

THE UPPER CARBONIFEROUS ROCKS OF THE EWDEN VALLEY,  
SOUTH YORKSHIRE

by

Rachel V. Elliott

Summary

Re-mapping Upper Carboniferous rocks of the Ewden Valley has resulted in a revised correlation of the sandstones, in particular sandstones previously regarded as Rivelin Grit being now recognised as Heyden Rock. Structural analysis has indicated the presence and extent of the Ewden Monocline trending WNW to ENE and throwing the strata down to the south by more than 30 m.

Introduction

Lying some 12 km northwest of Sheffield, the Ewden Valley is cut through strata of Upper Carboniferous age, comprising the upper part of the Millstone Grit and the lower part of the Coal Measures Groups.

Ewden Valley lies within the bounds of two Geological Survey of Great Britain 1 inch : 1 mile sheets (No.86, Holmfirth and Glossop and No.87, Barnsley) and the only published descriptions of the detailed geology are in the accompanying memoirs (Bromehead *et al.* 1933 and Mitchell *et al.* 1947).

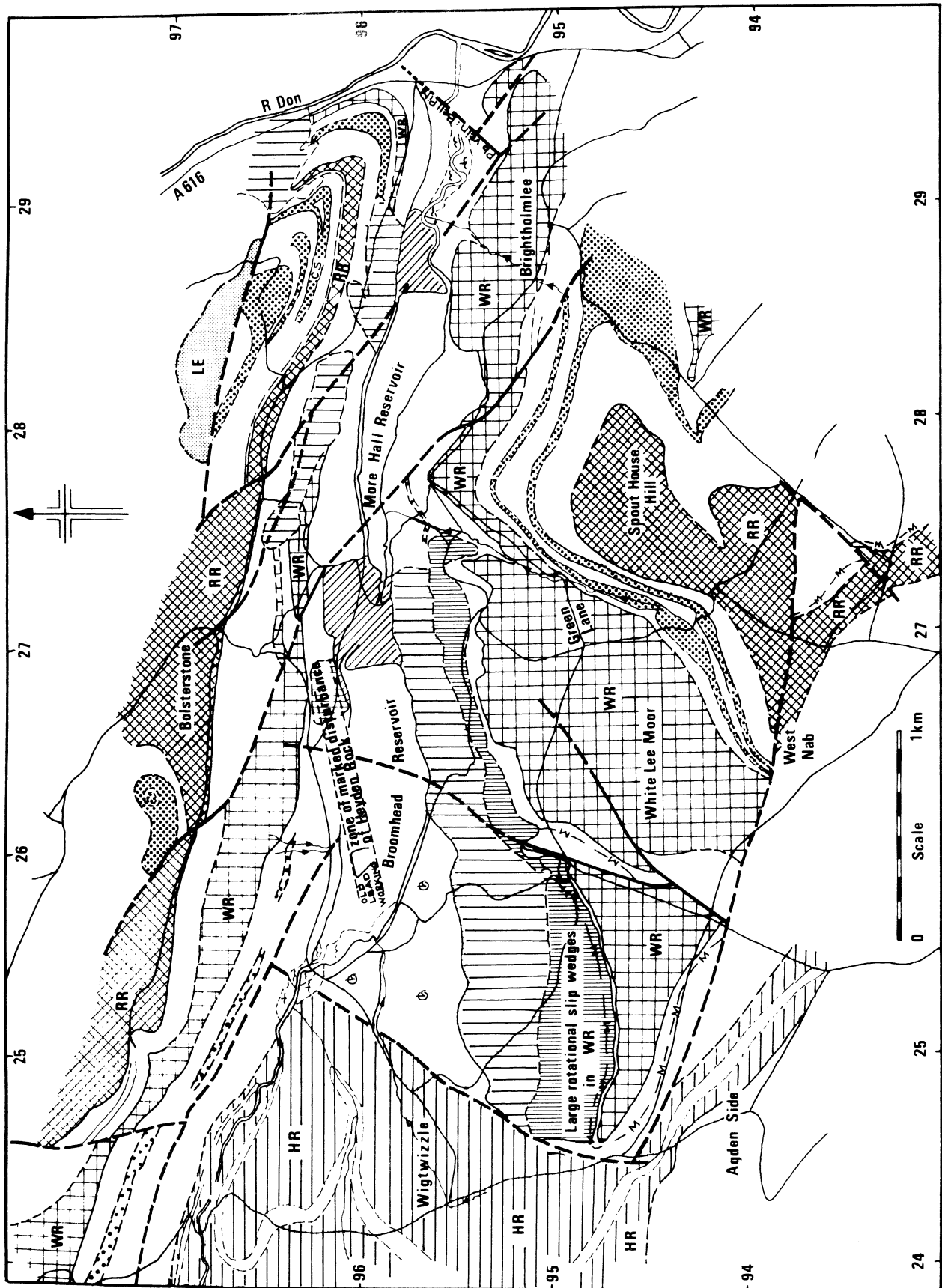
As a result of detailed field mapping for a B.Sc. thesis at the University of Leicester it became evident that previous authors had mis-correlated some of the Millstone Grit sandstones. Briefly, the outcrop of the "Rivelin Grit" on the Holmfirth Sheet could be traced directly in the field to correlate with a lower sandstone on the Barnsley Sheet. In the accompanying memoir Bromehead *et al.* (1947) commented only that the Rivelin Grit of the country to the west of the Barnsley Sheet was not the equivalent of the Rivelin Grit of the Rivelin Valley. Ramsbottom's correlation chart (1966) showed the correct situation but neither he nor Bromehead discussed the details. The correlation and map presented herein (text-fig. 1) remove the discrepancy in the regional correlation and allow a re-assessment of the faulting and the construction of a detailed structure contour map which partly fills the gap in the structural pattern left in the Barnsley Memoir where the contours were taken at much higher Coal Measure horizons and in the Holmfirth Memoir where only a generalised structure map was presented (Bromehead *et al.* 1947, p.117). Additional evidence of local structure has been obtained from the records of the geology of the foundations of the Broomhead Dam (Bendelow 1944).

