Corbridge Limestone Quarry, Northumberland

[NY 996 656]

Introduction

The Corbridge Limestone Quarry GCR site lies close to the A69, about 1 km north of Corbridge, near Hexham. This disused limestone quarry [NY 996 656] also known as 'Deadridge Quarry', provides the finest section of the Corbridge Limestone in the Northumberland Basin. Despite poor biostratigraphical control, the exposed sequence contains a distinctive but rather unusual fauna, which is generally regarded as basal Arnsbergian (E_2.) in age. The site is of critical importance to the correlation of Stainmore Group successions across the Northumberland Basin and into the adjoining Alston Block and Midland Valley Basin areas. The geology of the area is documented by Lebour (1885), Hedley and Waite (1929) and Hedley (1931), and significant palaeontological Information is given by Smith, S. (1910). However, the most useful accounts of the site geology are provided by Holliday and Pattison (1990) and Mills and Holliday (1998).

Description

Lying approximately 100 m above the Oakwood Limestone and 55 m below the Thornborough Limestone, the Corbridge Limestone is one of a number of prominent units within the cyclothemic Stainmore Group (Upper Limestone Group) sequence, and one that is better developed in the Corbridge district than anywhere else in northern England (Holliday and Pattison, 1990; Mills and Holliday, 1998). Its position within the Stainmore Group succession is illustrated in (Figure 3.3) and (Figure 3.6).

A boring at Corbridge Pottery works (Hedley and Waite, 1929) revealed a 30 m sequence of interbedded sandstone, shale and fireclay beneath the Corbridge Limestone but failed to intersect the Belsay Dene Limestone thought to lie locally approximately 20 m below the Corbridge Limestone (Holliday and Paulson, 1990). Above the Corbridge Limestone, a thick succession of sandstone is exposed in the A69 road cutting adjacent to the site just a short distance to the south-east.

Exposure of the Corbridge Limestone in the quarry is limited to a 6 m section of fine-grained, bioclastic limestone with interbedded calcareous and dark-grey mudstone partings (see (Figure 3.24)) which increase to 0.5 m in thickness near the top of the sequence. At the base of the section, a thin (0.2 m) sandstone with rootlets and a 1.5 m-thick fireday once used by the Corbridge Pottery industry (Hedley and Waite, 1929) lies directly beneath the limestone. An adit excavated into this unit was formerly visible at the northern end of the site (Mills and Holliday, 1998). The Corbridge Limestone fauna is typified by the presence of brachiopods such as *Buxtonia* and *Edmondia sulcata* which occur in abundance, by the occurrence of *Chaetetes septosus, Fenestella, Composita ambigua* and *Latiproductus latissimus,* and by the absence of solitary corals (Smith, S., 1910; Hedley and Waite, 1929; Hedley, 1931; Pattison, 1980; Holliday and Pattison, 1990; Mills and Holiday, 1998). Its faunal character serves to distinguish this limestone from the many other carbonate-rich marker horizons in the Stainmore Group with which, in the past, it has sometimes been confused (Holliday and Pattison, 1990).

Interpretation

To date, the only detailed and published account of the sedimentology of the Stainmore Group in the Northumberland Basin is that provided by Elliot (1976a) who worked exclusively on fluvio-deltaic deposits exposed along the Northumberland coast between Howick Bay and Longhoughton Steel. Comparable studies of similar successions inland and containing significant limestone intervals have yet to be undertaken (Holliday and Pattison, 1990). Despite this, it is generally accepted that the Stainmore Group successions of this region, as elsewhere in northern England, are the product of a delicate interplay between marine and deltaic influences operating in the southern part of the Northumberland Basin during early Namurian times. Seen in this context the chaetetid-brachiopod association of the

