
Stenkrith Beck, Cumbria

[NY 773 075]

Introduction

Stenkrith Beck is the type locality for the highest of the Permian brockrams, the Stenkrith Brockram. At this locality; these beds are overlain by the alternating red sandstones and shales of the St Bees Sandstone Formation (Triassic in age). This outcrop, near the southern margin of the Vale of Eden Basin (Figure 2.21), is in an area dominated by alluvial fan breccias (brockrams) and fluvial sands. The brockram is probably the lateral equivalent of the Belah Dolomite and D-bed gypsum-anhydrite farther north. The Stenkrith Brockram is made up of sheet-like units of breccia with angular to rounded limestone clasts. Trough cross-bedding indicates transport to the north. This is an important locality for the examination of the coarse fan-sediments of the Permian System.

Details of the sedimentology of localities close to Stenkrith Beck and the River Eden have been given by Sedgwick (1832), Binney (1855), Harkness (1862), Burgess (1965), Macchi and Meadows (1987, pp. 73–5), and Macchi (1990).

Description

The Upper Permian Stenkrith Brockram is exposed at several sites, generally in stream banks and small gorges, around Kirkby Stephen and Stenkrith. These localities include High Stenkrith [NY 771 073], Stenkrith Park [NY 775 075], and the banks of the River Eden. The Permo-Triassic rocks of this area occupy a small, approximately north–south-trending, syncline (Burgess, 1965).

The Stenkrith Brockram is approximately 19 m thick and comprises a series of laterally persistent sheets of rudaceous material, which vary from less than 0.1 m up to 1 m in thickness. The breccias are clast-supported and composed of large (0.3 m in diameter) clasts of yellowish Carboniferous Limestone, all sourced from the local area, and rarer clasts of reddish sandstone and chert. The matrix consists of red, well-rounded silty grains derived from the Penrith Sandstone.

Although the majority of the beds are traceable over 500 m or more (Figure 2.26), a few wedge out over as little as 10 m; in many cases this is associated with local developments of scours and other evidence of erosion. Most of the beds are characterized by parallel bedding, although examples of low-angle trough cross-bedding occur; some beds show crudely defined graded bedding, and sequences of beds may also show a fining-upwards series. Imbrication and parallel alignment of the clasts is common (Macchi and Meadows, 1987).

The Stenkrith Brockram passes laterally into reddish and grey mudstones and sandstones, more typical of the Eden Shales (Macchi and Meadows, 1987). Occasional thin beds of micaceous sandstone are found throughout the sequence, and become more common towards the top, where there is a passage upwards into the St Bees Sandstone Formation. Grains of well-rounded quartz similar to those found in the Penrith Sandstone have been recovered from one of these sandstone units towards the base of the Eden Shales (Burgess, 1965). In the Stenkrith area the shales have a maximum thickness of approximately 3 m. However, most of the sections through the Permian sediments in the Vale of Eden show thicknesses of at least 15 m, overlying a thin brockram (Burgess, 1965).

Interpretation

The Stenkrith Brockram was deposited in alluvial fans and as wadi deposits close to the margins of the Vale of Eden Basin (Waugh, 1970b), having been derived from the areas of high ground bordering the basin to the south and south-west.

The Eden Shales, generally characterized by reddish or grey, fine-grained mudstones, siltstones and sandstones, were deposited under lacustrine and coastal sabkha-type conditions (Arthurton *et al.*, 1978; Macchi and Meadows, 1987). At