Details of the Succession

The stratigraphical succession is shown in text-fig. 1, and is composed of 223 m of Millstone Grit sandstones and shales, followed by 115 m of Lower Coal Measures rocks. The latter are only seen in a small area to the north and east of Bolsterstone and, as no change from the sequence shown on the Geological Survey maps and memoirs has been detected, their stratigraphy need not be discussed further.

The lowest sandstone of the Millstone Grit succession in the Ewden Valley is identifiable as the Heyden Rock as it is overlain by shales containing the *Reticuloceras bilingue*

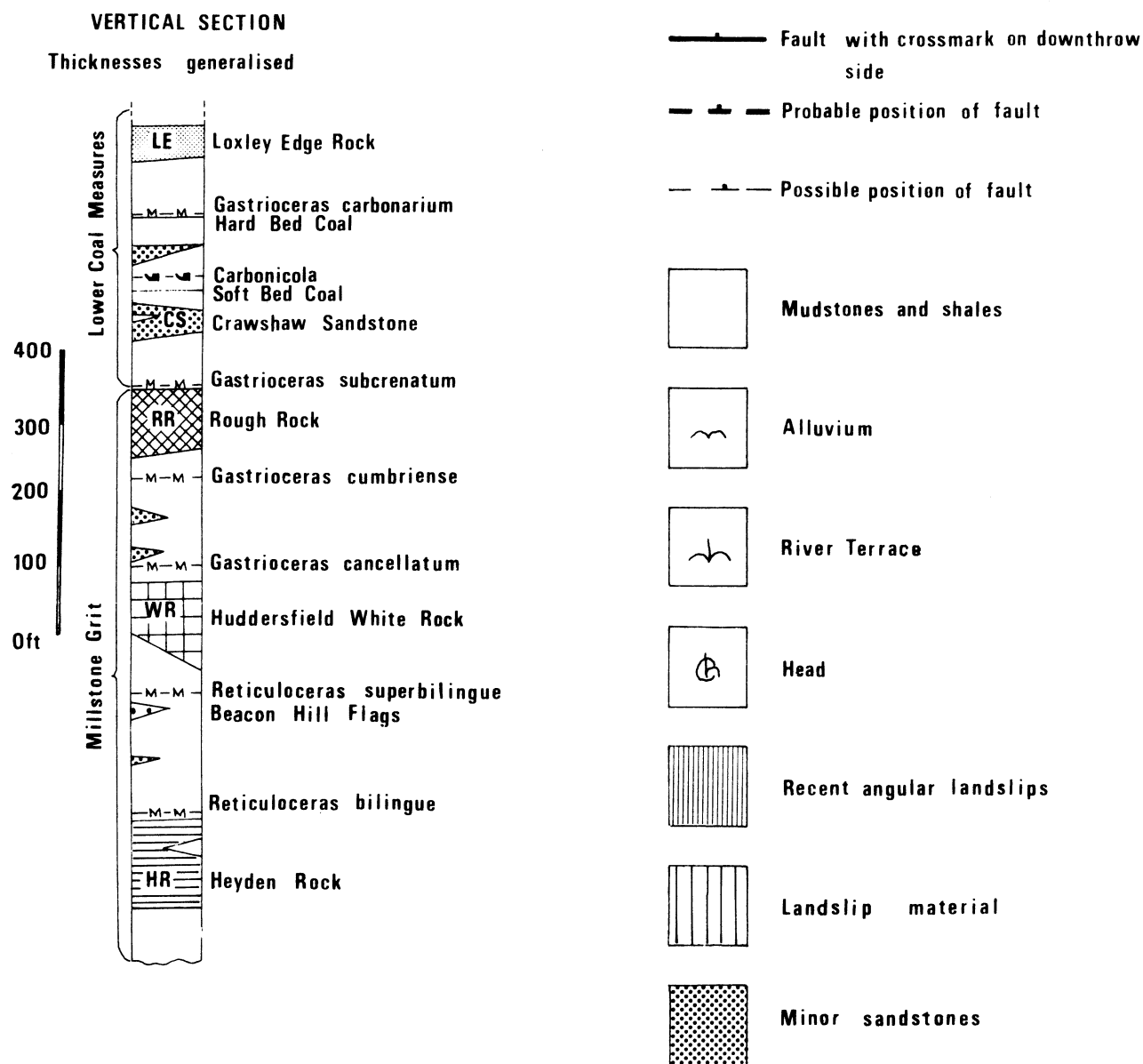
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1979, 3-text-figs., pp 43-49.



marine band, <sup>1</sup> as noted by Bromehead *et al.* (1933), which established correlation with the Heyden Rock of the type area in southeast Lancashire. In the Ewden Valley the Heyden Rock is approximately 36 m thick and consists of two leaves of a coarse pebbly arkose separated by a shale layer 7.7 m thick. The lower arkose is 21 m thick and the upper 7.7 m thick.

Footnote: <sup>1</sup> Throughout this paper the goniatites and marine bands are recorded under their modern names of *Reticuloceras bilingue* and *R. superbilingue* etc. though they were originally recorded in the memoirs under the old system of *R. reticulatum* mut  $\beta$  and mut  $\gamma$  etc.

Text-fig. 1, opposite, Geological map of the Ewden Valley  
below, Stratigraphical succession and key to map



The base of the Heyden Rock is seen on Agden Side (SK 249940)<sup>2</sup> and Hurkling Edge (239946) where it forms a steep south-facing escarpment, weathered into crags, which show small scale current bedding in the coarse grit. Northeast from Hurkling Edge, the shale parting forms a boggy hollow, which curves southwards to where Mortimer Road crosses the edge. Here the lower Heyden Rock is seen as 1 m of flaggy sandstone overlain by shale which has a dip of 10° north and a strike of 150°. This shale is seen again in the Ewden Beck at 252964 as a succession of 6 m of black shale overlying cross-bedded sandstone. Further downstream at 253963, there is a small outcrop of flaggy sandstone representing the upper leaf. The lower leaf outcrops in the Ewden Beck from 252964 to the edge of the area mapped. Upstream (west) of Ewden Bridge, at 238968, shale outcrops again with sandstone above, but this is not the base of the Heyden Rock, for 90 m further upstream there is another 6 m of cross-bedded, ripple-marked sandstone.

