Brocton Quarry, Cannock Chase, Staffordshire

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Introduction

Brocton Quarry provides excellent three-dimensional exposures of the Cannock Chase Formation. These texturally mature conglomerates are arranged in laterally continuous sheets that show large-scale cross-stratification, but are more usually internally structureless. The gravels are interpreted as the deposits of a braided river system that flowed to the north-east.

Brief accounts of the Triassic sediments in Brocton Quarry have been given by Stevenson and Mitchell (1955), Haim and Horton (1969), Steel and Thompson (1983), and Rees and Wilson (1998, pp. 77–9, 82).

Description

Brocton Quarry, a disused gravel and sand pit, is located in the north-western corner of Cannock Chase. The quarry has two main faces, which are at right angles to each other, and provide a three-dimensional exposure of the sediments and sedimentary structures. The face trending north-west to south-east is approximately 250 m long and reaches a maximum height of 30 m. The other face is some 100 m long and 10 m high. The faces are vertical towards the top and have talus slopes, planted with trees, at the base.

The sediments at Brocton Quarry are dominated by conglomerates, with subordinate sandstones and mudstones (Figure 3.52), and are similar to those in the Hulme quarries (see GCR site report, above). The lithologies seen at Brocton have been classified into lithofacies by Steel and Thompson (1983).

The conglomerates at Brocton Quarry are texturally mature. They form large, laterally continuous sheets, which at the base of the section have little internal structure. However, farther up the succession, well-developed cross-stratification is visible. Two lithofacies are recognized. Facies A is a clast- or matrix-supported conglomerate characterized by horizontal stratification. Clasts generally range in size from 50 to 100 mm, although larger cobbles with a diameter of around 200 mm are present. The surfaces of the clasts are often pitted, and have siliceous rims at contact points. Imbrication of the elongate clasts is common. Clasts in lithofacies A consist of quartzites, vein quartz, sandstones, cherts, rhyolites, agates, and rhyolitic tuffs (Steel and Thompson, 1983). Some of the pebbles have yielded Silurian and Carboniferous fossils. Facies B conglomerates typically preserve well-developed cross-bedded sets that may be up to 2 m thick, and persist laterally over many tens of metres. In many cases individual sets are grouped to form units approximately 8 m thick. Sandstone units are interbedded, and often form the toesets of the conglomerates.

The subordinate finer-grained lithologies at Brocton are classified as facies C, D, and E, following the scheme of Steel and Thompson (1983). These include thin sheet sandstones (Facies C) that are often associated with the rudaceous units. The lower surfaces of these sandstones are sharp and the upper surfaces commonly show evidence of erosion; internal structures include tabular cross-bedding. Fine-grained silty or clayey sandstones (Facies D) occur as thin sheets associated with the conglomerates. Facies E consists of 1-m-thick units of interbedded red micaceous shale, clayey siltstone, and very fine-grained sandstone. Pebble-filled gutter casts are known from this lithofacies, and the crustacean *Euestheria* cf. *minuta* has been noted in the mudstones.

Palaeocurrent measurements from the small tabular cross-beds of Facies C indicate flow directions predominantly towards the north, as in the Hulme quarries (see GCR site report for 'Hulme Quarry', this volume).

Interpretation

The sediments of the Cannock Chase Formation in Brocton Quarry represent deposition under predominantly fluvial conditions in the major northwards-flowing 'Budleighensis River' system (Figure 3.50).

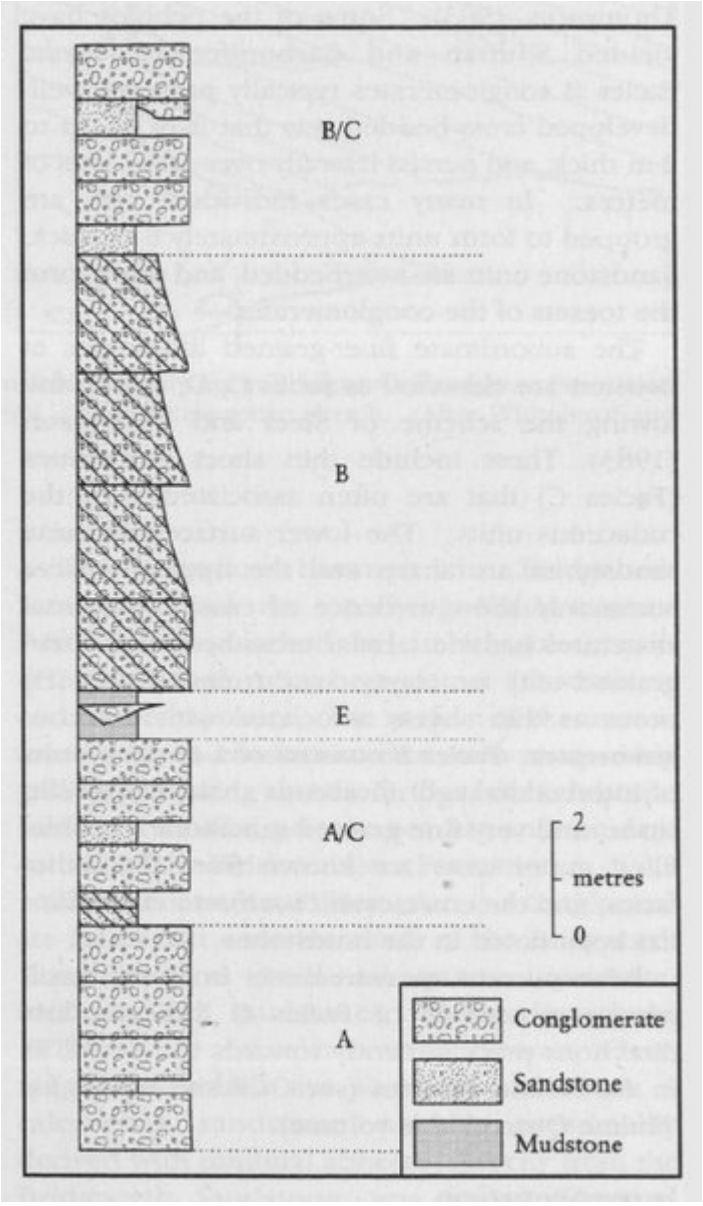
Lithofacies A reflects deposition in a high-energy regime, with high levels of sediment input, probably in a braided river system. The cross-bedded units of facies B are characteristic of the accumulation of sediments on river bars.