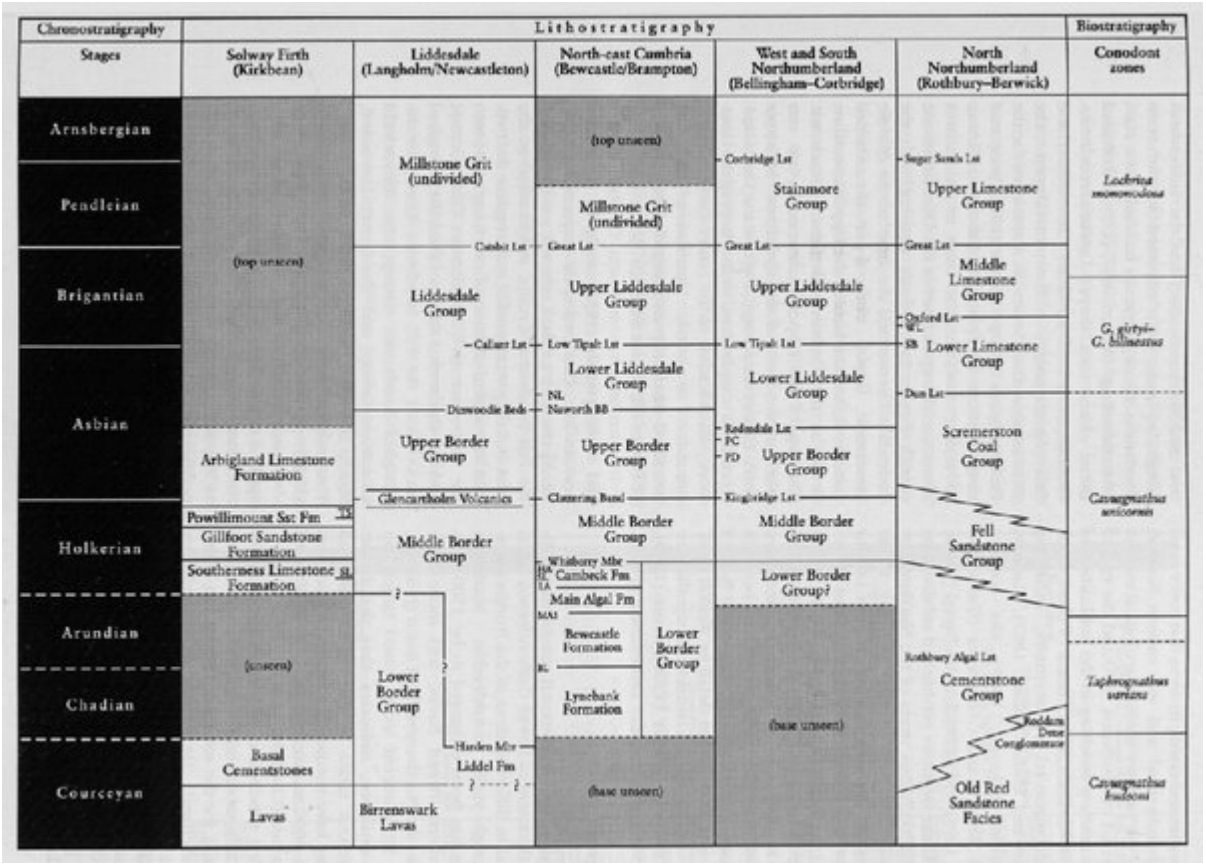
Corbridge Limestone is a clear indication of deposition under shallow and open marine conditions. Without further investigation, reasons for the absence of corals remain totally speculative; however, the incorporation of significant amounts of fine-grained tenigenous material within the limestone, and thick piles of coarser clastic deltaic deposits above and below it may indicate that, following coastline retreat and the onset of lime deposition, conditions were too turbid for coral growth.

An understanding of the stratigraphy of the Stainmore Group in the Corbridge district has, in the past, been hampered by the scarcity of diagnostic goniatites and by the difficulties experienced in mapping key lithostratigraphical marker horizons across poorly exposed and faulted ground Into areas where a previously established but different lithostratigraphical nomenclature already exists (Mills and Holliday, 1998). While advances in palynological and micropalacontological research are currently providing a clearer understanding of the stratigraphy (Owens, 1972, 1978a,b; Riley, 1982b), outstanding correlation problems remain. Because of this, the age of the Corbridge Limestone remains critical to the correlation of Stainmore Group successions across the Northumberland Basin and into the adjoining areas of the Alston Block and Midland Valley Basin. Recent mapping in the Newcastle area (Mills and Holiday, 1998) has confirmed the long-held view (Ramsbottom, 1977b, Ramsbottom *et al.,* 1978) of the Corbridge Limestone as the lateral equivalent of the Lower Fell Top Limestone of the Alston Block (Figure 3.6). The occurrence of low E_2 Zone spores close to this unit, and its correlation with the Mirkfell Ironstones containing *Cravenoceras cowlingense* farther south (Hudson, 1941; Wilson and Thompson, 1959), led Hull (1968) and subsequent authors (Mills and Hull, 1976) to regard the Lower Fell Top Limestone as basal Arnsbergian (E_{2a}) in age. While a similar age for the Corbridge Limestone is generally accepted (Ramsbottom, 1977b; Ramsbottom *et al.,* 1978; Mills and Holliday, 1998), suggestions of a slightly earlier E_1 age are implied by Holliday and Pattison (1990), who compared the Corbridge Limestone faunas with those of the Index Limestone of the Midland Valley Basin, and Johnson *et al.* (1995), who equated the Corbridge Limestone to a horizon a little below the Lower Fell Top Limestone in the Barton Borehole on the Alston Block.

