OCCURRENCES OF GALENA AND OTHER MINERALS IN THE AREA WEST OF MANSFIELD, NOTTINGHAMSHIRE

by

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Summary

Very thin stringers of galena, siderite and calcite have been found in the lower layers of the Lower Magnesian Limestone. Interstitial galena and barytes is seen in thin sections. The occurrence and origin is compared with that of other Permian mineral deposits of the East Midlands and elsewhere.

Introduction

Various examples of galena, wulfenite and barytes from the Mansfield area have been described by Deans (1961, p. 705). Most of these examples occur at the top of the Lower Magnesian Limestone, their origin being ascribed to ascending hydrothermal fluids trapped by the overlying marl. King (1966, p. 261) describes epi-syngenetic mineralization of the Midlands in the form of Neo-neptunian dykes. The examples given below are not consistent with Deans' ascending fluid theory; and, in fact, the few cases cited allow of no single origin.

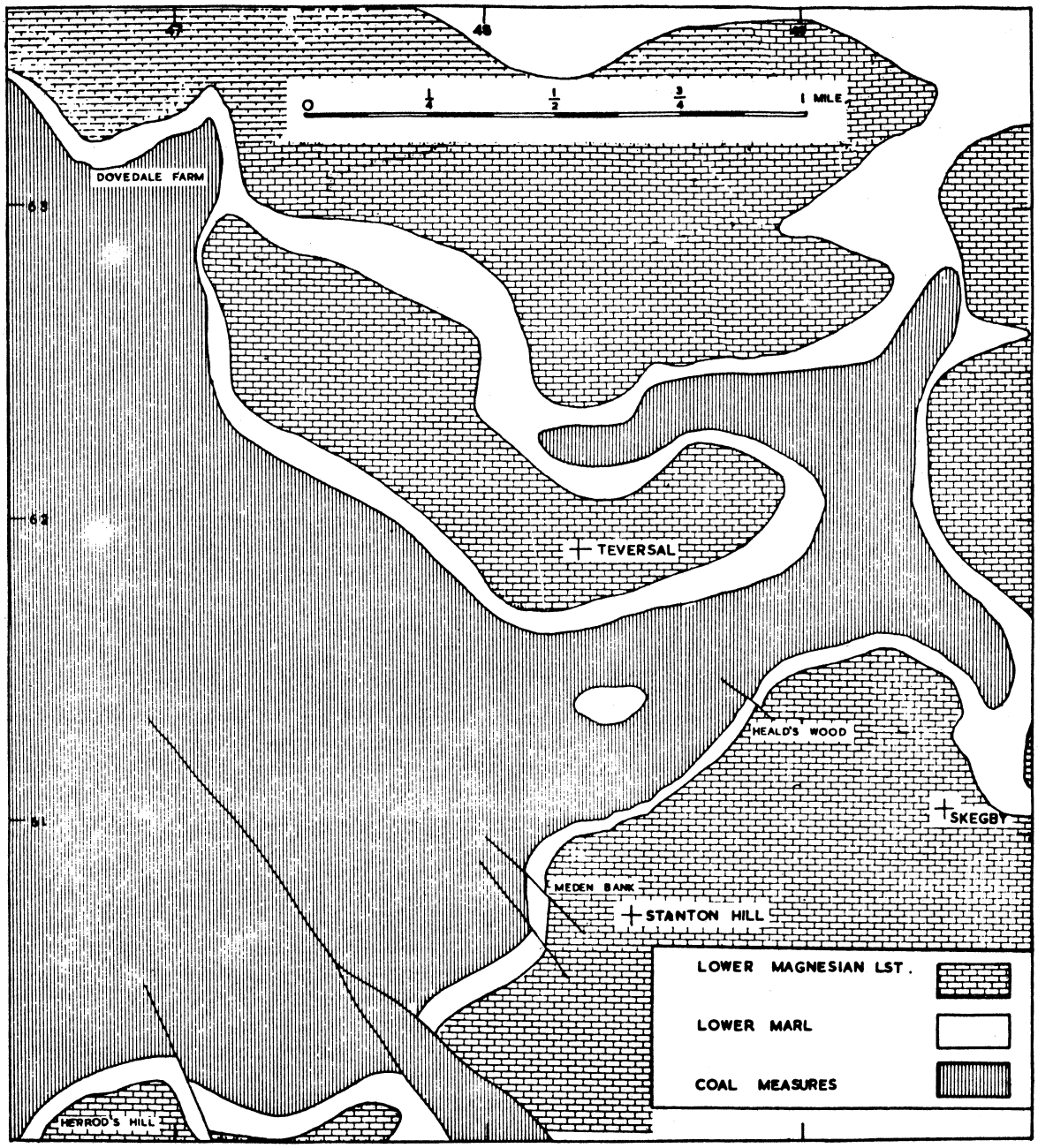
Description of Localities

Most examples under discussion occur near NW trending faults. One reason for this may be that the faulted Permian escarpment has more accessible exposures near the faults; but searches away from the faults have not yielded any mineralization within the Lower Magnesian Limestone. The small amounts of galena and barytes are nearly always interstitial, with larger amounts occurring as veinlets and euhedral crystals, and with galena replacing fossil lamellibranchs and foraminifera. While most of the mineralization occurs at the very base of the Lower Magnesian Limestone, some galena is present in the limestone bands within the Lower Marl. This mineral is found also with the Basal Breccia and nearby Coal Measures.

