Ross-on-Wye, Royal Hotel, Herefordshire

[SO 597 241]–[SO 595 239]

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Introduction

This site along Wilton Road, Ross-on-Wye (Figure 5.41) contains easily accessible, roadside cliff exposures of the Brownstones Formation, which forms the highest part of the Lower Old Red Sandstone magnafacies of south Wales and the Welsh Borderland. There are more extensive, but less accessible sections in nearby road cuttings on the A40 at Glewstone [SO 567 223] and the A449 [SO 598 252]; this site comprises an almost continuously exposed, 300 m-long section in which the architecture of the sand bodies can be easily seen. The Brownstones here are pebbly, cross-bedded sandstones, which formed in an alluvial, low-sinuosity, braided river system. The section has facilitated a reconstruction of bar morphologies, river channel sizes and palaeocurrent directions, and demonstrates the vertical stacking of the facies. The architecture of the stacked sand-bodies, representing in-channel bars and dunes, is typical of the eastern outcrops of the Brownstones Formation and contrasts with those farther west in south-central Wales, in which unconfined sheet sandstones are more typical. The sedimentological study of this site and the nearby road cuttings by J.R.L. Allen (1983a), and that of the beds between the Townsend and Pickard Bay Tuff beds in Pembrokeshire by Allen and Williams (1982) are the most detailed analyses of fluvial architecture carried out in the Anglo-Welsh Basin.

Description

Allen (1971, 1974b, 1978a, 1980, 1983a,b) provided detailed descriptions and illustrations of the section ((Figure 5.42)a,b). Smith (1980) provided a summary. The following description is based largely on Allen's work. The cliff section exposes about 25 m of beds over a distance of about 300 m. They lie in the upper part of the Brownstones Formation and dip gently to the SSE. The beds comprise mainly red-brown, fine-to coarse-grained, locally gravelly, cross-bedded, lenticular sandbodies, grouped into multi-storey complexes in which a hierarchical structure is defined by erosion surfaces. At the north-east end of the site, near the entrance to the Royal Hotel, a near-dip section shows cross-bedded, coarse-grained sandstones and pebbly, conglomeratic sandstones arranged in sets about 0.3–0.5 m thick, with foresets directed consistently to the south-west. There are also some parallel-laminated, fine- to medium-grained sandstones, many being the topsets of the cross-bedding foresets. Towards the south-west of the site, a near-strike section shows similar cross-bedded, pebbly sandstones and parallel-laminated sandstone bodies that have less consistent palaeocurrent directions (Figure 5.43). Parallel-laminated units extend laterally for up to 45 m. Most of the sandbodies rest on erosion surfaces and the pebbles include exotic types, as well as intraformational calcrete, mudstone and siltstone clasts, some of which are calcified, and a few of which are up to cobble or boulder size.

The exotic pebbles are mainly vein quartz, quartzite, cataclasite, jasper, acid lava, fine-grained green to red and yellow sandstones (?Lower Old Red Sandstone), a few with ?Silurian brachiopods, fine- to coarse-grained ?Silurian greywackes, pink sandstones with a Llandovery fauna and dark grey to black, fine-grained, acid lavas and tuffs with a mid-Ordovician shelly fauna, chert and 'oolite'. A detailed analysis of the pebbles is given by Allen (1974b).

Interpretation

Allen (1971) compared the rocks to those of modern sand-bed streams. He later (Allen, 1974b, 1983a,b) gave a detailed sedimentological interpretation of the section, as well as interpreting dune morphologies in exposures nearby as having formed by differentiation of a mixed bedload by gravel overpassing of humpback bars (Allen, 1983b). The cross-bedded units originated as channel dunes or bars that migrated downstream with accompanying scouring. The absence of argillaceous flood-plain deposits, other than as reworked clasts in the conglomeratic and pebbly layers, suggests low-sinuosity, high-energy streams with steep gradients (Allen, 1974b, 1983a). The prevalence of siltstone clasts, but

absence of siltstone interbeds points to deposition of silt drapes on floodplains and in abandoned channels, but constant channel switching led to their destruction. This, plus the low variance in cross-bedding directions, points to braided streams, with flashy behaviour suggested by the scoured surfaces at the bases of the sandbodies and the laterally impersistent fining-upward units. In addition, Allen (1983a) noted some epsilon cross-bedding in most of the complexes, indicating the presence of laterally accreted bars as well as the predominant, larger, downstream-migrating forms.