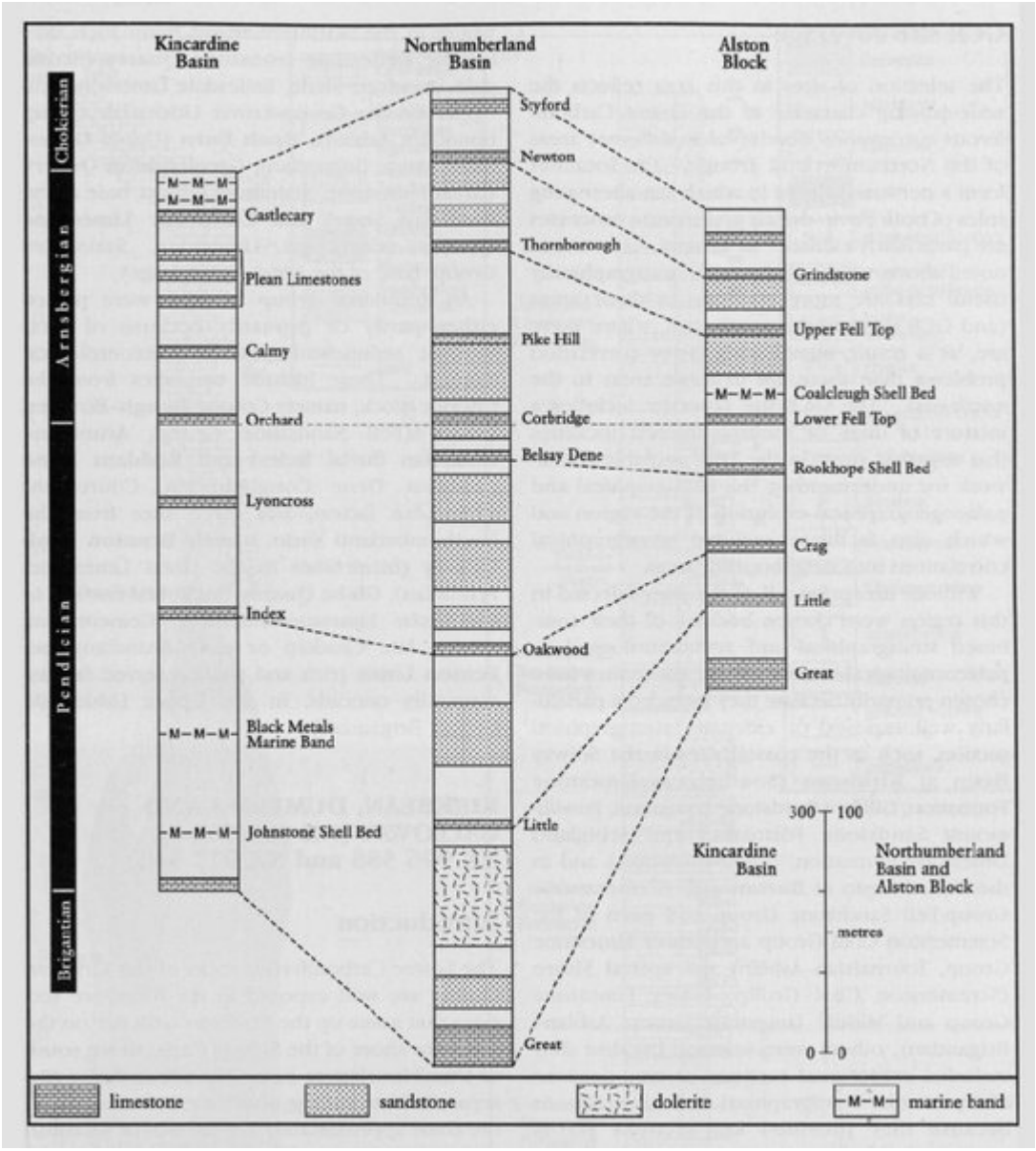
Conclusions

As the type locality of the Corbridge Limestone, the Corbridge Limestone Quarry GCR site provides a vital section for the definition of the Pendleian-Arnsbergian boundary within the Northumberland Basin, and for the correlations within the Stainmore Group throughout northern England. Uncertainties regarding the precise age and depositional environment of this distinctive marine interval serve to highlight the site's significant research potential, particularly in terms of biostratigraphy and sedimentology.

