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A MICROSCOPIC EXAMINATION OF BRUCITE GRANULES IN LIMESTONE FROM WAKEFIELD, P.Q.

by

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Introduction

It was requested by R.A. Wyman, Head, Milling Section, that an examination be made of the brucite granules in the limestone from the property of the Aluminum Company of Canada near Wakefield, P.Q. A description of the type of nucleation, if any, in the granules, which are known to have a concentric structure, was the information required.

Procedure

Several fragments of the brucitic limestone from unknown locations in the Wakefield quarry were available in the laboratory. Small fragments were stained to show the mineral relations, using the techniques described by Mr. Goudge.[1/] Thin sections were cut from each of the fragments and examined microscopically. The features noted are discussed in the following section and are illustrated by photomicrographs.

Results

Representative stained fragments are shown in Figures 1 (a) and 1 (b). The principal mineral constituents, calcite, dolomite, brucite and serpentine can easily be distinguished.

The size distribution of the brucite granules cannot be assessed accurately from the examination of thin sections because only a small proportion of them will be cut through the centres.

1/ Goudge, M.F. - Preliminary Report on Brucite Deposits in Ontario and Quebec, and Their Commercial Possibilities

The maximum size is about 1.5 to 2 mm and the variation does not appear to be great. Their concentric structure can be seen even at the low magnification of the photomicrographs.

In the various thin sections the granules are similar in the gross features, but show differences in the finer details. Basically, they are composed of concentric, overlapping, crescentic members which give an onion-like appearance. Each of the crescents is made up of radial aggregates of fine, prismatic brucite crystals. Because the ratio of the radius of the crescent to the length of the crystals is great, the aggregates of crystals are practically parallel.

Since the granules appear to be randomly distributed through the rock, only a few would be cut accurately through centres in any one section. However, no granule was found to have any foreign material as a nucleus and it is therefore safe to assume that most or all of them were not formed by deposition around a pre-existing grain. Inclusions of carbonates and serpentine are frequently found in the granules but they appear to be fortuitous and in some cases the arrangement of the brucite aggregates suggests that they were wrapped around pre-existing aggregates of serpentine (Figs. 2(a) and 2(b)). The length of the individual brucite crystals tends to increase with the size and radius of the crescentic aggregates and also with the distance from the centre of the granule. In some cases the outer layers have the appearance of tufts of fibrous materials (Figs. 3(a) and 3(b)). The periphery of a granule usually

conforms to the shape of the surrounding carbonate and/or serpentine grains with projections into the interstices for short distances. Where two or more brucite granules are close together, there is always a thin layer of carbonate or other material separating them (Figs. 4(a) and 4 (b)).

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Figs. 1(a) & 1(b) - Photomicrographs of stained fragments of brucitic limestone showing: (1) brucite - medium-grey, round granules with concentric structure; (2) serpentine - small, round, white spots; (3) dolomite - light-grey masses; (4) calcite - black ground mass. In colour these constituents would be blue, brownish-green, grey and deep violet, respectively. Note the concentration of serpentine granules along the upper edge of 1(a) and the dense mass of dolomite in the lower left portion of 1(b). Unpolarized, inclined light, magnification 2X.

Figs. 2(a) & 2(b) - Photomicrographs of thin section TS-58-109 showing a brucite granule (low relief) in transmitted light with, respectively, one polaroid and crossed polaroids. Note (1) the concentric structure formed by crescentic aggregates of prismatic brucite crystals; (2) the round serpentine granule near the left side around which the brucite appears to be wrapped; (3) irregular inclusions of carbonate near right side and (4) the irregular contact with the surrounding carbonate grains. Magnification 60X.