All National Grid co-ordinates are in 100 km. grid square SK.

Meden Bank, Stanton Hill (48426105)

Fine grained dolomitic limestone with many calcite veins up to 1.5 mm. thick. The calcite appears to fill cracks in the limestone, with extensive crystal continuity. Some of the cracks



Text-fig. 1 Sketch map of the area around Teversal, showing mineral localities.

are bordered with brown limonite. Galena cubes, up to 4 mm. across, are also bordered with limonite. Other galena fills fossil cavities in the limestone, whilst large Productus valves are replaced by calcite.

The thin section (Plate 2 Fig. 1) shows a mainly dolomitic rock containing rounded and subrounded fragments of detrital quartz. Fractures in the rock are often empty, but the vein shown is occupied by siderite which, in places, does not quite fill the void. Rhombs of dolomite protrude into the cavity, suggesting that diagenesis post-dated the fracturing. Coarser dolomite occurs in patches and fine micritic material exists in sparse quantities. The section was stained to distinguish between calcite and dolomite; but there is no calcite present in the section shown and it appears that the only calcite in the rock is that in the veins. The films of galena extend up to 4 cm. in length. The barytes is never extensive, being interstitial between the dolomite rhombs in scattered patches.

Healds Wood (48876139)

Very fine grained dolomitic limestone. Cracks up to 10 mm. wide are partly occupied by beautifully bladed pink and cream barytes. In thin section (Plate 2 Fig. 2) the specimen consists of a mosaic of dolomite with opaque material, possibly haematite, replacing foraminifera. Micrite occurs in patches between the dolomite. Quartz is very sparse. Other specimens from the nearby Fackley Road cutting contain small amounts of angular quartz.

Herrods Hill (46996020)

This limestone is very similar to that above except that colourless calcite crystals, as well as barytes, are present in the cracks. The two minerals never appear together. A drainage trench (47006034), to the north of this exposure, passed through the Basal Breccia. Besides the usual limestone and quartz fragments, the breccia here contained specimens of corroded detrital galena, up to 5 mm. diameter.

Dovedale Farm (47156320)

Two-inch bands of calcareous limestone, separated by similar bands of brown marl, are mapped by the Geological Survey as Lower Permian Marl. These beds have also been recently described as Dolomitic Siltstone. The former name is misleading, as it is of Zechstein age; and in many places between Norwood and Teversal more than 50% of the sequence consists of limestone. The beds correspond to the Marl Slate of Durham.

Freshly broken specimens have a colour layering, the centre being blue grey, with buff to pale grey zoning at the upper and lower surfaces. Galena is present near the middle of the limestone bands, filling cavities completely. Much of the rock is made up of the values of lamellibranchs, which in Plate Fig. 3 are seen to consist of a granular calcite fabric lined with very thin layers of galena. In some cases the space between the two valves also consists of coarse granular calcite. Galena replaces foraminifera.

Other localities where barytes has been found include Skegby Quarry (501612), where course grained dolomitic limestone contains many ill-formed fossils, among them large Productids. Also Mansfield Quarry (534601) contains large crystals of barytes filling, or partly filling, vertical cracks in the limestone. Some single crystals are up to 2 cm. long.

Discussion

Ford and King (1965, p. 1686; Ford, 1966) discuss the breakthrough of mineral-bearing fluids to the ground surface in Triassic times, the fluids depositing minerals at various places in the Midlands. In a similar way these fluids could also be trapped above the Lower Marl after moving downwards. Fowler (1943) considers various possible origins for the minerals present in the Permian rocks of South Durham and favours the view that they were deposited contemporaneously with those of the Coal Measures. The close geographical proximity of the two deposits makes this theory attractive; and a similar connection may be implied for the Mansfield examples. Rushworth (private communication) reports having seen galena veins, up to 6 cm. thick, in various East Midland coal mines. The minerals in the Coal Measures, Lower Marl and Lower Magnesian Limestone and those in the Basal Breccia may have had a single primary source, but their present distribution cannot be accounted for by any single hypothesis.

