FIELD MEETING IN CHARNWOOD FOREST

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Introduction

This upland area of considerable scenic interest has long attracted geologists with its wide variety of pyroclastic, igneous and sedimentary rock-types. These ancient rocks were designated as the Charnian System by Lapworth, Watts and Harrison in 1898 and their Pre-Cambrian age has been generally accepted for many decades. It was not until 1963 however that this age was confirmed by Meneisy and Miller (1963) who obtained radiometric ages indicating that some of the igneous rocks are about 700 million years old.

Broadly speaking, the Charnian rocks form a south-eastward plunging anticline, much faulted and obscured by the overlying mantle of Triassic rocks (Keuper Marl). The oldest rocks, the Blackbrook Series, crop out in the centre and north of the Forest whilst the younger rocks appear to the north-east, the south-east and the south-west forming a horseshoe-shaped distribution around the Blackbrook Series. In addition to the large anticlinal fold there are a number of other secondary structures. These include minor folds, cleavage and jointing. The cleavage does not show a close relationship to the major anticline, but usually crosses the fold-axis obliquely. In the south-east, however, (e.g. in Bradgate Park) it strikes parallel to the fold axis. The cleavage and some of the minor folds, which have a parallel trend, may therefore represent a later phase of deformation than that which gave rise to the main anticline. Further details of the structural geology and the stratigraphy appear in Evans (1968).

Excursion details

Bradgate Park (SK 5310). The party gathered in the car park of the Hallgate entrance (SK 542114) to the Park. Here the leader gave a brief résumé of the geology and warned the party that no hammering of the outcrops was permitted in the park. The party then proceeded to the first outcrop (SK 542112) where rocks near the top of the Maplewell Series are exposed. The Maplewell Series is the second of the three series into which the Charnian is divided. Over most of the Forest it is composed dominantly of pyroclastic material mainly of coarse to dust tuff grade. In this outcrop the bedding is fairly obvious and can be seen to dip at 24° to the north-north-east. The cleavage and jointing were also demonstrated.

Proceeding due south, outcrops around SK 541109 were then examined. The most important feature here is the reversal of dip which indicated that the party had just walked over the crest of a fold or a series of folds. In a small old quarry graded bedding was seen and in some crags to the east of the quarry a minor synclinal fold was inspected. Here deformation of the cleavage was demonstrated and some of the tectonic problems of the area were discussed.

The next stop was at the Stable Pit (SK 534100) where the middle quartzite unit of the Brand Series crops out. The Brand Series is the uppermost and dominantly sedimentary series of the Charnian. A synclinal fold is present in the main part of the outcrop and in the northern limb current-bedding is clearly visible. Some of the bedding surfaces are slickensided as the result of bedding slip during concentric folding. In the southern limb a prominent strike-slip fault is present and in it a much altered intrusion of diorite was inspected.

The party then proceeded to the nearby exposures of markfieldite (granophyric diorite) close to the walls of Bradgate House. Then followed a climb of a kilometre to the outcrops just below the War Memorial (SK 524111) where specimens of *Charniodiscus*, one of Britain's oldest fossils, were seen on a prominant bedding surface. Passing through Old John Spinney

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to the tower of that name incipient slumping was demonstrated in more outcrops of the Maplewell Series at SK 526112. Continuing eastwards the effects of severe sub-aqueous sliding were seen in the slump breccias of outcrops around SK 528112. An even more spectacular example of a slump breccia was demonstrated at SK 531113. These are the rocks incorrectly described as agglomerates by previous workers. The party then returned to the coach which carried it to the Reservoir Hotel where sandwiches and liquid refreshments were consumed beneath a hot sun.

Swithland Wood (SK 5312). From the Waterworks we followed a well-marked path into the wood to examine an outcrop of the Swithland Slate which occurs beside one of the old flooded slate quarries. This is a well cleaved siltstone in which the bedding cannot readily be discerned.

Church Quarry, Woodhouse Eaves (SK 531141). In this abandoned quarry a seam of slate in the middle unit of the Brand Series was once exploited. At the Staple Pit this unit was seen to be a well sorted quartzite but now, just over 2 km along the strike, the unit is a subgrey-wacke containing bands of pebbles and seams of slate.

Windmill Hill (SK 526143). After admiring the view over the Soar Valley to the Jurassic scarps of eastern Leicestershire the group turned their attention to a coarse-grained, non-stratified unit of the Maplewell Series. This is an ignimbrite (nuée ardente deposit) consisting of devitrified pumice-tuff in which flattened chloritized pumice fragments can be seen.

Beacon Hill Park (SK 5114). We entered the park at SK 523145 and almost immediately came to some outcrops of Beacon Hill Beds the most important unit of the Maplewell Series. In these outcrops about 10 m of tuffs are exposed and the party discovered a number of good examples of graded bedding. The long climb to the summit of Beacon Hill was then undertaken. This is the type locality for the Beacon Hill Beds which form rugged crags more in keeping with mountainous terrain than with the rolling Midland shires. Eschewing the attractions of one of the Midlands' finest views (Beacon Hill is the second highest point in Leicestershire) the party examined the well laminated buff and green tuffs which are folded into a syncline the hinge region of which is exposed.

The party then rejoined the coach in the car park and returned to Nottingham.

References

EVANS, A.M. 1968. *Charnwood Forest.* Chapter 1 in Sylvester-Bradley, P.C. and Ford, T.D., The Geology of the East Midlands.

MENEISY, M.Y. and MILLER, J.A. 1963. *A geochronological study of the crystalline rocks of Charnwood Forest.* Geol. Mag., vol. 100, pp.507-523.

Excursion references to localities in Charnwood Forest published previously in the Mercian Geologists can be found in:

Vol. 1. No.1. p. 69
Vol. 2. No. 4. p.419
Vol. 3. No. 1. p. 85
Vol. 3. No. 2. p.190

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