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TYPES OF DEDOLOMITIZATION

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ABSTRACT

Two types — centripetal and centrifugal dedolomitization is recognized. Petrographic evidence is provided to show that besides these two types, random formation of dedolomite also takes place.

INTRODUCTION

The replacement of dolomite by calcite has been recognized since 1848, when Von Morlot coined the term dedolomitization. Sometimes the terms dedolomitization and calcitization have been used synonymously (e.g. Friedman and Sanders, 1967; Lucia, 1972) for this important diagenetic process.

The dedolomitization textures, following Shearman *et al.* (1961), are accepted to be a result of either centripetal or centrifugal dedolomitization. This study presents petrographic data which negates the assignment of all dedolomitization textures to these two types, as some appear to be randomly generated.

RESULT AND DISCUSSION

On the basis of dedolomitization textures in carbonate rocks from the French Jura, Shearman *et al.* (1961) distinguished between centripetal and centrifugal dedolomitization. In centrifugal dedolomitization, the resulting dedolomites (calcite which has replaced dolomite) are formed in such a way that the dolomite rhombs are replaced from the inside towards the margins as shown in Fig. 1. The opposite of centrifugal type of dedolomitization is the centripetal dedolomitization, where the dolomite crystals are replaced from the outside by calcite and extend inwards from the centre (Fig. 2).

Figure 3 is a photomicrograph of a sample stained with alizarin-red S and potassium ferri-cyanide. The central portion of the figure shows partly to wholly dedolomitized crystals (dark grey colour). They consist of a mosaic of very small anhedral sparry calcite (not visible in black and white prints). These pseudomorphs of calcite after dolomite, termed "composite calcite rhombohedra" (Evamy, 1967) are considered by Shearman *et al.* (1961) to have formed by centrifugal dedolomitization.

Besides the partly to wholly dedolomitized rhombs, the same figure also shows clots of fine dedolomite as well (dark spots on dolomite crystals). These clots of finely crystalline dedolomite can only be seen in stained thin sections/peels at magnifications above 5x. The clots of fine dedolomite may occur on any part of the dolomite rhomb including the margins. According to Evamy (1967), the relict

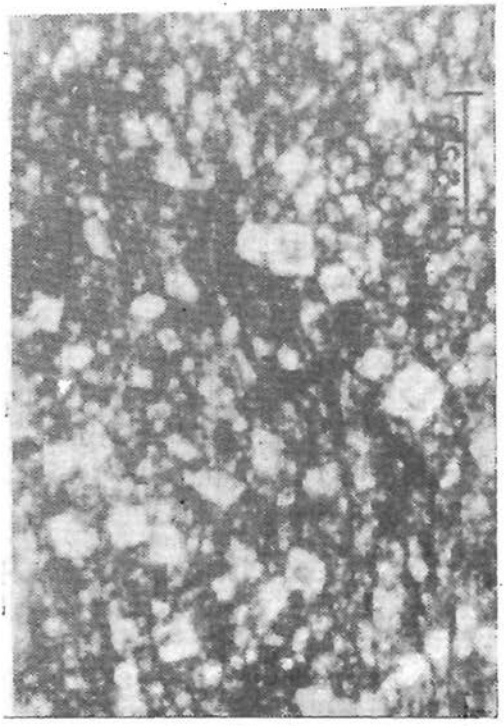

Fig. 2

Fig. 1

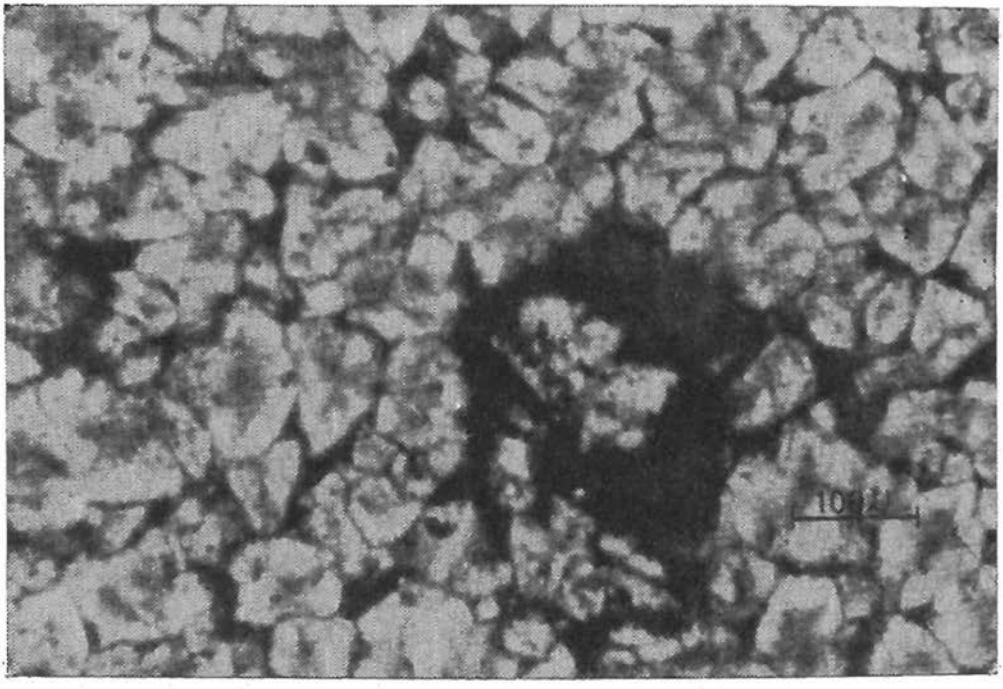

Fig. 3

Fig. 1. Centrifugal type of dedolomitization. The dolomite rhombs have calcite cores (dedolomite). Dark areas are dedolomites whereas light areas are dolomites. Sample treated with alizarin-red S and potassium ferri-cyanide.

Fig. 2. Centripetal type of dedolomitization showing partly to completely dedolomitized rhombs. The black organic laminae are believed to be algal mat.

Fig. 3. Random type of dedolomitization showing clots (some shown by arrow) of finely crystalline dedolomite on dolomite and composite calcite rhombohedra. Remnants of dolomite crystals still visible in composite calcite rhombohedra. Sample treated with alizarin-red S and potassium ferri-cyanide.

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calcite inclusions occur universally in dolomite that has replaced calcite. That these clots are not relict inclusions (pre-dolomitization calcite) is evidenced where in a dense mosaic of dolomite crystals, a clot may be observed to continue from one rhomb across the rhombic margins into an adjacent rhomb.

As can be observed the clots of finely crystalline dedolomite in association with partly to wholly formed mosaics of anhedral calcite in composite calctie rhombohedra indicate that these composite calcite rhombohedra are formed as a result of formation of many clots on dolomite. These clots, because of their occurrence on different parts of dolomite rhombs, appear to have been randomly generated. Thus they and the composite calcite rhombohedra have not originated due to centrifugal dedolomitization as originally proposed by Shearman *et al.* (1961). It is proposed that such types be called the random type of dedolomitization.

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