EAST MIDLANDS GEOLOGICAL SOCIETY

EXCURSION REPORTS, 1968

MINERAL LOCALITIES AT THE BASE OF THE TRIAS IN LEICESTERSHIRE AND DERBYSHIRE

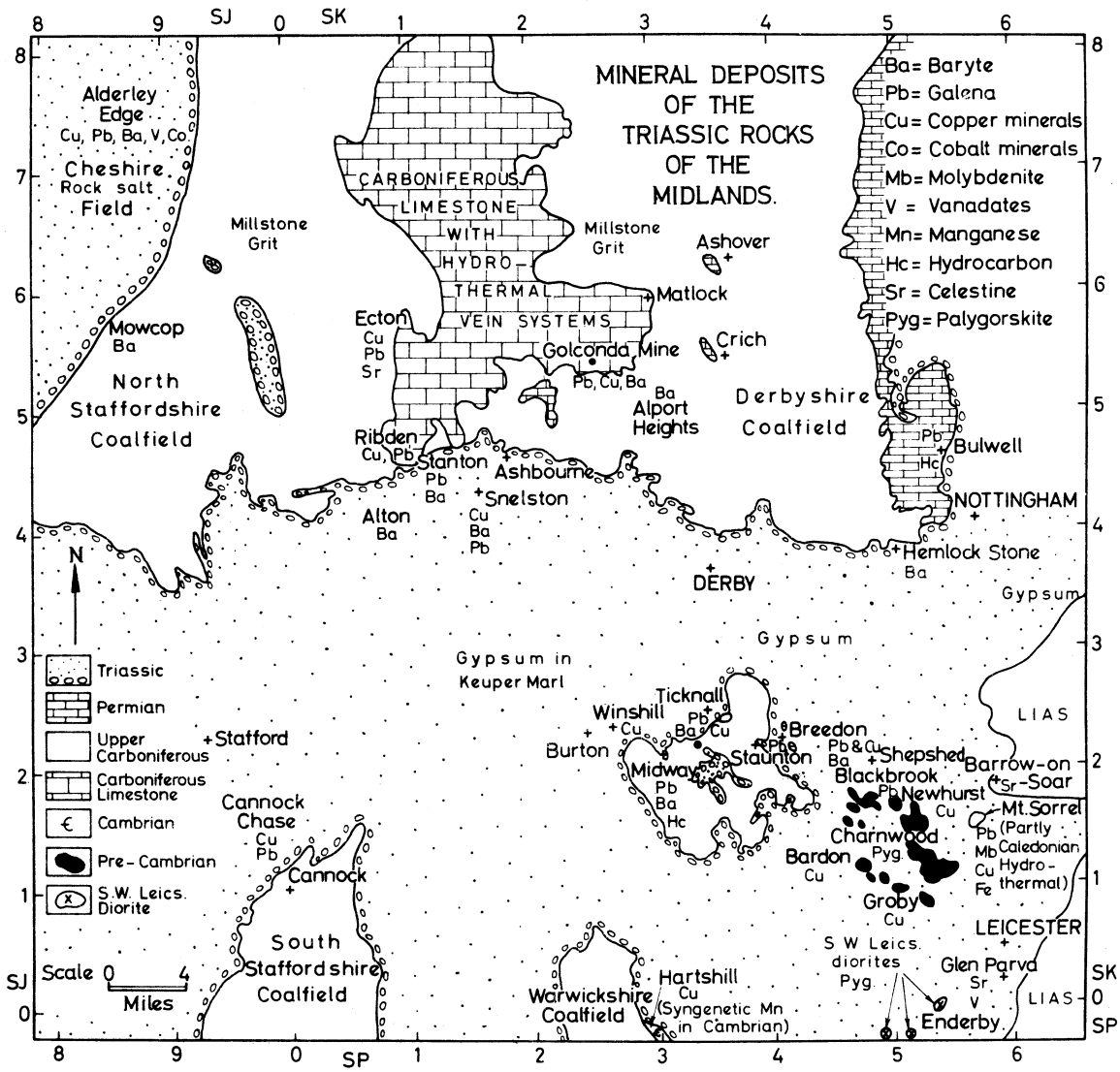
Leaders : R.J. King and T.D. Ford — Saturday, 4th May 1968

The theme of the excursion, which was attended by some 60 persons, was to demonstrate the varied nature of the "hydrothermal" mineral associations at the base of the Trias and to show that the associations were at least partly controlled by the nature of the underlying rock.

The first stop was made at Enderby Warren quarry (SK/538001), by kind permission of Redland Roadstone Limited. Here Keuper Marl is seen to rest unconformably on one of the South Leicestershire diorite masses, believed to be of Caledonian date (Le Bas, 1968). The diorite has a dark banded appearance due to analcitization associated with late Caledonian metasomatic effects. In the north-east corner of the quarry, the contact with the Keuper Marl is easily accessible. The Red Marl has patchy development of basal breccia in hollows in the diorite surface, and the spaces between the boulders are seen to be filled with a white clay mineral, palygorskite (Evans and King, 1962). This magnesium-bearing chain silicate is widely dispersed throughout the Keuper Marl on a microscopic scale, but has been concentrated here. It is seen to penetrate joints in the diorite, but gradually dies out downwards, thus demonstrating its origin in the Triassic groundwater circulation.