To the east of Wigtwizzle the Heyden Rock is thrown up against the Huddersfield White Rock and lower beds, as is seen in Lee Lane Dyke at 248955 and Allas Lane Dyke at 2512959. At Lee Lane Dyke there is a continuous outcrop of an uncorrelated sandstone possibly equivalent to the Beacon Hill Flags. A window of shale appears for a short distance at 248955 which indicates the base of the sandstone, but there is a marked steepening of dip upstream towards the shale which suggests that the Wigtwizzle fault brings the shale parting of the Heyden Rock on the upthrow side of the fault against this uncorrelated sandstone on the downthrow side. At Allas Lane Dyke (251959) there is a faulted junction showing 1.3 m of orange to grey shale steepening upstream from 20° to 72° over a distance of 4 m lying against a sandstone which flattens upstream.

The Heyden Rock should outcrop north of the Ewden Beck below the Huddersfield White Rock but there is no feature and this is taken to indicate that it has been cut out by the Ewden Fault downthrowing it 66 m to the south.

Between the Heyden Rock and the Huddersfield White Rock are 56 m of measures with the *Reticuloceras bilingue* marine band at the base, on top of the Heyden Rock. Bromehead *et al.* (1933) recorded a dark silty shale with goniatites from this horizon east of Smallfield Lane at 256939. The shales contain two thin discontinuous flaggy sandstones. The topmost sandstone, the Beacon Hill Flags, has a ganister above it. The shales are not seen at outcrop on the northern side of the valley. On the southern side of the valley in Lee Lane Dyke (252957) there is a shale exposed with slabby sandstone above and below it. The sandstone is persistent upstream until it is cut out by the Wigtwizzle Fault. The sandstone is too high to be the Heyden Rock and too low to be the Beacon Hill Flags.

In Raynor Clough these measures between the Heyden Rock and the Huddersfield White Rock are siltstones and shales with the Beacon Hill Flags 2 m thick forming a waterfall, at 276956, about 5 m in height. The sandstone is discontinuous and forms flaggy lenses several feet in thickness further east. At the waterfall, the Beacon Hill Flags are 30 m below the Huddersfield White Rock, the succession above being of black and grey shales.

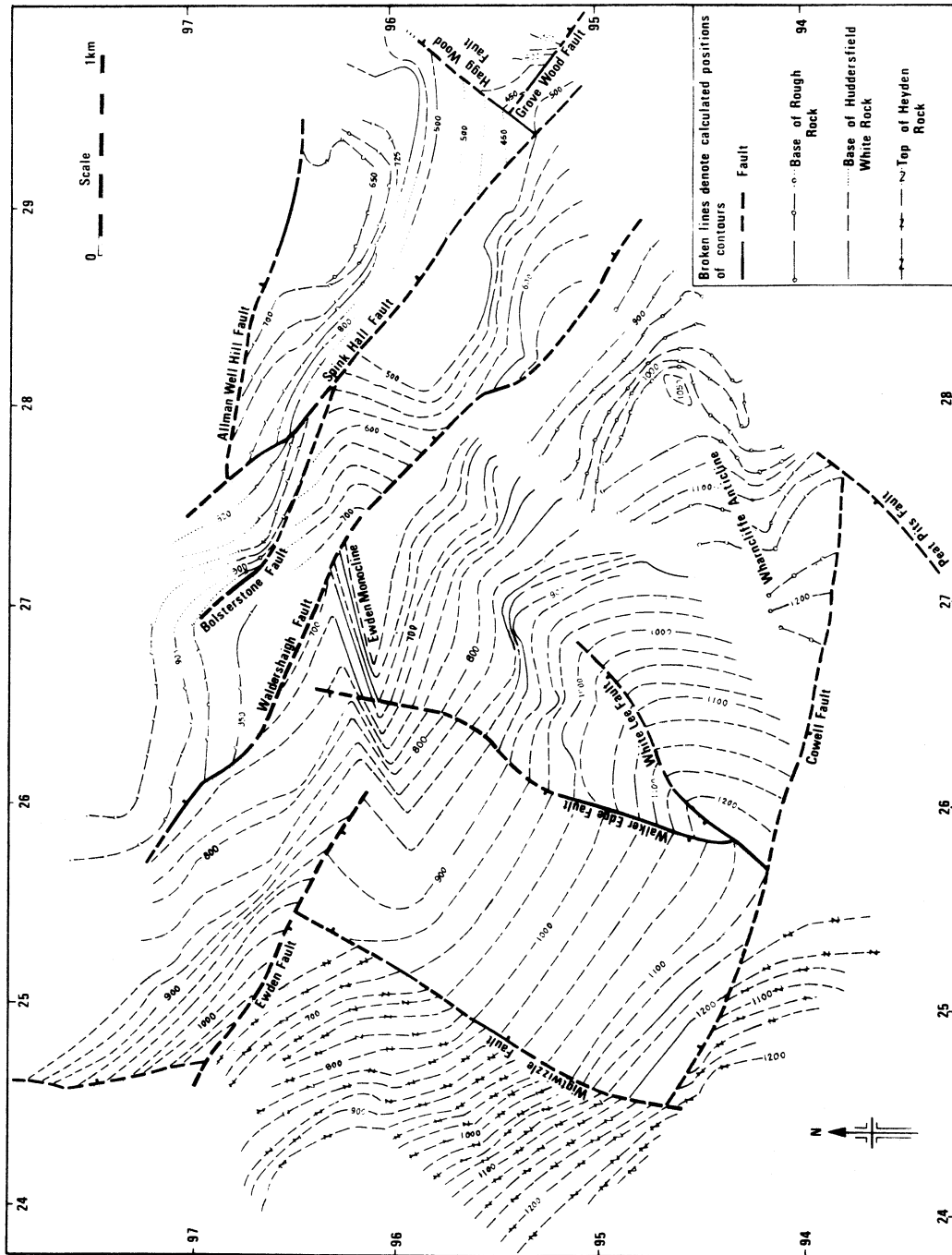
The Beacon Hill Flags north of Cowell House (2595) are totally obscured by the Canyon Landslips. To the east of the Walker Edge Fault the flags are exposed where the ganister above them has been worked for firebricks (261950).

