
Cauldon Railway Cutting, Staffordshire

[SK 076 496]–[SK 078 498]

Introduction

The Cauldon Railway Cutting GCR site is a disused railway cutting [SK 076 496]–[SK 078 498] lying some 250 m north of Cauldon village, near Waterhouses. It provides a particularly valuable and arguably near-complete section through the Lower Namurian (Pendleian) *Cravenoceras leion* Zone (E_{1a}). The succession includes fossiliferous mudstones and shales containing a number of distinctive goniatite-bearing marine bands; some in the form of prominent bullion beds in which the goniatites may be preserved whole. Early records of fauna collected from this site are detailed by Wain and Stobbs (1907), Hester (1932) and Moore (1946). However, the most informative site description, which includes a detailed account of the goniatite sequence, is by Morris (1967b). Rich microfossil assemblages (conodonts) from some of the marine bands in the cutting are reported by Higgins (1961, 1975).

Description

The section extends for approximately 400 m between two footbridges leading into Cauldon village. The NE-SW-orientated cutting runs oblique to the trend of a series of asymmetric fold structures and is locally disrupted by faulting such that parts of the sequence are repeated along the section and the succession becomes difficult to follow. The account presented here is based mainly on the work of Morris (1967b) who made the first serious attempt to unravel the complexities of the section. However, it should be noted that most of the localities described by Morris (1967b) from the northern side of the cutting, especially at its north-east end, are no longer in existence (Prosser, 1989).

The succession (Figure 7.32) comprises approximately 20 m of mudstone, shale, calcareous shale with some thin beds of limestone, volcanic ash (Ludford, 1951) and limestone bullions (Figure 7.33). The dominant lithology is of medium- to dark-grey shales in which bivalves are particularly abundant and structures resembling burrows also occur. Morris (1967b) identified seven goniatite horizons in the sequence, including five bullion bands containing assemblages largely typical of the *Cravenoceras leion* (E_{1d} Zone (Chisholm *et al.*, 1988). The goniatite succession defined by Morris (1967b) is as follows:

7. *Eumorphoceras* sp., *Dimorphoceras* sp.
6. *Eu.* sp. form A of Moore, *D.* (*Metadimorphoceras*) *wiswellense*
5. *Eu. stubblefieldi*, *Eu.* sp. c.f. *Eu. involutum*
4. *Eu.* sp.
3. *Eu. medusa*, *Eu.* sp. (position uncertain)
2. *Cravenoceras* cf. *leion*, *D. wiswellense*
1. *C.* cf. *leion*

Note that the eumorphoceratid taxa identified by Morris (1967b) listed above are now generally assigned to the genus *Edmooroceras* (N. Riley, pers. comm., 2000) and that the early record of the E_{1b} zonal indicator '*Eumorphoceras pseudobilingue*' by Bisat (in Hester, 1932) is most probably either *Edmooroceras* '*Eu*' cf. *medusa* or *Ed.* '*Eu*' cf. *stubblefieldi* (Ramsbottom in Morris, 1967b). Additional records from this section include *Stroboceras*, the bivalves *Posidonia corrugata* and *P. membranacea*, orthoconic nautiloids, gastropods, crinoid ossicles, trilobite pygidia, ostracodes, fish teeth and spines (Higgins, 1961; Morris, 1967b). Rich conodont faunas from horizons 2, 3 and 6 of Morris (1967b) including *Gnathodus girtyi*, *G. bilineatus*, *Idioprioniodus confunctus*, *Lochriea nodosa*, *L. mononodosa*, *L.*

commutate, *Mestognathus bipluti* and *Cavusgnathus naviculus* are also reported from the sequence (Higgins, 1961, 1975).

Interpretation

Although no formal lithostratigraphical name has been applied to the Namurian succession in the Cauldon area, the exposed beds are the lateral equivalent, at least in part, of the Lask Edge Shales recognized in the Macclesfield and Stoke-on-Trent areas to the west (Evans *et al.*, 1968; Rees and Wilson, 1998), and the Edale Shales and the Upper Bowland Shales in basins to the north. The section forms part of a condensed Pendleian sequence deposited towards the southern margin of the North Staffordshire Basin (Trewin and Holdsworth, 1973) over an upstanding mass of Dinantian carbonates at the margin of the Staffordshire Shelf (Chisholm *et al.*, 1988). Evidence presented by Fraser and Gawthorpe (1990) and Ebdon *et al.* (1990) suggests that the rift systems that controlled the basin's development at an earlier stage in its history (during Dinantian times) became progressively inactive during this period as the basin entered a post-rift thermal subsidence phase at this time.

