
Pot Bank Quarry

Highlights

Pot Bank Quarry is the best available exposure of quartzitic sandstones, typical of the lower and middle Millstone Grit Group of the Staffordshire Basin. It also yields important fossil assemblages, and has included the types of some important Chokierian and Alportian species.

Introduction

This is a disused quarry [SJ 869 593] 1 km north of Mow Cop, about midway between Stoke on Trent and Congleton, Cheshire. Exposed here are mudstones and sandstones of the lower Millstone Grit, at the northern end of the Staffordshire Basin. Fossils have been described from here by Hind (1910, 1914), Bisat (1924) and Neves (1961), while the geology is described by Evans *et al.* (1968).

Description

Lithostratigraphy

About 25 m of strata are exposed here. The upper and lower parts of the sequence are dominated by argillaceous lithologies. They partly consist of marine mudstones with fossils (see below). Mostly, however, they have carbonaceous streaks and ironstone nodules, and at one point include a palaeosol. There are also ganisters, which were worked here. These argillaceous deposits indicate mainly littoral and even emergent conditions.

The middle of the sequence is dominated by sandstones, and belongs to the Lum Edge Sandstone Formation. They are characteristically fine-grained, quartzitic sandstones, with parallel-bedding as the main sedimentary structure (Figure 9.6). They often contain plant fragments, and at one point include stigmarian rooting structures. These are thought to represent deltaic sediments derived from the Wales–Brabant Barrier to the south, although palaeocurrent evidence at Pot Bank Quarry itself is equivocal.

Biostratigraphy

Marine bands

The shales immediately below the Lum Edge Sandstone have yielded an unusual assemblage of fossils for this stratigraphical level, representing a shallow-water, marine fauna. It includes the brachiopod *Rugosochonetes hindi* Muir-Wood, for which this is the type locality. It probably belongs to the upper part of the *Homoceras beyrichianum* Zone, but there are no diagnostic species to confirm this.

About 5 m above the sandstone is a second marine band. Evans *et al.*, (1968) list a diverse assemblage of crinoid fragments, brachiopods, bivalves, gastropods, and the goniatite *Homoceras smithi* (Brown) and *Hudsonoceras proteum* (Brown). These ammonoids are indicative of the lower Alportian Proteum Marine Band.

Hind (1914) described some ammonoids from here as *Pericyclus divaricatus*, but which Ramsbottom (1958) later renamed as *Homoceras undulatum*. This would suggest a level in the middle Alportian, and thus higher stratigraphically than the marine band mentioned in the previous paragraph. However, no such marine band is exposed today.

Palynology

The palynology of the marine shales yielding *H. proteus* (Brown) was studied by Neves (1961). Several new species were described from here: *Acanthotriletes baculatus*, *Neoraistrickia inconstant*, *Mooresporites trigallerus*, *Dictyotriletes*

tuberosus and *Proprisporites laevigatus*. Some of these (*A. baculatus*, *M. trigallerus*, *D. tuberosus*) were only found in marine shales, and were thought to represent a quite different vegetational community to that represented in the coals. The assemblage belongs to what is now known as the *L. subtriquetra*–*Kornatus* Zone.

Interpretation

This is the best exposure of the upper Chokierian and lower Alportian in the Staffordshire Basin. A similar section is shown in the Alportian stratotype at Blake Brook, but exposure is considerably better here, and the Alportian part of the sequence is less condensed. Pot Bank Quarry also seems to yield a more diverse assemblage of animal macrofossils, although the Blake Brook assemblage has yet to be described in detail. On the other hand, no conodonts have been reported from Pot Bank Quarry, nor does it show the upper part of the Alportian stage.

A feature particularly well seen here is the nature of the sandstones, which are southerly derived quartzites, known locally as 'crowstones'. This is typical of the lower and middle Namurian of both the Staffordshire Basin and the Widmerpool Gulf (Falcon and Kent, 1960; Collinson, 1988), and contrasts with the northerly derived feldspathic sandstones of the Pennine and Craven basins (i.e. the classic 'Millstone Grit'). The Staffordshire sandstones are thought to represent small-scale deltaic or turbiditic deposits derived from the Wales–Brabant Barrier (Holdsworth, 1963; Bolton, 1978). Unlike the feldspathic deposits, which were probably derived from the extensive Caledonian Highlands, the deltas spreading out from the much smaller Wales–Brabant Barrier were never able to fill the basin. Thus, until the late Kinderscoutian to early Marsdenian, sedimentation in most of the Staffordshire Basin and Widmerpool Gulf tended to be dominated by mudstones, with only relatively small-scale arenaceous intercalations. At least near Congleton, however, the mudstones are not basinal, but frequently reflect littoral or emergent conditions, which according to Hodson (1959) is a result of the close proximity of the Wales–Brabant Barrier.

Conclusions

Pot Bank Quarry is the best site for seeing the type of sandstone, known locally as crowstone, that characterizes the lower and middle Millstone Grit in Staffordshire. They represent sands deposited in the delta of a river flowing from the south, about 320 million years ago, that brought sediment down from an upland area that extended across parts of the English Midlands (the so-called Wales–Brabant Barrier). They are different in composition from the same-aged rocks found further north in Yorkshire and Lancashire, which are probably the remains of sands deposited by southerly-flowing rivers, and derived from the Caledonian Highlands in northern Scotland.

[References](#)



(Figure 9.6) Proteus Marine Band and underlying quartzitic sandstones of the lower Millstone Grit of the Staffordshire Basin at Pot Bank Quarry. Reproduced by permission of the Director, British Geological Survey: NERC copyright reserved (L247).