
East Wemyss to Buckhaven Coast

Highlights

East Wemyss to Buckhaven Coast provides the best exposure of Barren Red Formation in the Scottish Basin.

Introduction

Foreshore exposures [NT 339 964]–[NT 363 981] on the southern coast of Fife, Scotland, show Upper Carboniferous red beds, as developed in the northeastern part of the Scottish Basin. The only published account is by Binney and Kirkby (1882).

Description

The original section described by Binney and Kirkby (1882), which was exposed between Leven and East Wemyss, was some 290 m thick. However, the section between Leven and Buckhaven is now obscured by the Methil Dockyard, and the remaining outcrop shows a succession only about 105 m thick. It nevertheless is an excellent example of the red beds known as the Barren Red Formation (Figure 12.14).

The base of the succession is reported to lie on grey shales of the Productive Coal Formation, although the contact is not well seen. The lowest well exposed beds comprise a prominent soft, red sandstone, 30 m thick. It displays well-developed cross-bedding and has numerous lenses and stringers of pebbles.

The sandstones are overlain by a 58 m unit dominated by seat earths of various shades of red, purple, yellow and white. Binney and Kirkby (1882) provide the following interesting footnote, 'After a gale, when these fireclays have been swept bare of sand, the colouring is something gorgeous.' Interbedded between the seat earths are irregular beds of red and yellow sandstone.

The top part of exposed succession is another soft, variegated sandstone, 9 m thick. It does not show the marked cross-bedding seen in the lower unit, but has more prominent pebbly bands, especially in the lower part of the unit.

None of the strata presently exposed along this stretch of coast have yielded fossils. However, the beds just to the east, which are now covered by Methil Dockyard, included several fossiliferous horizons. Binney and Kirkby (1882) provide species lists, which include numerous plants, limulids, estheriids and fish fragments. However, none are illustrated, other than some putative roots which are of no stratigraphical value. Furthermore, the species lists include a number of names which are almost certainly misidentifications (e.g. '*Neuropteris auriculata* Brongniart, which is an upper Stephanian and Autunian species). Consequently, the lists are impossible to use as a basis for establishing the stratigraphical position of the beds.

Interpretation

This is the best exposure of the upper part of the Coal Measures of the Scottish Basin, and which are referred to as the Barren Red Formation. There has been no published sedimentological study on these beds in recent years. However, the occurrence together of seat earths (palaeosols), cross-bedded sandstones and conglomerates suggests some comparison with the alluvial fan facies association of the Etruria Formation in the English Midlands, as described by Besly (1988). According to Besly, this association typically occurs near the margins of fault-bounded basins. This site indeed lies near a major fault, the Ochil Fault a few kilometres to the north. However, the isopach map for the lower Westphalian given by Read (1988) suggests that this was not a basin margin. Alternatively, the facies association may be related to the contemporary volcanicity that developed in this part of the Scottish Basin (Francis and Ewing, 1961).

It is widely assumed that these beds were secondarily reddened during the Permian (e.g. Read, 1988). However, if the comparison with the Etruria Formation can be maintained, a penecontemporaneous reddening of the beds becomes more plausible.

Conclusions

East Wemyss to Buckhaven Coast is the best place to see the upper part of the Coal Measures in Scotland. The succession, which is dominated by seat earths and red sandstones, belongs to the Barren Red Formation, and is probably about 310 million years old.

References



(Figure 12.14) Barren Red Formation exposed near caves at Wemyss, East Wemyss to Buckhaven Coast VCR site. Reproduced by permission of the Director, British Geological Survey: NERC copyright reserved (B410).