South of the bridge in Raynor Clough (276955) Mitchell *et al.* (1947, p.6) recovered goniatites, bivalves and ostracods from the *Reticuloceras superbilingue* marine band, which consists of nodular ironstone in black sulphurous shales.

The shales pass upwards into the Huddersfield White Rock which forms cliffs 14 m high in Raynor Clough. There is a mudstone with sandy intercalations at the base followed by 14 m of sandstone and a further 7.7 m of sandstone succeeds out of the Clough.

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Footnote: <sup>2</sup> All grid references herein are in 100 km square SK.



Text-fig. 2. Structure contour map of the Ewden Valley.

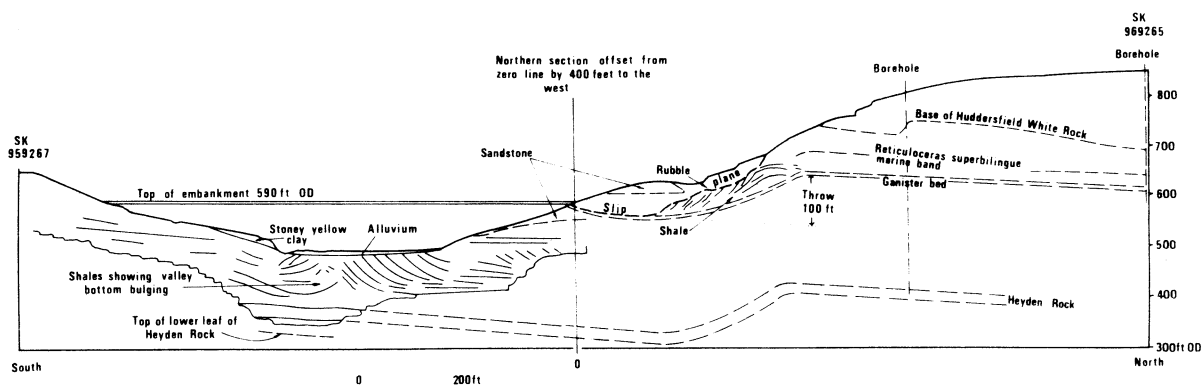
At Loadfield Quarries (258949), the Huddersfield White Rock is 12 - 15 m thick. It is a well-bedded, fine-grained, siliceous sandstone. At the top are 2 m of ganister with a flaggy sandstone above bearing the rhizoids of *Stigmaria sp.* at the horizon of the Ringinglow Coal.

