New trenches at Martley Rock, Worcestershire

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Summary

Further to trenching in and around the small inlier of Precambrian meta-igneous rocks at Martley, Worcestershire in 2010 and 2011, a further phase of temporary trenching was carried out on 3rd January 2013. This report presents the results of this recent trenching.

Introduction

The results of the 2010 trenching were given by Barclay (2010) and, along with those of the 2011 trenching, are incorporated in a paper by Barclay et al. (2013). The 2010 trenches (Figure 1, trenches 1 and 2) remain open as a geosite visitor attraction, with display boards and plaques marking the geological formations that are exposed in the trench. The 2011 trenches were temporary and are backfilled. The new trenches are also temporary, but add important data on the boundaries between formations and add precision to the provisional geological map given by Barclay et al. (2013). In addition to the trenches, one of us (JP) dug three shallow pits to confirm the bedrock geology.

Trenches

Figure 1 shows the locations of all the trenches and pits dug on the site. Trenches 5, 6, 7 and 8 were dug on 3rd January 2013 and examined the following week. These are described in the following account. In addition, parts of trenches 1 and 2 were re-examined.

TRENCH 5

Trench 5 repeated 7m excavated at the north-east end of Trench 3 and continued north-eastwards for about 37m. Pink and green dioritic meta-igneous rocks of the Malverns Complex crop out for about 11m from the south-west end of the trench. They are truncated by a 1m-wide zone of sheared igneous debris reduced to greenish clayey sand, interpreted as the Martley Rock Fault. To its north-east, from about 2m south-west of the ‘crossroads’ of trenches 5, 6 and 8 to 3m north-east of the ‘crossroads’ are shattered, tectonised rusty, orange-stained quartzite of the Malvern Quartzite. These are truncated by a sharp faulted junction trending NNW-SSE against clays of the Halesowen Formation. The clays extend for 3m to the north-east before underlyng red clays of the Raglan Mudstone Formation were dug in the base of the trench. The junction of the Halesowen Formation and Raglan Mudstone Formation is both straightforward and complex. Where straightforward, a basal Halesowen layer of orange sand overlies unconformably a flat-lying surface of Raglan Mudstone Formation red clays, infilling hollows in the latter (Plate 1). Where complex, on part of the north-west wall of the trench, red and green clays are apparently tectonically inter-sliced (Plate 2). Above the basal orange sandy layer, which is about 0.1 m thick, the Halesowen Formation comprises mainly greenish clays with some dark grey carbonaceous clays and pale grey clays.
The Raglan Mudstone extends for 20 m north-east and comprises stiff red clays with blue-grey and pale green mottling. These clays are truncated against a zone of pale green leached, water-bearing sandstone marking the East Malvern Fault. To the north-east of this are red-brown sands of the Bromsgrove Sandstone Formation, seen for 7m to the north-east end of the trench.

**TRENCH 6**

Trench 6 extends north-westwards from Trench 5 from the ‘crossroads’ of trenches 5, 6 and 8, dropping several metres from the high point of the site at the ‘cross-roads’ down-slope to the end point. Tectonised, shattered, orange-stained quartzite of the Malvern Quartzite extends from ‘crossroads’ for 4m to a tectonic, flat-lying junction with green clays and hard, dark grey-green tabular sandstones of the Halesowen Formation. To the north-west is a 3m zone of green clay and quartzite fragments, followed to the north-west by about 3m of dark green sandstone fragments and green clay to a point [502 621] where the nature of the Halesowen Formation here is best seen. Here, a 0.2m-thick tabular bed of hard, dark green, fine-grained sandstone overlies yellow/orange/greenish stiff clay (Plate 3). The sandstone dips about 20° to 320°. Dark green sandstones with carbonaceous clasts crop from here for 3m to the north-west and are followed by 5m of greenish clays and fragmented thin sandstones to a sandstone [492 628]. Green clay with some black carbonaceous streaks extends from here until red-brown clay of the Raglan Mudstone Formation was dug 1 to 2m from the end of the north-west end of the trench. The outcrops of Halesowen Formation indicate the presence of structural complexity, with the beds seen younging north-westwards towards a junction with the Raglan Mudstone that is apparently flat-lying and unconformable.

**TRENCH 7**

From its easterly end point, Trench 7 was dug for 9m westwards in dioritic rock of the Malverns Complex. To the west is a 2m-wide zone of weathered, sheared Malverns Complex debris and shattered, fragmented quartzite of the Malvern Quartzite. The quartzite crops out for 5m to the WNW in a highly fractured state, and overlies green clays of the Halesowen Formation in a flat-lying, tectonic junction. These clays unconformably overlie stiff red clay of the Raglan Mudstone Formation, seen in the westernmost 3m of the trench.

**TRENCH 8**

Trench 8 extends SSE from the ‘crossroads’ intersection of trenches 8, 5 and 6. It exposes a short stretch (c. 2m) of rusty shattered quartzite of the Malvern Quartzite. This is truncated to the south-east by a zone 4m wide of quartzite fragments and green clay. It is interpreted as the southward continuation of the Malvern Quartzite/Halesowen Formation fault seen in Trench 5, here also faulting the Malvern Quartzite to the north-west against Halesowen Formation to the south-east. This fault is also interpreted as truncating the Martley Rock Fault at this point and to continue southwards to Trench 4, where a sharp, steeply dipping junction between the Malverns Complex and the Halesowen Formation was recorded in 2011. Some green clay (Halesowen Formation) and red clay (Raglan Mudstone Formation) are interleaved at the south-east end of the 4m-wide fault zone in Trench 8. Green and blue-grey clays with black carbonaceous lenses (Halesowen Formation)
extend from here for about 15m to the south-east, where they are apparently thrust over by red clays of the Raglan Mudstone Formation, the junction dipping about 40° to the south-east (Plate 4). The red clays extend for about 1.5m to the south-east where the East Malvern Fault is marked by a 1m-wide outcrop of pale green, leached sandstone. Red-brown sands of the Bromsgrove Sandstone lie to the south-east (Plate 5).

TRENCH 1

Trench 2 was re-examined immediately to the north-west of its junction with Trench 4. Only shattered quartzite of the Malvern Quartzite is now visible.

TRENCH 2

The south-west end of this trench was re-examined. Outcrops of tectonised, dioritic rock of the Malvern Complex and quartzite of the Martley Quartzite extend almost to the south-west end of the trench. Dark grey-green, hard sandstone of the Halesowen Formation crops out at the south-west end of the trench, just by the road.

Pits

Pit 1 [498 610] proved dark grey-green sandstone fragments of the Halesowen Formation at 0.38m depth. Pit 2 [503 508] proved quartzite of the Malvern Quartzite. Pit 3 [507 629] was dug in an area of dark grey-green sandstone fragments in the soil and proved yellowish gravelly material of the Halesowen Formation at 0.35m depth.

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References


**Plate 1.** Orange sandy layer at base of Halesowen Formation overlying red, green-mottled clay of the Raglan Mudstone Formation in Trench 5

**Plate 2.** Complex junction of orange sandy clay and green clay (Halesowen Formation) with red clay (Raglan Mudstone Formation) in Trench 5.

Plate 4. Red clay to right (Raglan Mudstone Formation) thrust over blue-grey clay (Halesowen Formation) in Trench 8.
Plate 5. View of south-east end of Trench 8. Green and blue-grey clays (Halesowen Formation) in foreground, red-brown sands of the Bromsgrove Sandstone Formation at the end. A short stretch of red clay to the south-east of the blue-grey clay is Raglan Mudstone Formation.