
Crimsworth Dean

Highlights

Crimsworth Dean is the best site for demonstrating the progradation of the Kinderscout Delta across the eastern part of the Pennine Basin during the Kinderscoutian.

Introduction

Exposed along this stream near Hebden Bridge [SD 988 292]–[SD 994 325], 20 km west of Bradford, West Yorkshire, are sandstones and shales belonging to the Todmorden, Hebden Bridge and Kinderscout Grit formations. They are on the western margins of the Central Province, not far from the positive area known as the Rossendale Block. Fossils from here were recorded by Bisat and Hudson (1943) and the geology described by Wray *et al.* (1930), Stephens *et al.* (1953) and McCabe (1975, 1977).

Description

Lithostratigraphy

The sequence here is only incompletely exposed and is disrupted by small faults, but is probably about 200 m thick. The faulting has caused some confusion as to the exact sequence and the identity of some of the sandstone units, particularly towards the top of the section. The most recent analysis of the field evidence is by McCabe (1975), and his conclusions form the basis of the following summary.

The lower part of the section belongs to the Todmorden Formation and consists mainly of shales with a single sandstone in the upper part known as the Todmorden Grit; the latter is thought to be the equivalent of the Caley Crag Grit of Wharfedale (Ramsbottom, 1977). They are believed to represent deep water, basinal muds together with a turbiditic sandstone (McCabe, 1975), and thus compare with the Edale Shales and Mam Tor formations in the Edale Gulf (see accounts of River Noe and Mam Tor earlier in this chapter).

The Todmorden Grit is overlain by an interval of shales and siltstones, thought by McCabe to be delta slope deposits, and thus similar to the Grindslow Shales Formation of the Edale Basin. These are in turn overlain by thick sandstones of the Kinderscout Grit Formation. As elsewhere, the latter is divided into two distinct leaves, separated by shales, in this case c.30 m thick.

Biostratigraphy

Only marine animal fossils have been reported from here. Three marine bands have been identified in the Todmorden Formation, below the grit (Bisat and Hudson, 1943). They all contain essentially similar assemblages, dominated by *Reticuloceras reticulatum* (Phillips) and *Vallites striolatum* (Phillips). The uppermost band, from just below the Todmorden Grit, yields *Hudsonoceras ornatum* (Ford and Crick).

The Hebden Bridge Formation includes only one marine band, although the fine preservation of the fossils in limestone bullions in the lower part of the band makes it of some interest. The goniatites identified from here include *Reticuloceras reticulatum* (Phillips) and *Vallites striolatum* (Phillips), and probably belong to the upper part of the *R. reticulatum* Zone.

In the shales separating the two sandstone members of the Kinderscout Grit Formation, Stephens *et al.* (1953) report *Reticuloceras coreticulatum* Bisat, indicating the topmost subzone of the Kinderscoutian.

Interpretation

This is the best exposure for demonstrating the progradation of the Kinderscout Delta over the eastern part of the Central Province. It can be compared with the sequence of sites demonstrating the same event in the Edale Gulf (River Noe, Mam Tor, Blackden Brook, Alport Castles), where the same transition from basinal deposits, through turbidites and delta slope deposits to delta top deposits can be observed. The fact that the sequence can be observed at a single site, rather than having to be pieced together from four geographically separated locations, gives Crimsworth Dean some advantage. Also, the latter has rather better biostratigraphical control, particularly in the upper part of the section. However, exposure is never as good as in the Edale sites, and the problem of faulting makes it difficult to be certain that the sequence has been correctly reconstructed. Nevertheless, it is of considerable interest to be able to demonstrate that the delta evolved in the same way at the same time over relatively wide areas of the Pennine Basin.

Conclusions

Crimsworth Dean is an important exposure of part of the Millstone Grit in Yorkshire. It is one of the few places where the whole history of the progressive migration of the Kinderscout Delta over the area about 314 million years ago can be charted at a single locality.

References