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THE GEOLOGY OF HALLICAR WOOD ADIT, VIA GELLIA

by S.G. Walters and P.R. Ineson

ABSTRACT

Situated at SK.2830.5722, Hallicar Wood Adit is some 400 m long. It exposes strata which ranges from above the Matlock Upper Lava, through the Matlock Group (Brigantian) limestones into the Matlock Lower Lava. The clay wayboards, scrins, dolomitised wallrocks and mineralisation exposed in this unsuccessful trial are described.

INTRODUCTION

Hallicar Wood Adit (SK.2830.5722) gives access to approximately 400 m of adit workings on the south side of the Via Gellia to the west of Cromford. It was termed the Hallicar Wood Sough by Flindall et al. (1977) who reported a survey of the then accessible passages. Smith and Ford(1971) briefly described the same locality and called it Groaning Tor Adit. The present authors dispute both names for there is a Groaning Tor Vein on Barmaster's plans to the west of the workings described in this article, and an adit is not indicated. Likewise there is no evidence for the level acting as, or being driven with, the specific purpose of dewatering mineral workings, i.e. a sough. The authors therefore propose the geographical location name in that it does not imply specific connotations.

The adit exposes a 55 m sequence of the Matlock Group (Brigantian) limestones above the horizon of the Matlock Upper Lava. Recent extensions have also provided a section of the Matlock Lower Lava.

GEOLOGY AND MINERALISATION

The initial 150 m of the adit were driven on a NE-SW trending scrin, here termed the 'main scrin'. Other parallel scrins are also seen in cross-cuts and these in turn are cut by a series of SE-NW joints and scrins. The main scrin rarely exceeds 30 cm in width and is usually 10 to 20 cm wide. It illustrates numerous divergent and convergent intersections with dolomitic riders, and where the adit and the main scrin part it is a 2 cm wide calcite veinlet. Evidence for movement along the dislocation in the form of slickensides, is not observed; however, the main scrin displaces cross-courses for up to 0.8 m.

The dominant mineral infill of the main scrin is coarse crystalline calcite with minor amounts of barite and galena. The barite, a pink earth form, occurs either as a pre-calcite phase lining the walls or as stringers in calcite. Galena, where present, is associated with the later phase of barite deposition. As no evidence for the extraction of galena is observed the prime objective of the adit may have been to test veins at depth.

The numerous cross-courses are shown in Fig. 1. Cross-cuts have been driven on the larger of these while a number have been backfilled and stopes are evident, for example at 12 m from the entrance where the adit has partially collapsed.

In addition to the mineralised scrins there are a number of either open or red clay infilled fissures and enlarged bedding planes. The enlarged bedding planes superficially resemble clay-wayboards; however, the clay infill and the discontinuous nature of the horizons are diagnostic of solution cavities rather than stratabound wayboards. The red clay most probably represents karstic action in the vicinity; it is also located infilling vugs in the main scrin.

Adjacent to the mineralised fractures thewallrocks are heavily dolomitised, and for the initial 150 m of the adit the walls are in dolomitised limestone. However the stratigraphical sequence may be elucidated by the presence of five clay-wayboards exposed in the adit (see Fig. 1). The wayboards may represent either atmospheric dust derived 'fossil soils' that mantle emergent surfaces in the limestone sequence (Walkden, 1974) or represent the degraded distal pyroclastic material related to local basaltic vulcanicity. Wayboard No.4 of Flindall et al. (1977) is 1.2-0.8 m thick and may be equivalent to the Matlock Upper Lava. This view is supported by Dr. N.J.D. Butcher (pers.comm.) who believes that the Matlock Upper Lava 'fronts' in the nearby Ball Eye Quarry, as well as the evidence of Walters and Ineson (1980) who gave a geographical distribution of the lava and Rieuwerts (1980, p.306) from a study of contemporary mining documents. The remaining wayboards are all less than 5 cm thick.

At the divergence of the adit and the main scrin the limestone wallrocks are massive bedded, pale shelly micrites almost porcellanous in character with poorly defined bedding planes. The adit adopts a 'coffin-level' type profile beyond this locality. Approximately 25 m before the Matlock Lower Lava is intersected a marked change in dip occurs which is clearly defined by No. 1 wayboard. The regional dip of 10-15°/135° changes to one of 40°/135° for the rest of the adit. The contact between the limestones and the lava dips at 50°/135°. This marked change in dip may be due to a local structural feature or some palaeotopographical expression related to the lava. 42 m of Lower Matlock Limestone is exposed between Wayboard No.4 and the Matlock Lower Lava.

