
Heys Britannia Quarries

Highlights

Heys Britannia Quarries are the best available exposures in the Haslingden Flags, a unique development in the Millstone Grit of the Central Province, having been formed in a birdfoot-type delta.

Introduction

These extensive workings, 3 km south of Bacup, Lancashire [SD 872 202], are in the upper part of the Haslingden Flags, a major sandstone unit in the upper Namurian of the Craven Basin. The geology of the site is discussed by Collinson and Banks (1975) and Bristow (1988), and trace fossils from here are dealt with by Hardy (1970a, 1970b) and Eagar *et al.* (1985).

Description

The exposed sequence here is in the upper member of the Haslingden Flags Formation, and consists mainly of fine-grained sandstones. A distinctive feature of these strata, which is well displayed here, is the large sets of inclined-bedding, in excess of 25 m thick. The inclined beds are at a very low angle for sets of this size (dip 14° or less), and often show ripple laminations. The base of the sets is not well seen here, but in nearby quarries it has been shown that they could sometimes be non-erosional. Collinson and Banks (1975) compared them with the 'epsilon'-style cross-bedding of Allen (1963), and interpreted here as lateral accretion surfaces in deep channels. Subsequently however, Bristow (1988) argued that they are part of a synsedimentary growth faults.

The site is also particularly good for trace fossils (Hardy, 1970a, 1970b; Collinson and Banks, 1975; Eagar *et al.*, 1985). The most common are the escape shafts and resting burrows of the bivalve *Carbonicola*, and usually referred to as *Pelecypodichnus*. They are associated with sinuous trails known as *Cochlichnus*, thought to have been produced by annelid worms attracted to the decaying corpses of dead bivalves. Finally, there are traces produced by limulids such as *Belinurus* or *Euproops*; these include rows of resting places known as *Limulicubichnus rossendalensis* (Hardy), for which this is the type locality, and walking tracks with a clear groove produced by the telson (*Koupbichnium aff. variabilis* (Linck)). Eagar *et al.* (1985) argue that such an assemblage indicates shallow non-marine conditions, possibly with periodic intervals of emergence.

No body fossils have been reported from this site. However, in a nearby borehole, Collinson and Banks (1975) report the presence of the Cumbriense Marine Band immediately below these sandstones, which are thus upper Yeadonian.

Interpretation

This is the best available exposure of the Haslingden Flags, a unique development of deltaic strata in the Millstone Grit of the Central Province. There are other outcrops, such as Closebrow Quarry, but nowhere else can the distinctive sedimentological features of this unit be seen. These include the large-scale, low-angle cross-bedding, the relatively fine grain of the sandstones, and the internal ripple lamination. Collinson (1988) argued that they represent the mouth bars of an elongate birdfoot delta, similar to that seen in the present-day Mississippi. If correctly interpreted, the Haslingden Flags would be the only known example of this kind of delta to have been so far recognized in the Millstone Grit of the Central Province. Alternatively, Bristow (1988) has argued that the elongate form of the Haslingden Flags sandstone bodies merely reflects its deposition in a tectonically controlled half graben.

This is also one of the best localities for non-marine trace fossils in the British Millstone Grit. As pointed out by Eagar *et al.* (1985), *Pelecypodichnus*-type bivalve escape shafts do not necessarily indicate non-marine conditions. However, those found in the Haslingden Flags are of a similar order of size to those found in the non-marine Westphalian. The

occurrence of a series of limulid resting marks in a line is thought to indicate the periodic emergence of the sediment from the water; Eagar *et al.* suggest that they were produced by the animal floundering, as it was lifted by the returning water, after it had been stranded on the sediment surface. The fact that it is associated with non-marine type *Pelecypodichnus* is thought to suggest that they were formed by the non-marine *Belinurus* or *Euproops*, rather than by the marine *Limulus*.

Conclusions

Heys Britannia Quarries are the best exposures of a suite of rocks, just over about 316 million years old, known as the Haslingden Flags. They represent deposits formed in an elongate, birdfoot-type delta, similar to those seen in the present-day Mississippi delta-complex.

References