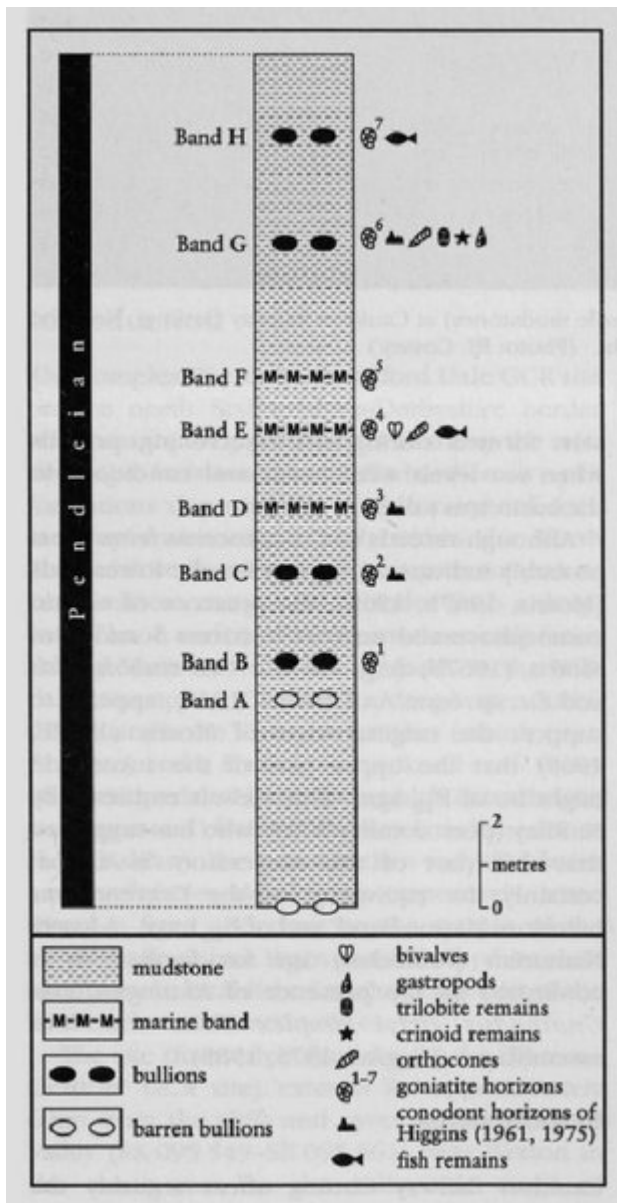
The serial repetition of goniatitic marine bands most probably reflects the development of small-scale, eustatically controlled sedimentary cycles (Holdsworth and Collinson, 1988), the definition, anatomy and significance of which, in terms of lithology, faunal content and palaeosalinity, has yet to be fully evaluated. Studies of broadly comparable but thicker sequences of a similar age in the Craven Basin to the north (Brandon *et al.*, 1995, 1998) indicate that these bands may have been formed during periods of sea-level highstand and full marine salinity, while the remaining parts of the succession formed during the intervening periods when sea levels were lower and conditions in the basin less saline.

Although records of *Cravenoceras leion* most probably indicate an E_{1a} age for the lower beds (Morris, 1967b, 1969), the presence of certain eumorphoceratid taxa, at horizons 5 and 6 of Morris (1967b) (e.g. *Ed.* 'Eu.' cf. *stubblefieldi* and *Eu.* sp. form A of Moore, 1946), appears to support the original view of Morris (1967b, 1969) that the upper part of the succession might be of E_{1b} age. This view is endorsed by N. Riley (pers. comm., 2003) who has suggested that this part of the succession 'is almost certainly the equivalent of the *Cravenoceras brandoni* Marine Band' and of E_{1b}1 age. A lower Namurian (Pendleian) age for these beds is confirmed by the presence of *Kladognathus–Gnathodus girtyi simplex* Zone conodont assemblages (Higgins, 1975, 1985).