The Wayboards cannot be correlated into adjacent areas. Worley and Nash (1977) in describing the Jugholes Caves noted that of the six wayboards in the Lower Matlock Limestones only two are laterally persistent. Dunham (1954) and Smith et al. (1967) attempted to erect regionally applicable composite sequences in terms of wayboard stratigraphy; this, it is concluded, cannot, with the evidence available, be undertaken. The 42 m succession of the Lower Matlock Limestones compares with 35 m of beds recorded in boreholes to the north of Ball Eye Quarry, 40 m in Oxclose Mine Shaft and a maximum of 54 m in boreholes at Cawdor Quarry. The limestones thin to the west for they are 28 m thick in the Tearsall area and 24.4 m thick in borholes on Bonsall Moor.

Following Findall et. al. (op.cit.) publication, the collapse which blocked the adit at the limestone-lava junction, has been cleared and provided access to over 40 m of workings which exposed the Matlock Lower Lava and an overlying tuff. The tuff (3.5 m thick) is equivalent to the iron-stained clay-rich horizon seen above the lava in Bonsall Basalt Quarry (SK.283.574). Pyrite in the overlying limestones and upper surface of the tuff has weathered and produced a 10 cm thick orange clay which passes into a grey clay and then the typical pale green 'toadstone clay'. Unlike weathered surface exposures, this tuff has not been decalcified and has remained compact and coherent. It grades into a coarse tuff with included blocks and fragments of amygdaloidal basalt and limestone clasts (often > 10cm in diameter) the whole set in a fine-grained clay matrix. Graded bedding is developed towards the base where the overall grain size is coarser but the large basalt and limestone fragments are less frequent in number. The tuff overlies a 0.4 m thick fine grained chocolate-brown clay (the 'Brown Bed' of the present contribution) the uneven base of which rests on weathered vesicular lava. Fragments of the lava are included in the base of the 'clay horizon', which in appearance is similar to the columnar clay beneath the Tideswell Sill and considered to be a volcanic mudflow. A petrographic examination of the clay indicates small limestone clasts (> 85%) basaltic pyroclastic fragments (5%) and organic debris set in a sparry calcite matrix. Visually it is identical with material infilling the Ember Lane Vent, south of Low Mine (SK.284.586). The strong iron-oxide coatings, marked rounding of the clasts and preponderance of country rock fragments suggests that the material represents a pyroclastic explosion breccia associated with strong degassing.

A highly vesicular 1.5 m horizon overlies a non-vesicular, coarse holocrystalline basalt of which 20 m are exposed. As vesicular units are rarely seen, it would imply that the whole succession represents a single flow comparable with exposures in Bonsall Basalt Quarry. In contrast with the hard black lava, the adit is intersected by a number of pale-green clay-rich alteration zones associated with numerous calcite veinlets. The larger alteration zones (> 1.0 m thick) indicated on Fig. 1, trend NE-SW, have a vertical displacement of up to 0.4 m, and as they lie on the projection of the Goodluck Sough Veins to the east most probably represent the peripheral mineral influx, i.e. calcite. As the adit forefield terminates in an intense zone of alteration (where a vein coincides with the line of the adit) it proves that this mining venture did not penetrate the Matlock Lower Lava and was therefore unsuccessful as a trial of veins at depth.

