Clints and Steelbarrow Quarries, Cumbria

[NY 006 123] and [NY 008 124]

Introduction

The large disused quarry complex at Clints [NY 008 124] and Steelbarrow [NY 006 123] Quarries, 1.5 km north of Egremont, exposes an Asbian (D_1) to Brigantian (D_2) sequence from the top of the Fifth Limestone and Fourth Shale to the Orebank Sandstone (Figure 4.3). At Steelbarrow, only the higher intervals of the Fourth Limestone (the Saccammina Limestone and Junceum Limestone) are well exposed. The succession overlaps with that at Yeathouse Quarry, but extends up into the Brigantian Stage and provides the best easily accessible exposures of this part of the Lower Carboniferous Subsystem in west Cumbria. Key elements of the site geology are described by Eastwood *et al.* (1931) and Thurlow (1996).

Description

The account that follows derives principally from the work of Thurlow (1996) who logged and described the Asbian part of the succession (White Limestone) and Eastwood *et al.* (1931) who described the higher Brigantian part of the succession. The section is dissected by a number of NNW–SSE-trending normal faults.

The White Limestone (*c.* 20 m) can be seen resting on the micaceous siltstones of the Fourth Shale in the entrance cutting to Clints Quarry. It is more clearly seen in the north face of the quarry where it consists of thickly bedded limestones interbedded with palaeosol clays, resting on the top karstified surface of the Fifth Limestone. One palaeosol clay in the middle of the succession is particularly thick and passes laterally into alternating bands of clay and limestone. The top of the White Limestone is also deeply karstified and contains a sandstone fill.

The Rough Limestone (14 m) is darker coloured and more bituminous than the White Limestone. The Spotted Limestone, so-called because of conspicuous darker spots in a paler 'matrix' (pseudobrecciation), is 6 m thick. The Potholes Limestone (6 m) has at its upper boundary a karstic surface with up to 2 m of relief; which gives it its name (Figure 4.16). The karstic pits are filled with sandstone and siltstone with a few plant fragments. Near the top of the Potholes Limestone, there is a horizon rich in corals, including *Orionastraea edmondsi, Corwenia rugosa* and *Nemistium edmondsi,* known as the 'Orionastraea Band'.

The Saccammina Limestone (6 m) is typically a grey crinoidal limestone characterized by the problematical organism *Saccaminopsis* scattered throughout its thickness. Close to the top of this limestone is the Erythrospongia Sponge Band, recorded throughout northern England at this level by Hudson (1929) and later traced into the west Cumbria district by Hudson and Edmonds (see Eastwood *et al.,* 1931). *Saccaminopsis* is also abundant in the overlying mottled shales which fill the potholed surface developed on the limestone. The Junceum Limestone (*c.* 16 m), named after the coral *Siphonodendron junceum* which occurs at a number of levels, is rather variable in colour and contains chert nodules and silicified fossils.

Higher beds of the Third Limestone (2 m) and the base of the Orebank Sandstone occur in the south-west corner of Clints Quarry, the former comprising grey crinoidal limestone with corals and brachiopods and the latter comprising pale-coloured quartz-rich sandstone (Johnson, 1992).

Interpretation

The Asbian–Brigantian stage boundary in west Cumbria is taken as the line of division between the top of the White Limestone and the base of the overlying Rough Limestone. Its position at this site is confirmed by the occurrence of the typical Asbian (D_l) brachiopod *Davidsonina septosa* in the White Limestone, and the typical Brigantian (D_2) faunas recorded from the Potholes Limestone (e.g. *O. edmondsi, N. edmondsi* and *C. rugosa*)in association with *Palastraea*

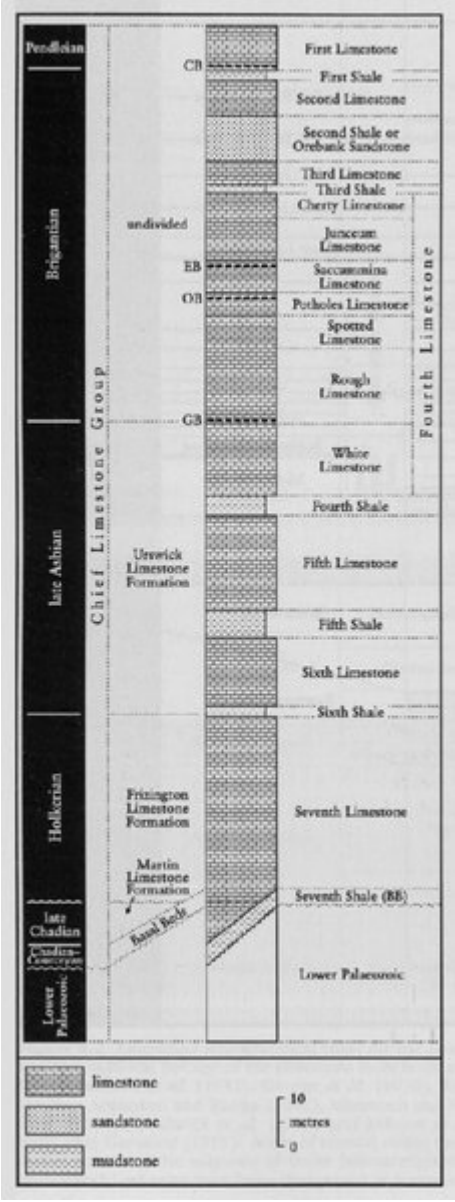
regia (Smith *et al.,* 1925; Eastwood *et al.,* 1931; *Mitchell et al.,* 1979). Just above this boundary, and at the base of the Rough Limestone, Smith *et al.* (1925) recorded the 'Girvanella Band' (= the Girvanella Nodular Bed of this volume), the typical lower Brigantian (D_2) marker bed.