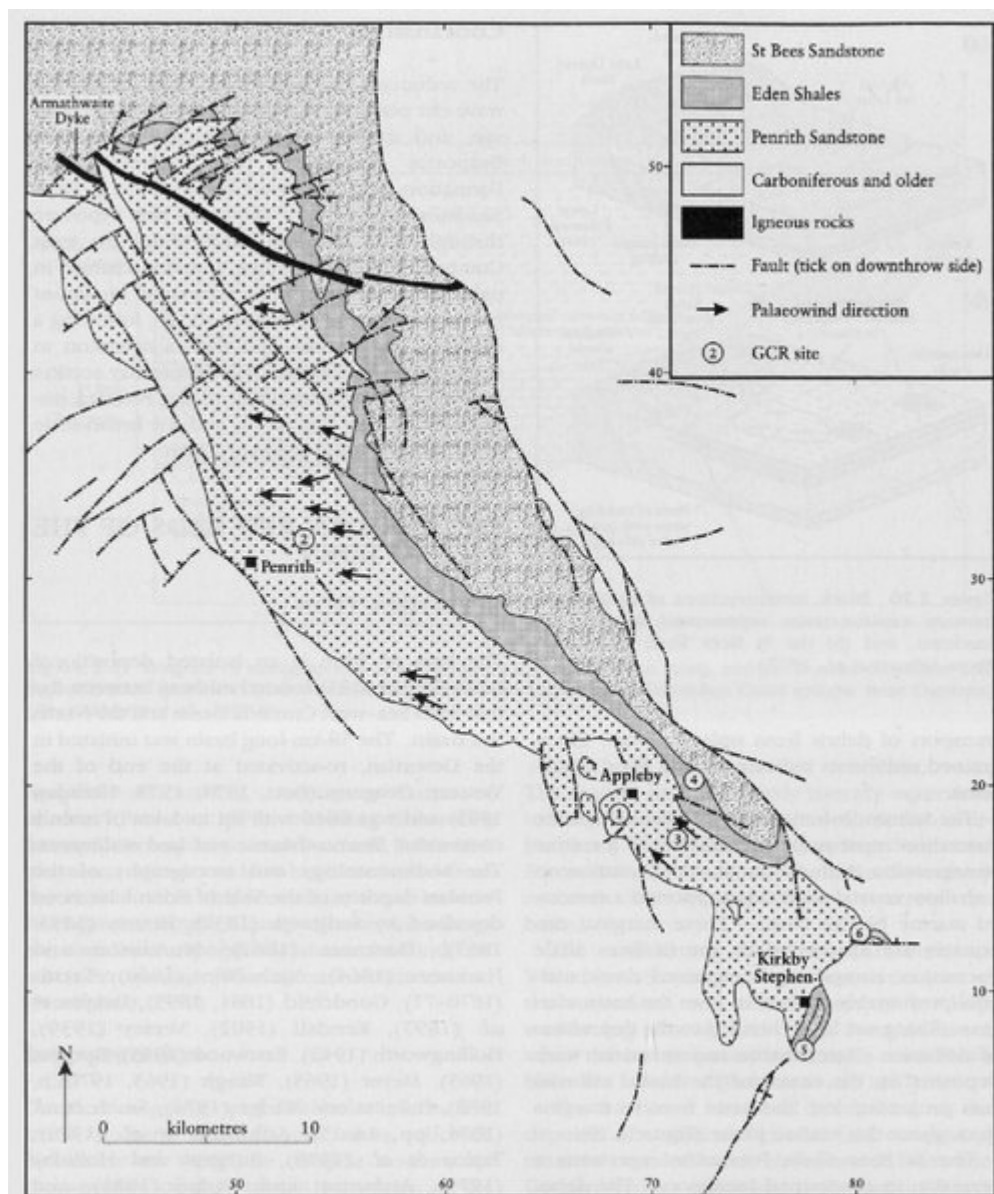
Stenkrith, the locally occurring Stenkrith Brockram interdigitates with the Eden Shales (Figure 2.22) and hence it is younger than the other brockrams seen in the Vale of Eden Basin, which lie below the Belah Dolomite level or are equivalent in age to the Penrith Sandstone.

Lithostratigraphical evidence from this site indicates that the Stenkrith Brockram is equivalent in age to, or younger than, the Belah Dolomite, and hence probably also equivalent in age to the D-bed gypsum-anhydrite farther north in the basin (Figure 2.22).

