ISSN 1750-855X (Print)
ISSN 1750-8568 (Online)

Field Meeting Report: The Malvern Hills, led by David Bullard 10th October 1987

Les Dolamore[1]

DOLAMORE, L. (1988). Field Meeting Report: The Malvern Hills, led by David Bullard 10th October 1987. *Proceedings of the Shropshire Geological Society*, **7**, 17–19. The purpose of the field meeting was to visit key exposures within the Malvern Hills to reveal the complex Precambrian geology and its Lower Palaeozoic cover.

[1]*affiliation: Member of the Shropshire Geological Society*

INTRODUCTION

The group assembled on a fine autumn morning at the clock tower in North Malvern.

The leader, Mr David Bullard, has studied the area over a period of 17 years and has written the text and prepared maps for an N.C.C. Guide to be published in 1988. This Guide will update the present thinking on the geology of the Malverns using a large number of key sites.

The itinerary for the field day included five of these key sites, all of which will be described in detail in the Guide with drawings, photographs, diagrams and maps, unfortunately none of which could be included in the day's documentation.

GEOLOGICAL SETTING

The Malvernian is a very complex group of Precambrian rocks; only a small amount of detail has been published on the internal geology. The rocks consist of a mixed suite of plutonic igneous rocks of mostly diorites, tonalites and granites, intruding an earlier sedimentary series, now a mixed group of metamorphic schists, gneisses and quartzites. Later igneous activity has introduced at least two phases of dolerite and a trachyte vent. The schist and gneiss appear to have developed at the garnet amphibolite grade of regional metamorphism although all rocks except the youngest have suffered some retrogressive hydrous metamorphism at chlorite grade.

At least five phases of folding or foliation have been recognised within the Malvernian of which two are late stages, developed post metamorphism. Faulting is intense throughout the Malvernian with several phases of different ages being clearly recognised including Precambrian, Caledonian, and Hercynian. The Malvernian is thus chopped up into a series of smaller fault blocks. Overall mapping of the northern Malvernian was carried out 10 years ago as part of a research project and the subsequent unpublished map is included here. The mapping was based on a 25" to the mile scale with outcrop and subsoil specimens forming the basis to the construction of the map. There is no published map of the Malvernian and this map is expressly only a very simplified form of the surface and quarry expression of the Malvernian, much detail has been omitted in reducing the map down to this scale.

The adjacent Silurian strata rest unconformably with a good basal conglomerate exposed about a mile to the north. The sequence of Silurian rocks is a typical shelf sea formation typical of the Welsh Borderland. Fossils are abundant particularly in the shale divisions with brachiopods commonplace and trilobites not quite so abundant. The Wenlock Limestone is a typical algal limestone - modular in appearance and only richly fossiliferous in parts, weathered specimens providing the best source of fossil material. In the final exposure in the traverse, in Brockhill Coppice, there is a good upwards transition from the marine Silurian to the fluvial Downton Castle Sandstone, unfortunately the intervening Ludlow Bone Bed is not well exposed.

The overall structure of the Malverns is of a giant Hercynian Monocline which has brought Precambrian rocks to the surface. All that is left of the Monocline today is the steep vertical limb, faulting and erosion have removed the top flat zone of this structure. Associated with the development of the fold structure are a series of faults, both high angle reverse and low angle thrust. After the fold structure, tension in the crust

produced the normal faults associated with the eastern boundary of the Malvernian. Later Tertiary cross faulting has probably affected the hills.

ITINERARY

LOCALITY 1: Broomhill Quarry [SO 764 466]

This old quarry has been cleaned up to expose a faulted contact between Malvernian and Silurian Wych Beds. The Malvernian consists of diorites intruded by a large late dolerite. The new trench exposes 4 metres of Silurian sediments wedged within the Malvernian. Just to the west of the exposures is the western boundary to the Malvernian and here it is in contact with older Cowleigh Park Beds.

LOCALITY 2: Dingle Quarry [SO 765 457]

No cleaning of faces has taken place at the Dingle, but a new footpath has been constructed for safer access to the key exposures. A late dolerite intrusive cuts across pink granites, the dolerite itself faulted by a younger (Permo-Trias) normal fault. The dolerite shows good fine grained margins and may be Ordovician in age.