After crossing Charnwood Forest by the M1 (with some interesting hitch-hiking for half the party!), the next stop was at Newhurst Quarry, Shepshed (SK/486180), by kind permission of Groby and Charnwood Granite Company Limited. Here the basal Trias has been exposed recently in a new cutting. Some 20 feet of gritty sandstones alternate with bands of ripple-marked and mud-cracked marl and with lenses of a fine breccia, formed of chips of the nearby Blackbrook Series of the Charnian and its intrusive diorite. About 3 feet from the base one band of sandstone, some 4 inches thick, carries disseminated galena in crystals up to about 2 mm. in diameter. The sandstone can be followed for about 30 feet and carries galena throughout, but little sign of it is seen in beds above or below at this point, though galena has been found in the basal breccia elsewhere in the quarry.

Down in the main quarry, copper mineralization has been known for many years. A sheet of native copper, 10 feet across and 1/8 inch thick, was found in a joint in the diorite many years ago (King, 1967). Recently a number of veins of quartz with chalcopyrite have been found in the lower level of the quarry. They are rarely more than an inch thick and can be seen to be cut through by later veins of calcite and dolomite, which carry oxidized copper minerals such as chalcocite, azurite, malachite and, rarely, native copper. Some of these are in veins which can be traced as gradually widening joints up to the base of the Trias; and there can be little doubt that the copper in the primary quartz veins has been redistributed by Triassic groundwater circulation. Chalcocite and malachite have been found amongst the boulders in the basal Triassic breccia elsewhere in the quarry; also a few small patches of a white clay mineral, possibly palygorskite, have been found in the breccia.



Text. Fig. 1. Sketch-map of the Mineral Deposits of the Triassic rocks of the Midlands, showing localities visited, and their relationship to the regional geology (after Ford, 1968).

The next locality, some 2 miles to the west, is beneath the Shepshed-Blackbrook road bridge over the abandoned Loughborough-Coalville railway (SK/463186). The railway was built in 1883 and abandoned in 1963; over this section its route was made by partly infilling a canal dug in the 1780s and abandoned in 1802. At some unknown date, galena was found in the cutting; and in 1865 a small mine trial was opened and driven in for a few yards. The entrance was subsequently filled in and the locality was lost and completely forgotten, until Moorbath (1962) applied isotope dating methods to British galenas. One of his specimens was obtained from the Geological Survey collections, but was only vaguely labelled "Blackrook, Garendon Park, Charnwood", although in a Triassic matrix. No more precise locality could be determined. (Blackrook is a mistaken spelling of Blackbrook). The chance discovery by Dr. W.A.S. Sarjeant of a brief note concerning galena - bearing pebbles in the Trias by the Nottingham geologist, James Shipman (1882), enabled the Directors to tie this 'Blackrook' specimen to the old canal-railway cutting; a series of trial excavations since the Field Excursion has revealed the lost mine near the old railway bridge. Specimens of galena in Triassic breccia were found in the spoil outside the lost mine and thin layers of galena have been found interbedded with the Keuper Sandstone inside the adit. A full account of this geological detective story is in press (King and Ludlam). The discovery is of particular significance in demonstrating the distribution of galena in the basal Trias, which is rarely exposed owing to the cover of boulder clay and pre-glacial gravels; the latter were also visible beneath the bridge.

It was not possible to visit Breedon Cloud Quarry (SK/413216) on this excursion, but the leaders explained the nature of the chalcocite and malachite occurrences in the basal Keuper breccia there and reminded members of the sand-filled fissures, with galena and malachite impregnations, described in the "Mercian Geologist" (King, 1966).

The Carboniferous Limestone inlier at Ticknall (SK/362238) was next visited. Some 40 feet of beds are visible, lying nearly horizontal. The former Triassic cover has been mostly eroded away but was once visible above the roof of the "caves", underground workings in the far south-east corner of the quarries. Projection of the Triassic cover from this point shows that it must have once been no more than a few feet above the present exposure. The topmost bed of limestone has been dolomitized, probably by penetration of magnesian fluids from the former cover of Trias, but several shaly horizons have dolomitization limited to a few joints in the lower beds. One such joint complex is present in a wall of rock left standing between two of the old quarries; members were able to see the small solution cavities at the dolomite-limestone contact, lined with galena and barytes and forming, in some respects, a miniature development of the mineralization story at the Golconda Mine, Brassington (Ford and King, 1965).

After driving across the Trent Valley to the Derbyshire limestone massif, the final call of the day was made at Manystones Quarry, near Brassington (SK/235551). This disused quarry was worked for the pure Hoptonwood Limestones beneath a thin cover of dolomitized limestone, and the contact is well displayed in the quarry walls. At the contact, solution cavities developed in the relatively porous dolomite above the impervious limestone, some of the cavities being at the basal limit of dolomitization down joints. The dolomitization is almost certainly of Permian age (King and Ford, 1968; Ford, 1968). The subsequent mineralization of the Triassic period resulted in a precipitate of bedded galena and baryte in the bottoms of the solution cavities, similar to those seen in the Golconda Mine, the cavities being finally infilled with calcite scalenohedra. The details of some faces were figured by King (1966). The evidence for the former cover of Triassic sediments was outlined before making a hasty retreat for the bus as rain set in. The rain and the lateness of the hour prevented the final scheduled stop in the Masson Hill opencast fluorspar workings (SK/284591), where it would have been again possible to demonstrate that downward penetration of dolomitizing fluids preceded the development of solution cavities in the joints of the limestones between two toadstones and that the cavities were subsequently infilled with fluorspar.

In the final discussions, it was pointed out that the study of basal Triassic mineralization has so far been pursued from an academic point of view, but that there might well be some economic significance, since all the points with such mineralization represent former "highs" in the Triassic landscape, and the "lows" are as yet unknown and unexplored. If any form of gravitational separation of minerals in the lows had taken place, there might be ore-deposits hidden beneath the Triassic rocks of the Trent valley.

R.J.K. and T.D.F.

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