Bonhay Road Cutting

Highlights

Bonhay Road Cutting is the best available exposure of deeper water deposits of the Crackington Formation. It has several ammonoid-bearing horizons, including some not found in the coastal exposures.

Introduction

This cutting on the east side of Bonhay Road, overlooking the River Exe, Exeter, Devon [SX 914 926] is one of the best inland exposures of the Crackington Formation, with numerous horizons yielding ammonoids. The strata are overturned and steeply dipping, and faulting causes some repetition of the sequence. The site has been studied by Butcher and Hodson (1960) and Grainger (1983).

Description

Lithostratigraphy

Exposed here are a series of cycles of shales and subsidiary sandstones. Typically, a cycle comprises of 20 cm of sandstone with scour and load structures at the base, grading up through 10 cm of finely laminated siltstone to 35 cm of dark shale. The sediments are very iron-rich, and there are ironstone nodules in the shales. The sedimentology suggests that the sequence represents distal turbidite deposits.

The mineralogy of the clays was studied by Grainger (1983), who showed that their illite crystalinity reflects a high diagenetic grade. Chlorite and illite were found in all samples, but kaolinite and vermiculite were only spasmodically present. Elsewhere in the Crackington Formation, a broad correlation has been reported between the pattern of clay mineral distribution and stratigraphy (Grainger and Witte, 1981), but this is not evident at Bonhay Road Cutting.

Biostratigraphy

Butcher and Hodson (1960) record ammonoids in ironstone nodules found here. These belong to the *Hudsonoceras proteus* and *Homoceras undulatum* zones (Alportian) and the *Reticuloceras circumplicatile* Zone (Kinderscoutian). There is also possible evidence of Arnsbergian ammonoids.

Interpretation

The presence of several ammonoid-bearing horizons makes this section of prime importance, allowing a direct correlation with the more extensive sections along the north Cornwall coast. Of particular significance is the presence of Alportian assemblages, only poorly represented at Crackington (see above).

In contrast to the sequences exposed further west on the coast, sandstones are a less prominent part of this succession, and it is likely that they deposited in deeper water conditions. This agrees with the palaeoenvironmental reconstruction provided by Thomas (1982, fig. 3.6), which places Exeter near the centre of the Culm Trough in the Late Carboniferous.

Conclusions

Bonhay Road Cutting is the best available exposure of fine-grained rocks of the Crackington Formation. They represent deep water muds, deposited between 320 and 318 million years ago, in an elongate marine basin that extended approximately east–west across from south-western Britain into northern France and Germany (the 'CuIm Trough'). At several levels in the exposed succession are beds with abundant marine fossils, including the remains of animals known

as ammonoids that have proved of great value in establishing detailed correlations with other exposed sequences of this age.

References