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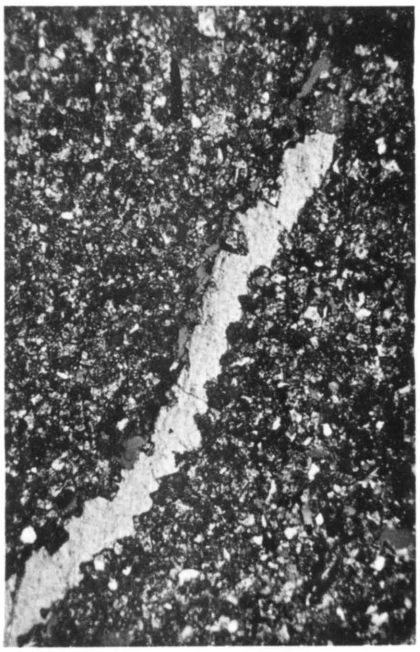

Fig. 1. Meden Bank x 25
Cross nicols. For details see fig. 3

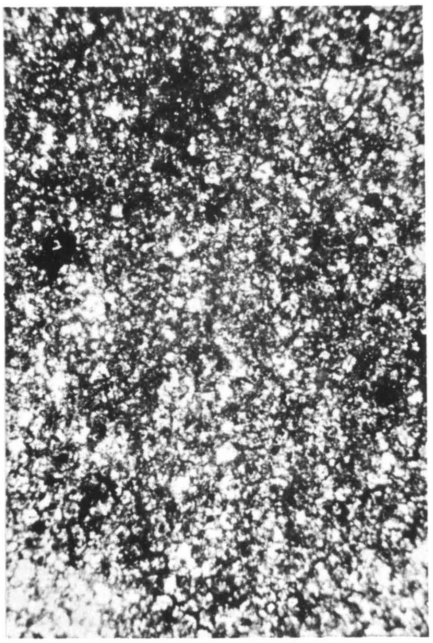

Fig. 2. Healds Wood x 25
Dolomite with galena.

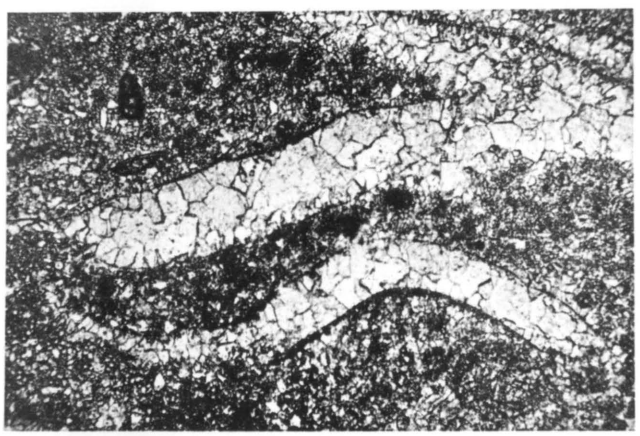

Fig. 3 Dovedale Farm x 25
Galena edge to fossil valves of shells.

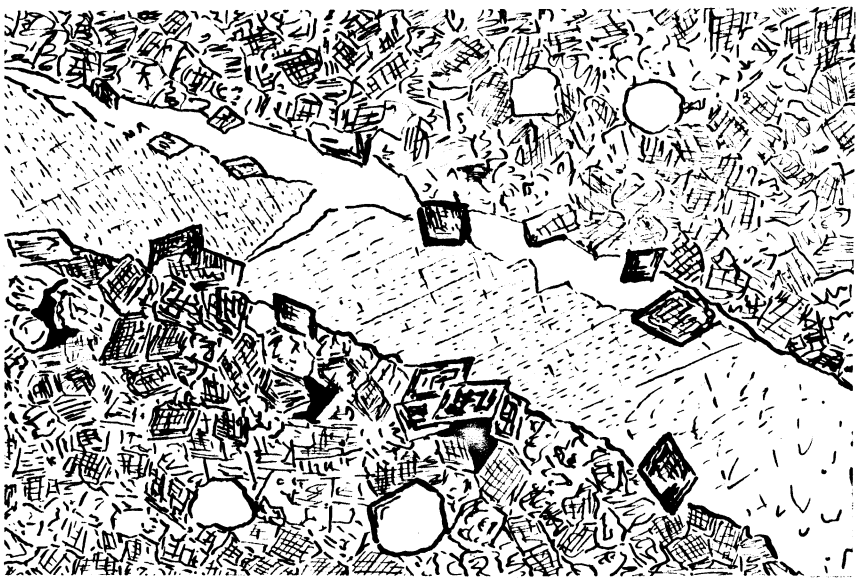

Fig. 4. Meden Bank x 100
Crack in dolomitic limestone edged by rhombs of dolomite. Siderite vein does not quite fill the void. Detrital quartz shown clear. Galena shown black.

Fig. 5. Skegby Quarry x 30
Coarse dolomitic limestone with band of finer dolomite and detrital quartz. Interstitial galena.