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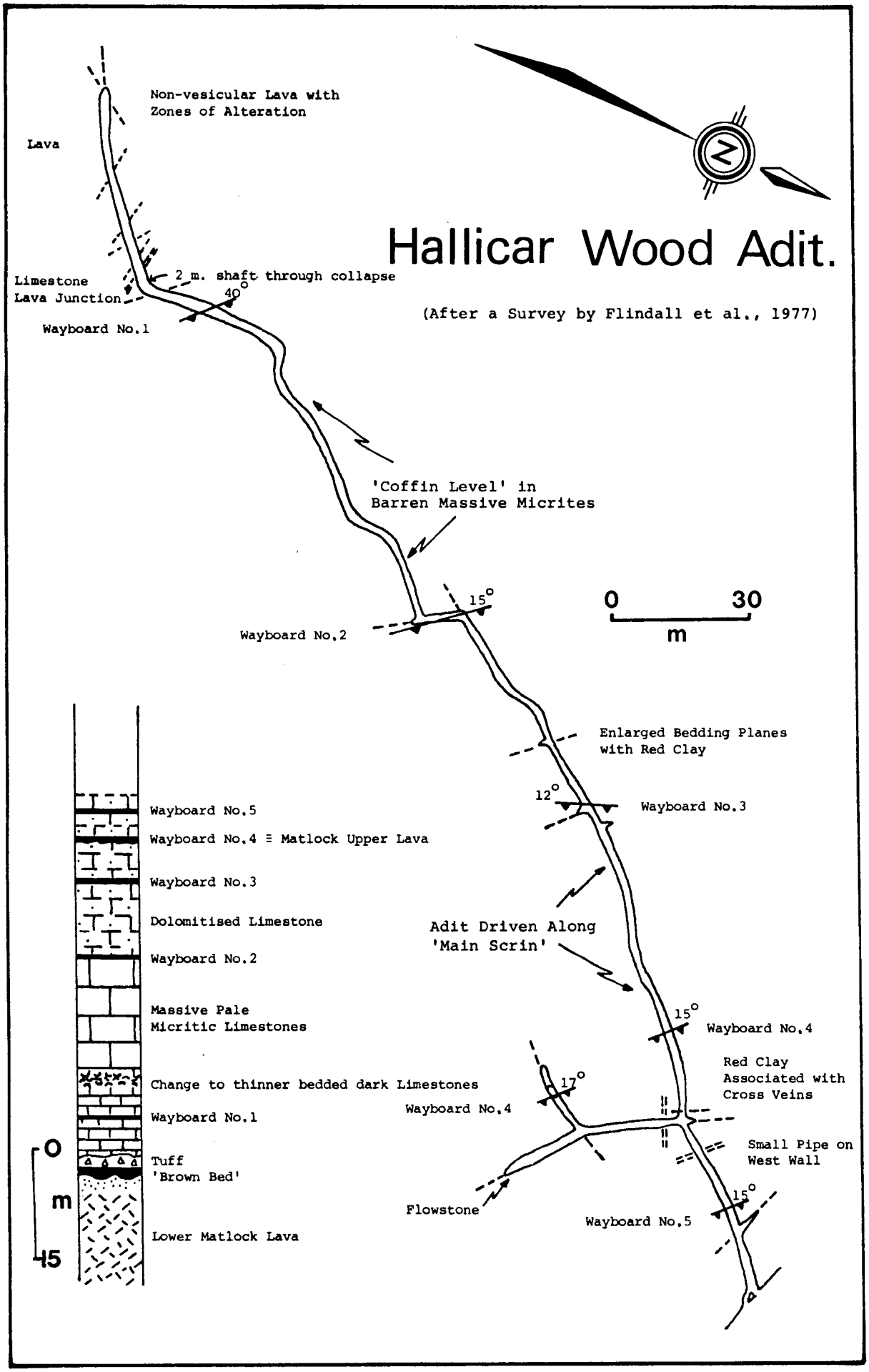
S.G. Walters & P.R. Ineson,
Geology Dept.,
University of Sheffield.


Hallicar Wood Adit.
(After a Survey by Flindall et al., 1977)
Non-vesicular Lava with
Zones of Alteration
Lava
Limestone
Lava Junction
2 m. shaft through collapse
40°
Wayboard No.1
'Coffin Level' in
Barren Massive Micrites
15°
Wayboard No.2
0
30
m
Enlarged Bedding Planes
with Red Clay
12°
Wayboard No.3
Adit Driven Along
'Main Scrin'
15°
Wayboard No.4
Red Clay
Associated with
Cross Veins
17°
Wayboard No.4
Small Pipe on
West Wall
15°
Flowstone
Wayboard No.5
Wayboard No.5
Wayboard No.4 ≡ Matlock Upper Lava
Wayboard No.3
Dolomitised Limestone
Wayboard No.2
Massive Pale
Micritic Limestones
Change to thinner bedded dark Limestones
Wayboard No.1
Tuff
'Brown Bed'
Lower Matlock Lava
0
m
45