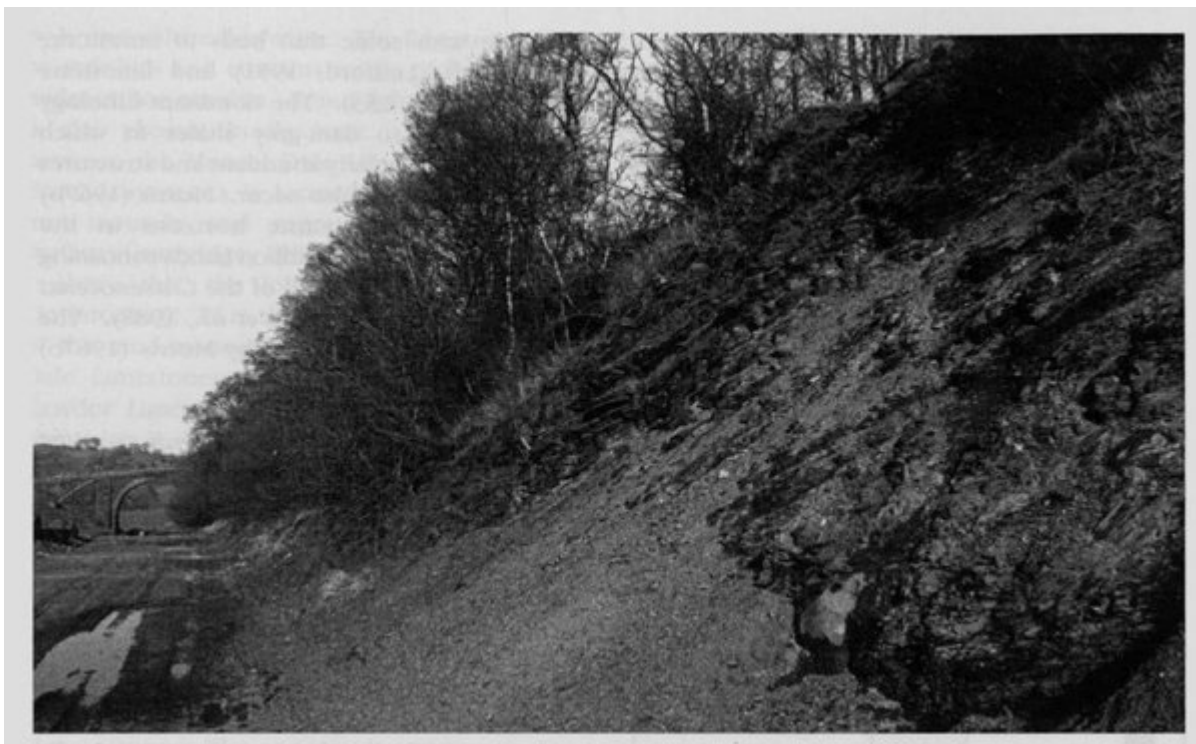
Conclusions

Cauldon Railway Cutting offers arguably the finest section of basal Namurian (Pendleian) strata in north Staffordshire. Traditionally the section has been regarded as providing an almost complete section through the *Cravenoceras leion* Zone (E_{1a}). However, refinements in Pendleian ammonoid biostratigraphy suggest that the upper part of the sequence may lie within the overlying E_{1b} goniatite zone. Notwithstanding these stratigraphical uncertainties, the section remains an important reference section for regional intrabasinal and interbasinal correlations of Pendleian strata throughout western Europe. Rich goniatite and conodont faunas make this a promising site for further stratigraphical and palaeoecological research.

[References](#)



(Figure 7.32) Schematic log section of the lower Namurian succession at Cauldon Railway Cutting. After Morris (1967b).



(Figure 7.33) General view of Pendleian strata (mainly fissile mudstones) at Cauldon Railway Cutting. Note the prominent bullion beneath the lens-cap scale, lower right. (Photo: P.J. Cossey.)