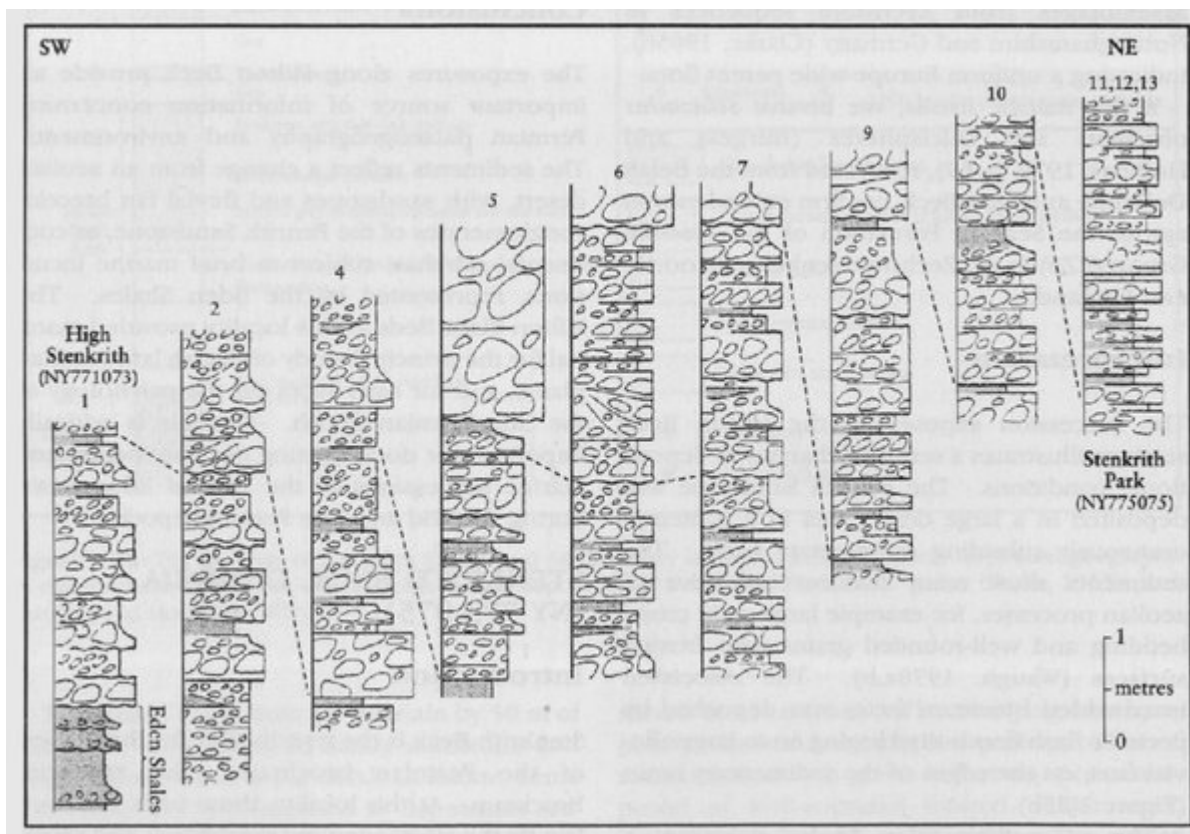
Conclusions

Stenkrith Beck, the type locality for the Stenkrith Brockram, is a regionally and nationally important site for understanding the Permian palaeogeography of north-west England. The sections expose excellent examples of the deposits of fluvial fans that reflect active erosion around the margins of the Vale of Eden Basin until late in the Permian Period, and of contemporary sabkha environments.

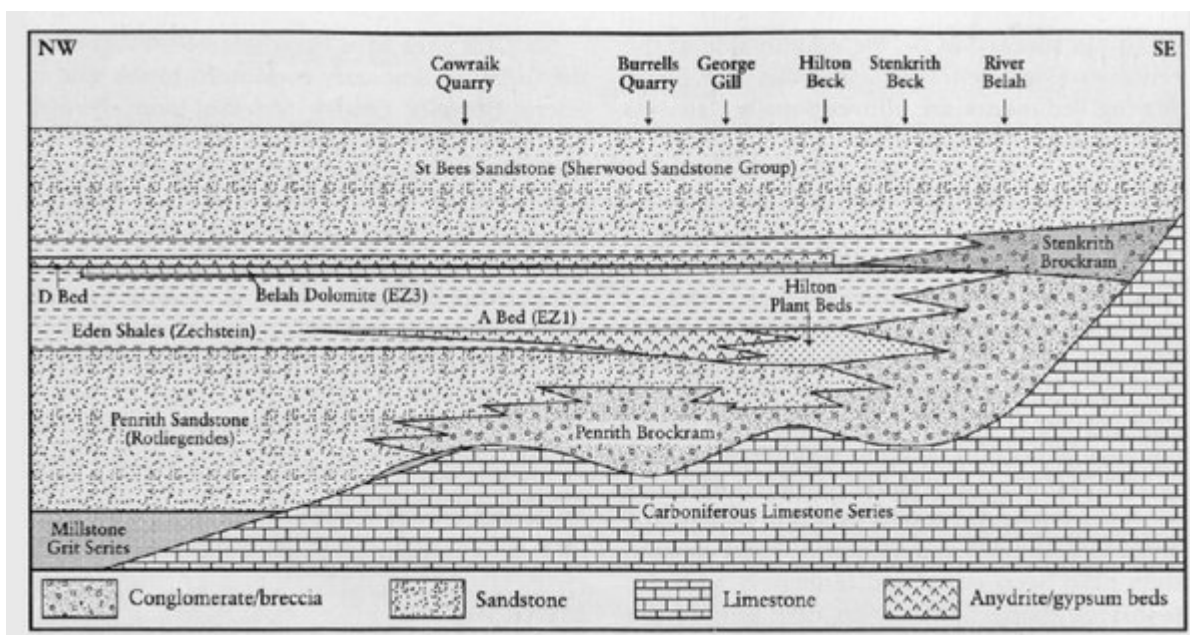
References



(Figure 2.21) Simplified geological map of the Vale of Eden and the surrounding area, including palaeowind directions for the Penrith Sandstone. GCR localities are: (1) Burrells Quarry; (2) Cowraik Quarry; (3) George Gill; (4) Hilton Beck; (5) Stenkrith Beck; (6) River Belah. Based on Waugh (1970b), Burgess and Holliday (1974), and Younger and Milne (1997).



(Figure 2.26) The Stenkrith Brockram, recorded in a series of logs from High Stenkrith to Stenkrith Park, along Stenkrith Beck. (After Macchi and Meadows, 1987.)



(Figure 2.22) Diagrammatic NW-SE section through the Vale of Eden basin, showing the Permian succession. The section is about 55 km long. (After Arthurton et al., 1978.)