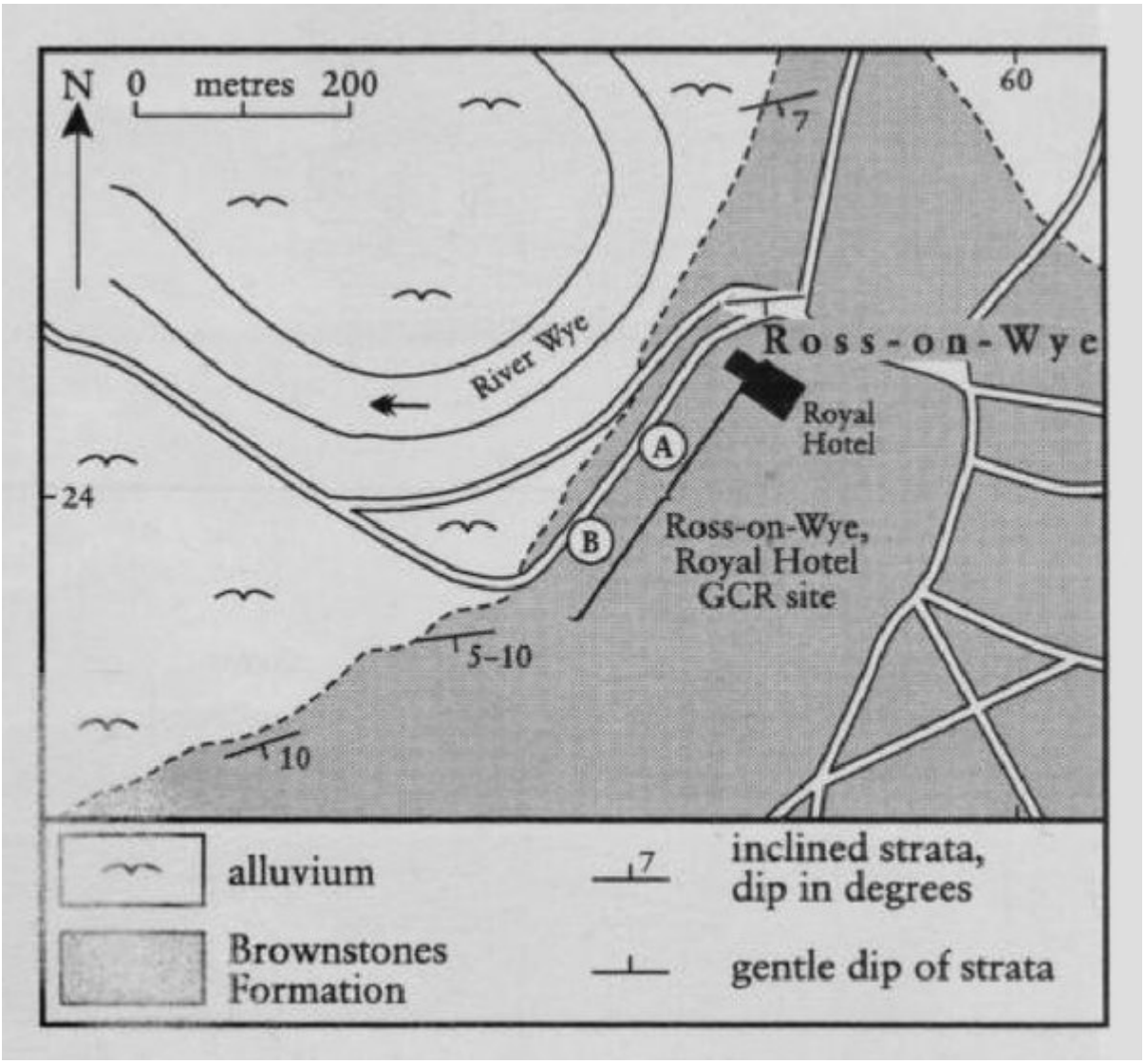
Allen (1971, 1974b) noted that except for the acid-lava pebbles, the pebble suite resembles that of the stratigraphically equivalent Monkeys Fold Formation of Brown Clee Hill in Shropshire and concluded that the pebbles were derived from Ordovician, Silurian, early Lower Old Red Sandstone and perhaps Precambrian outcrops in north Wales and Anglesey.

The markedly lenticular, channelized sandstones present in this section, typical of the Brownstones Formation of the Welsh Borderland and south-east Wales, contrast with the more heterogeneous Brownstone successions farther west in the Brecon Beacons, where, in addition to the braided channel facies seen in the Ross-on-Wye section, interbedded sheet-like sandstone bodies and flood-plain siltstones were interpreted by Tunbridge (1981a) as representing deposition in a more distal setting on an extensive alluvial plain.