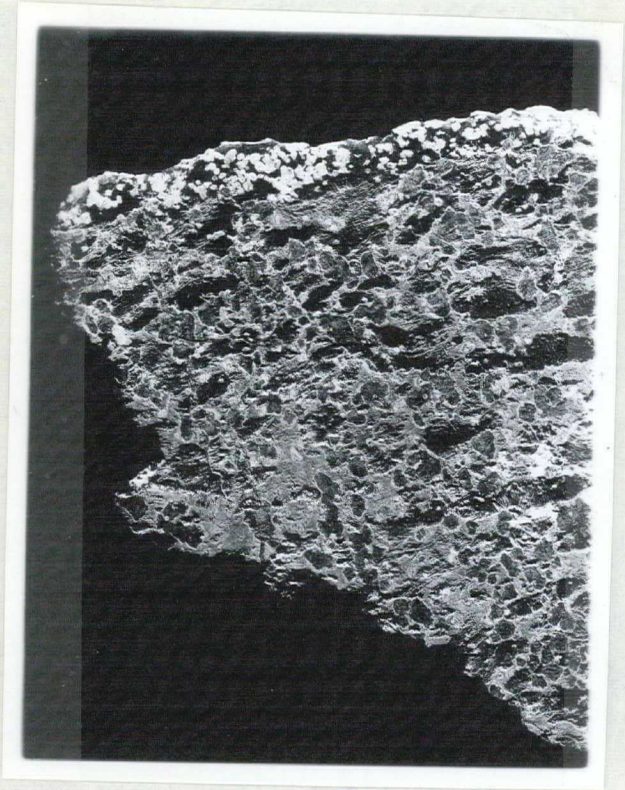

Fig. 1(a)

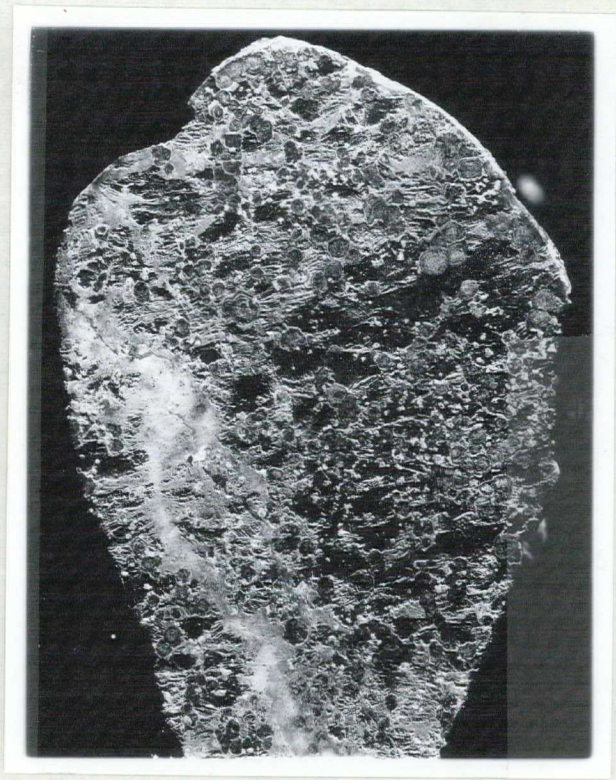

Fig. 1(b)

Fig. 2(a)

Fig. 2(b)

Figs. 3(a) & 3(b) - Photomicrographs of thin section TS-58-109 with, respectively, one polaroid and crossed polaroids, in transmitted light, showing a brucite granule (low relief) sectioned near the periphery. Note the long fibrous brucite crystals and the indistinct concentric structure. Two serpentine granules are observable at the bottom of the photograph and there is an irregular contact between the brucite and the surrounding carbonate (high relief), Magnification 60X.

Figs. 4(a) & 4(b)- Photomicrographs of thin section TS-58-111 in transmitted light, with, respectively, one polaroid and crossed polaroids showing two adjoining brucite granules (low relief) which are separated by a thin zone of carbonate and graphite (opaque, black). Magnification 60X.

Fig. 3(a)

Fig. 3(b)

Fig. 4(a)

Fig. 4(b)