LOCALITY 3: Brockhill Quarry [SO 756 439]

Various cleaning operations at different parts of this quarry have improved the value of this important site. At the western end a small cut exposes Downton Castle Sandstone dipping westwards. In the centre of the quarry, cleaning has exposed the Ludlow/Pridoli transition - the Ludlow Bone Bed equivalent. To the east vegetation removal has exposed good faces of the Upper Ludlow Shales/Whitcliffe Beds, which are mostly calcareous mudstones with some good fossil horizons.

LOCALITY 4: Hollybush Quarries [SO 875 371]

These large quarries form two important sites in the book. In the western major quarry, cleaning at the entrance way has exposed a sequence of faulted Cambrian sediments down faulted against the Malvernian, with good exposures of the overlying Quaternary deposits. In the quarry itself massive diorites and ultrabasics are intruded by younger pink felsites, and dolerites/basalts. There are also patches of metasediments (quartzites) and mineral veins of pyrite.

The small central quarry exposes an unconformable relationship between the basal Cambrian Malvern Quartzite and the Malvernian. This is a useful quarry for viewing both the different types of Malvern rock groups and seeing the nature of the depressions that makes up the central regions of several of the southern hill masses.

LOCALITY 5: White leaved Oak Quarry [SO 761 360]

This old quarry now forms one of the major sites in the book. Clearance at both the lower and upper levels has been carried out. The lower levels expose a broad cross section of Malvernian rock types with quartzites, phyllites, pegmatites, granites, dolerites and altered schists. The important double foliation separated by about 30° is visible here.

In the upper level, approached by a new footpath along the north eastern edge of the quarry a clear unconformable contact between Cambrian sediments and the Malvernian is revealed. The Cambrian exposures are of Hollybush Sandstones with pebble horizons. The Malvernian is a mixture of felsites brecciated granites, well foliated gneiss and some early metaquartzite.

Disclaimer - The information contained in this account has been prepared from notes taken during the field meeting. Its sole aim is to provide a record of what was seen and provide an insight into the diversity of Precambrian and Lower Palaeozoic geology exposed across the Malverns. It should not be used for any other purpose or construed as permission or an invitation to visit the sites or localities mentioned.

	Red Downtonian	
SILURIAN	Grey Downtonian	Ludlow Bone-Bed shales with many calcareous bands, often sandy.
	Upper Ludlow Shale	Massive impure lst., dark-blue, well-bedded.
	Lower Ludlow Shale	Finely laminated flags with calcareous concretionary bands, dark grey shales and mudstones.
	Wenlock Limestone	Bluish-grey, thin-bedded argillaceous limestone with thin bands of shale.
	Wenlock Shale	Soft grey shale and calcareous flags.
	Woolhope Limestone	Blue flaggy limestone frequently nodular with thin bands of shale.
	Woolhope Shales	Passage beds.
	Upper Llandovery	Purple shales and thin limestones basal fossiliferous conglomerate.
	Wych Beds	
	Cowleigh Park Beds	

- - - - - U N C O N F O R M I T Y - - - - -

Igneous intrusions found in Cambrian - camptonite, dolerite and diabase probably late Ordovician in age.

CAMBRIAN	Tremadoc	Bronsil Shales	Light-blue, light-green or yellowish shales.
	Upper Cambrian	White-leaved Oak Shales	Black shales.
	Middle Cambrian	Hollybush Sandstone	Green flaggy sandstone with thin calcareous layers. Fossils fairly common including horny brachiopods - small.
	Lower Cambrian	Malvern Quartzite	Bands of conglomerate and quartzite.

- - - - - U N C O N F O R M I T Y - - - - -

Pre-Cambrian	Largely gneisses. Probably originally diorite, syenite or hornblende-granite. 'Hybrids' - possibly of granite and gabbro. In a few places schists. Veins of pegmatite. + Younger Warren House Volcanics - Spilites, Ignimbrites, Pillow Basalts	

Figure 1: Stratigraphic column for the Malvern Hills.

ISSN 1750-855x