School Share, North Yorkshire

[SD 844 623]

Introduction

The School Share GCR site is a stream section located in the bank of Black Gill Beck [SD 844 623] 2.5 km ESE of Settle. This site offers a unique section of the School Share Boulder Bed close to the base of the Upper Bowland Shales. Also recorded from this site, but regretfully no longer clearly visible, is the non-sequence between the Lower Bowland Shales (Brigantian, P_2) and the Upper Bowland Shales (Pendleian) marking the Dinantian–Namurian boundary. Situated in the transition zone between the Askrigg Block and the Craven Basin just 1.5 km south of the Middle Craven Fault, the existence of these features provides compelling evidence of a contemporaneous (late Brigantian–early Pendleian) phase of earth movements along the line of the Middle Craven Fault. The locality was first mentioned by Marr (1899) but the most detailed accounts of the site geology are by Garwood and Goodyear (1924) and Dixon and Hudson (1931). A more recent account is by Arthurton *et al.* (1988) and it is upon this work that the following account is largely based.

Description

At the base of the section, below the School Share Boulder Bed, Dixon and Hudson (1931) described two shale units separated by a sharp erosive contact (non-sequence) at beck-level. This included a lower unit (Lower Bowland Shales) comprising 2.4 m of dark, closely jointed shales with bunions containing the P_2 (Brigantian) goniatites *Lyrogoniatites* and *Sagittoceras* cf. *meslerianum*;and a higher unit (Upper Bowland Shales) consisting of 5.5 m of dark shales with small limestone clasts and bunions, but seemingly without joints or readily identifiable stratigraphically useful goniatites (Arthurton *et al.,* 1988). Currently the lower part of this succession (including the non-sequence) is obscured by weathered debris from the stream bank (Figure 5.23).

Overlying these units, the School Share Boulder Bed (*c.* 5 m) is a limestone debris bed containing angular blocks of medium- to dark-coloured oncoidal wackestone and crinoidal packstone loosely set in a pyritic mudstone matrix (Figure 5.23). An irregular erosion surface separates it from the underlying shales (Arthurton *et al.,* 1988). Garwood and Goodyear (1924) discovered a rich coral–brachiopod fauna in these boulders, including spiriferoids, gigantoproductids, cerioid lithostrotionids and *Orionastraea ensifer* (most probably the *Pleionastraea matura* of Nudds, 1999) and abundant *Girvanella* from some of the more nodular (oncoidal) limestone blocks. Together these features suggest that the blocks were derived from Brigantian (D_2) limestones of Yoredale facies in the Wensleydale Group (Arthurton *et al.,* 1988), which are most typically developed on the Askrigg Block area north of the Middle Craven Fault.

The Upper Bowland Shales above the debris bed comprise a further 5 m of the dark calcareous mudstone containing bullions and a Pendleian (E_{lb}) fauna that includes *Posidonia corrugata* and the diagnostic goniatite *Tumulites pseudobilinguis* (formerly *Eumorphoceras pseudobilingue*;see Arthurton *et al.,* 1988; Brandon *et al.,* 1998). Regrettably, the geometry and lateral continuity of beds recognized at this site cannot be established as parts of the section are badly weathered and disrupted by faulting (Garwood and Goodyear, 1924; British Geological Survey, 1989).

Interpretation

Sedimentological and palaeontological evidence indicates that at this site the Bowland Shales were deposited during late Dinantian and early Namurian times as a deep-water marine facies close to the contemporary southern margin of the Askrigg Block and within the transition zone of the Craven Fault System. However, a significant stratigraphical gap between the Lower Bowland Shales (P_2) at the base of the section and the Upper Bowland Shales (E_{1b}) at the top of the section is indicated by: the erosion surface (non-sequence) recognized by Dixon and Hudson (1931); the development of the School Share Boulder Bed and its associated erosion surface; and the apparent absence of early Pendleian (E_{1a}) strata. Although this stratigraphical gap represents a relatively 'small hiatus' within the School Share succession (Dixon

and Hudson, 1931), it is generally regarded as the local equivalent of the more extensive sub-Pendleian and basal Namurian unconformity that is recognized throughout the Craven District at the base of the Upper Bowland Shales (Hudson, 1930a; and see Settle GCR site report, this chapter).

The development of this unconformity and of the School Share Boulder Bed has been widely attributed to a period of 'mid-Carboniferous' or late Brigantian–early Pendleian earth movements which, in the Craven District, were centred mainly along the line of the Middle Craven Fault. This fault, arguably the most significant of the basin-margin faults active within the Craven Fault System at the end of the Viséan Epoch, profoundly influenced the character of Lower Carboniferous successions in the area — most notably in separating the shallow-water facies of the Askrigg Block to the north, from deeper-water facies in the Craven Basin to the south (Ramsbottom, 1974; Arthurton *et al.,* 1988; Kirby *et al.,* 2000; Mundy, 2000).

The formation of the School Share Boulder Bed was considered in detail by Dixon and Hudson (1931) who suggested a local origin for the boulders on account of their angularity, size, composition and unweathered appearance. These same authors concluded that the deposit was most probably the product of a subaqueous land-slip' emanating from an active submarine fault-scarp raised by earth movements at the end of Viséan times. Evidence of late Brigantian faulting and the occurrence of in-situ Wensleydale Group lithofacies similar to that seen in the boulders south of the Middle Craven Fault (Arthurton *et al.,* 1988; British Geological Survey, 1989) support the idea of an active submarine fault-scarp in the vicinity of School Share at this time. An alternative view put forward by Walker (1967) was that the slopes necessary for the generation of submarine debris slides in the vicinity of School Share were primarily the result of an extended late Viséan period of differential subsidence and sedimentation across the basin margin, during which carbonate shoals built up at the southern edge of the Askrigg Block which temporarily starved the Craven Basin of sediment. The present authors' view is that both contemporaneous faulting and differential subsidence/sedimentation were influential in the formation of the School Share Boulder Bed. More recently N. Riley (pers. comm., 2002) has interpreted the boulder bed and overlying disturbed shales as a submarine canyon fill.

Conclusions

The development of the School Share Boulder Bed and associated unconformity provides important evidence of a late Brigantian-early Pendleian episode of tectonic instabilty within the Craven Fault System. The occurrence of these features remains critical to our understanding of the tectono-sedimentary evolution of the transition zone between the Askrigg Block and the Craven Basin; one of the most complex areas of Lower Carboniferous geology in Britain.

References

(Figure 5.23) Outcrop of the School Share Boulder Bed (a submarine debris bed) in the Upper Rowland Shale Formation (Pendleian) at the School Share GCR site. (Photo: JNCC.)