As with other Asbian and Brigantian shelf deposits in the British Isles, the succession at this site is strongly cyclic, with episodes of shallow marine carbonate sedimentation punctuated by periods of subaerial exposure and the development of karstic surfaces. Some of these are overlain by clay palaeosols of probable bentonitic origin, but others are overlain by probable fluvial sands (e.g. at the top of the Potholes Limestone). In addition there are shales, such as that at the top of the Saccammina Limestone, which show evidence of a marine origin. The succession is thus intermediate in type between the carbonate shelf successions of south Cumbria and Derbyshire and the Yoredale-type mixed carbonate–clastic successions of the Askrigg and Alston blocks. The closest parallel is probably the Brigantian succession on Anglesey.

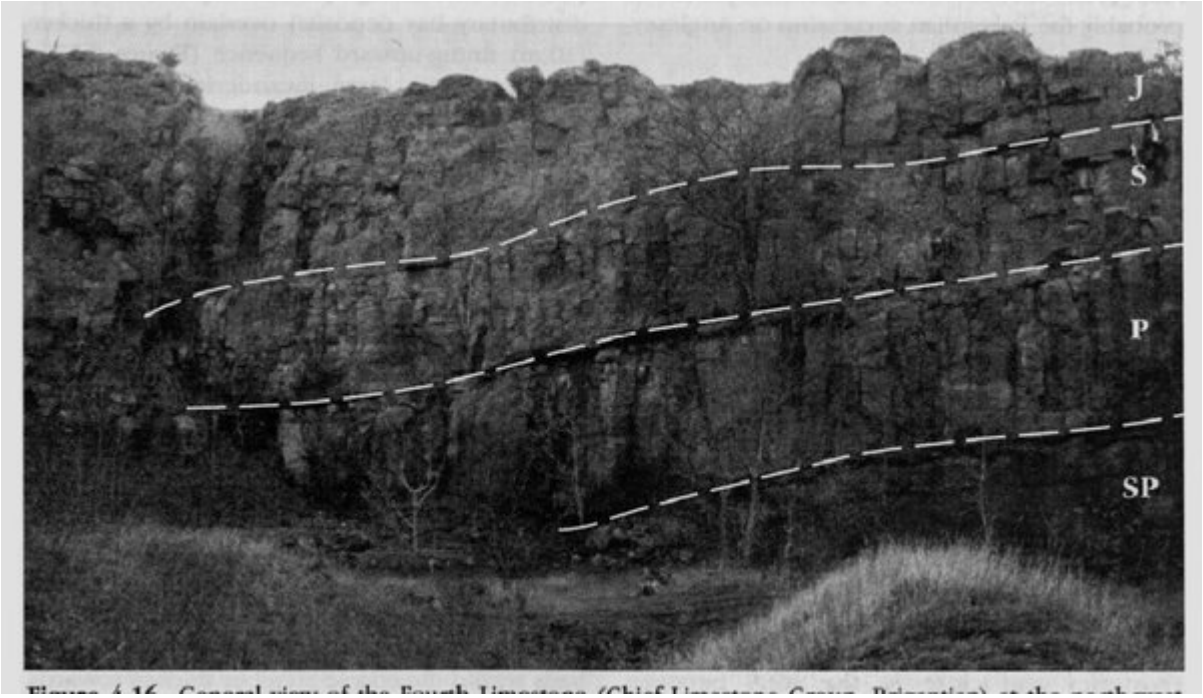
Conclusions

This site is the finest and most easily accessed Brigantian section in west Cumbria. It is particularly valuable for demonstrating the cyclicity of the limestones, with the palaeokarstic surfaces well developed and with strong relief. Its value also lies in the presence of marine and fluvial clastics which make the succession intermediate in style between Yoredale-type cycles and pure carbonate cycles.

References



(Figure 4.3) Stratigraphy of the Lower Carboniferous Chief Limestone Group in west Cumbria. (BB — Basement Beds; GB — Girvanella Band (= Girvanella Nodular Bed, see Clints and Steelbarrow Quarries GCR site report, this chapter); OB — Orionastraea Band; EB — Erythrospongia Band; CB — Chaetetes Band.) After Akhurst et al. (1997).



(Figure 4.16) General view of the Fourth Limestone (Chief Limestone Group, Brigantian) at the north-west corner of the Clints Quarry GCR site. The components of the succession, which are separated by dashed lines, are from the base up: the Spotted Limestone (SP), the Potholes Limestone (P), the Saccammina Limestone (S) and the Junceum Limestone (J). The height of the cliff face is approximately 17 m. (Photo: P.J. Cossey.)