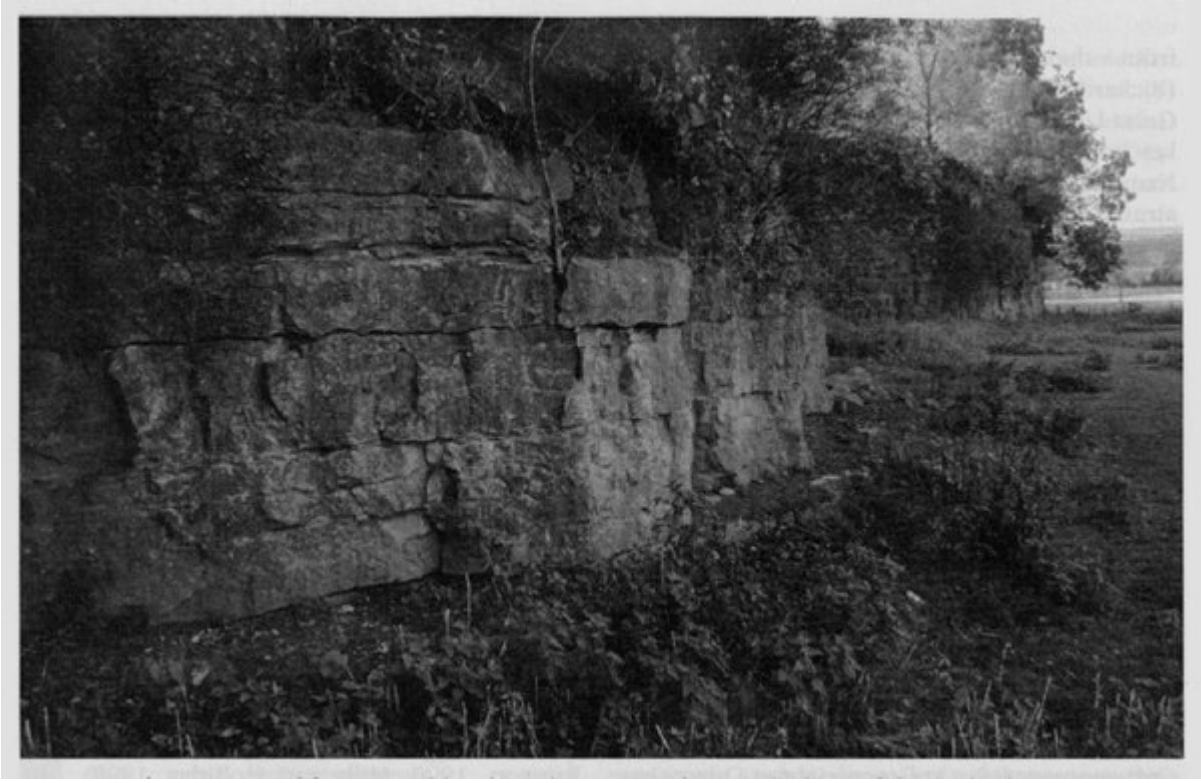
References



(Figure 3.3) Simplified Lower Carboniferous stratigraphical chart of the Northumberland Trough. Compilation based on information from Lumsden et al. (1967), Day (1970), George et al. (1976), Ramsbottom et al. (1978), Frost and Holliday (1980), Armstrong and Purnell (1987), Smith and Holliday (1991), Purnell (1992), British Geological Survey (1993a), Turner et al. (1993), Chadwick et al. (1995), Johnson et al. (1995) and Maguire et al. (1996). Note that the implied correlations between the lithostratigraphy and both the biostratigraphy and the chronostratigraphy remains uncertain in many areas. SL — Syringothyris Limestone Member; TS — Thirlstane Sandstone Member; BL — Bogside Limestone Member; MAI — Main Algal 1 Member; LA — Lower Antiquatonia Member; HA — Hillend Algal Member; Naworth BB — Naworth Bryozoa Band; NL — Naworth Limestone; PD — Plashetts Dun Limestone; PC — Piper's Cross Limestone; SB — Spirifer Band; WL — Watchlaw Limestone; Lst — Limestone; SSt — Sandstone; Mbr — Member; Fm — Formation. Conodont zones from Armstrong and Purnell (1987) and Purnell (1989, 1992). Not to scale.



(Figure 3.6) Correlation of lower Stainmore Group successions (Pendleian, E_1–Arnsbergian, E_2) between the Kincardine Basin, the Northumberland Basin and the Alston Block. After Ramsbottom et al. (1978).



(Figure 3.24) Exposure of fine-grained bioclastic limestones close to the base of the Corbridge Limestone at Corbridge Limestone Quarry (Photo: P.J. Cossey.)