On the north side of the valley, the Huddersfield White Rock forms a prominent scarp across the hillside from Yew Trees Wood at 267967 where 6 m of alternating flaggy, laminated and massive sandstone is found, to Thorpe's Brow (239976), and 3 m of flaggy cross-bedded, micaceous sandstone is seen in a quarry.

To the north of Ewden Valley, the Upper Meltham Coal is well developed above the Huddersfield White Rock and to the south similarly, as the Ringinglow Coal. This seam is only poorly developed on the ganister above the Huddersfield White Rock in Ewden and was found at one locality, Loadfield Quarries (258949).

### Structure

The structure contour map (text-fig.2) has been assembled in three parts using three stratigraphic horizons which are respectively best exposed in the southwest, centre and northeast, providing the best control from as many points of observation as possible. As exposures of the marine bands are rare, the top or bottom surfaces of the major sandstones have been used. While a single surface map could be produced by adding or subtracting thicknesses as appropriate, this procedure might well overlook variations in thickness. Both the Rough Rock and the Huddersfield White Rock are known to vary in thickness regionally, though detailed variations in the Ewden area cannot be determined. The method also has the advantage of showing a previously unrecognised structure, the Ewden Monocline, which is not mentioned in either of the memoirs, though disturbed strata were revealed in the investigations of the Waldershelf Landslip which occurred during the construction of the Broomhead Reservoir between 1924 and 1930 (Bendelow 1944 ; Section re-drawn as text-fig.3)



Text-fig. 3. Section along the Broomhead Dam Trench showing the Ewden Monocline and the Waldershelf Landslip of 1924 (after Bendelow 1944).

During the cutting of the bywash bay at the northern end of the embankment the removal of a sandstone "toe" caused instability allowing a large mass of sandstone and shale to slip down into the bywash bay. A series of boreholes was followed by deep drainage trenches being cut and these revealed the existence of a monoclinical flexure dropping the beds by 30 m to the south over a width of 120 m. Some evidence of earlier movement was found in these investigations suggesting that the disturbance extended westwards along strike to the site of the old Broomhead Lead Mine now submerged in the reservoir, where disturbed sandstones of the Heyden Rock could be inferred from the very limited mine records. Possible further extension of this structure to the west is suggested by the irregularities of dip in Lee Lane Dyke. However, much of the displacement caused by the monocline seems to be taken up by

the Ewden Fault trending west-northwest parallel to Ewden Beck from where Wood Brook enters the Reservoir at 261962. The Ewden Fault has been inferred from the necessity of explaining the relationship of the Heyden Rock which is some 60 m lower than its expected stratigraphical position below the Huddersfield White Rock. This relationship is at variance with Bromehead *et al.* (1933) as their map infers a fault in the same position with the throw in the opposite direction, to the north.

Eastwards the Ewden Monocline is less obvious, but nevertheless still present. East of Ewden Village a flexure is visible in the structure contours on the base of the Huddersfield White Rock, and still further east these and contours on the Rough Rock show a distinct flexure down to the south though with an elongate depression on the crest at Hollin Edge. Lower Coal Measures are preserved hereabouts.

The structure contour map also shows the Wharncliffe Anticline clearly in the southeast. Although there has been little comment in the literature, this anticline is clearly displayed as a broad but gentle structure in the Wharncliffe Crags escarpment to the east of the Ewden area, where the fold plunges to the east-northeast. The present study shows that the Wharncliffe Anticline extends further west than previously noted.

#### Conclusions

The re-mapping of the Ewden Valley has provided field evidence for the identification of the Heyden Rock in the outcrops previously noted as Rivelin Grit by Bromehead *et al.* (1933) at the western end of the Ewden Valley. This supports the correlations shown in Ramsbottom's pictorial diagrams (1966 and 1969) wherein the Rivelin Grit is equated with the Huddersfield White Rock, and the Heyden Rock is equated with the Pule Hill Grit. The structural analysis has added considerably to knowledge of the Ewden Monocline, previously known only from the foundation studies of the Waldersheaf Landslip. Although seemingly of local significance only, this flexure is parallel to and has the same sense of movement as the Don Monocline to the south.

#### Acknowledgements

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*6<sup>e</sup> Cong. Internat. Strat. Geol. Carbonifere. Compte Rendu*  
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Rachel Victoria Elliott,  
Geology Dept.,  
The University,  
Leicester LE1 7RH