Moraceæ* and margosa, a member of *Meliaceæ*.

These "fused trees" have become very famous in the locality and the neighbourhood. People attribute strange powers to this combination especially to the margosa due to the absence of the bitter principle in its leaves. Offerings are made by villagers to this unusual margosa tree on Mondays and Fridays.

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