The finer-grained components of the sedimentary sequence reflect lower-energy conditions. The sandstones of lithofacies C and D were deposited during low flow conditions, or perhaps in the sheltered lee of large bedforms. The finest sediments (facies E) were deposited from suspension in quiet pools and abandoned channels.

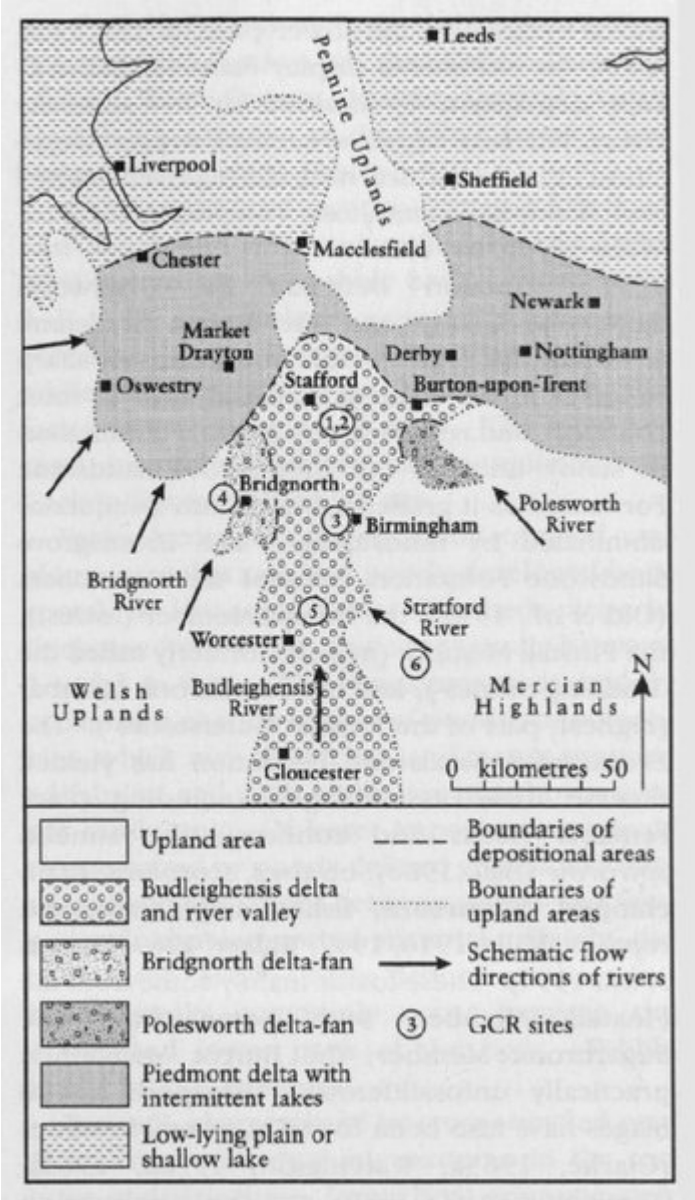
Conclusions

The faces in Brocton Quarry display the Cannock Chase Formation sediments in three dimensions. The sediments, including conglomerates, sandstones, and silty-mudstones, represent deposition in a complex braided river system that brought sediment from upland areas farther south. Brocton Quarry is complementary to the Hulme quarries in that it provides excellent three-dimensional exposures of the sandy and conglomeratic bedforms, essential for adequate sedimentological study and the interpretation of palaeoenvironments and aspects of Early Triassic palaeogeography.

References



(Figure 3.52) Sedimentary log recorded at Brocton Quarry, showing the lithofacies A, B, C and E in the Cannock Chase Formation, as defined by Steel and Thompson (1983).



(Figure 3.50) Early Triassic palaeogeography of Central England, showing postulated major river systems, based on palaeocurrent measurements and studies of clast provenance. 1, Hulme Quarry; 2. Brockton Quarry; 3, Wollaston Ridge; 4, Claverley Road Cutting; 5, Burcot; 6, Shrewley (After Wills, 1948.)