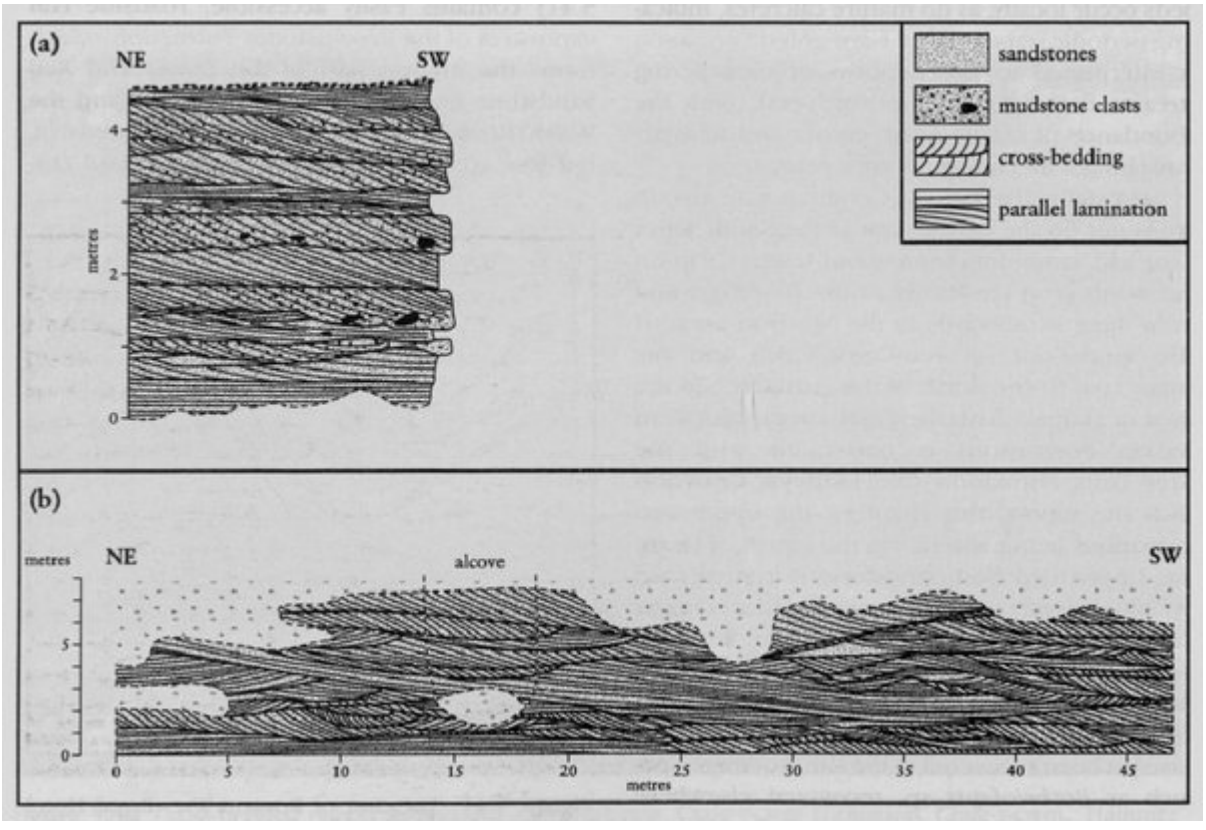
Conclusions

The site comprises easily accessible roadside cliff exposures of the Brownstones Formation. The section has been the subject of a detailed sedimentological analysis and interpreted as the deposits of braided, steep, flashy rivers. Its study has allowed reconstruction of bar morphologies, river channel sizes and palaeocurrent directions. The far-travelled pebbles in the sandstones and conglomerates were derived from a northerly Welsh source, consistent with the general southerly flow of the streams that carried them.

References



(Figure 5.41) Location of Ross-on-Wye, Royal Hotel GCR site. After British Geological Survey Ross-on-Wye Special 1:10 000 Sheet (1980).



(Figure 5.42) Graphic logs of the Brownstones Formation at the Ross-on-Wye Royal Hotel GCR site. (a) — vertical section at Point A on (Figure 5.41); (LI) — elevation showing sedimentary structures at Point B on (Figure 5.41). After Allen (1971, 1978a).

(Figure 5.43) Cross-bedded sandstones of the Brownstones Formation at the Ross-on-Wye, Royal Hotel GCR site. (Photo: W.J. Barclay.)