Afon y Waen, Powys

[SN 976 147] Potential ORS GCR site

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Introduction

The section of strata exposed in the bed of the Mon y Waen in Powys, south-central Wales (Figure 5.32) is characteristic of the Upper Devonian (Frasnian–Famennian) Plateau Beds Formation of the Upper Old Red Sandstone. The site is an established GCR site for its fossil fishes (Dineley and Metcalf, 1999) on account of the Late Devonian fish remains recovered from a conglomerate — the eponymous Mon y Waen Fish Bed (Hall *et al.,* 1973). The importance of the site is enhanced in being one of the best sections of the Plateau Beds Formation, which elsewhere contains a shallow marine fauna that is unique in the predominantly continental Late Devonian Old Red Sandstone facies. The formation is also important in containing an aeolian sandstone fades, not known elsewhere in the Anglo-Welsh Basin, and seen, for example, in a key section at Duffryn Crawnon [SO 095 150] (see GCR site report, this chapter; Lovell, 1978a,b).

Description

Hall *et al*. (1973) provided a detailed description of the section, following the discovery of fish remains by Taylor (1972). In the Mon y Waen valley to the north of the site, the Plateau Beds are repeated by a NE-trending fault. The basal part of the Plateau Beds is exposed north of the fault [SN 972 172]–[SN 973 174], where a variable succession comprises 0.9–1.8 m of purplish red, flaggy sandstones and red mudstones, truncated by an erosion surface and overlain by 0.6–2.7 m of quartz pebble conglomerate (Figure 5.33). The section south of the fault is shown in (Figure 5.34). About 6.1 m of thinly bedded, purplish red, argillaceous sandstones and siltstones with a few mudstone interbeds become more massive upwards, a thin grey sandstone lying 4.5 m from their top. The topmost bed of this group is a fine-grained, reddish purple, argillaceous sandstone with buff sandstone-filled burrows. It is overlain by the Mon y Waen Fish Bed, which is exposed at two localities in cliffs on the west bank of the stream [SN 9747 1500]; [SN 9761 1476]. At the first, a 1.52 m-thick, purplish grey, trough cross-bedded, quartzitic sandstone has lenses of quartz conglomerate at its base containing fish fragments. These also occur in the bases of the cross-bedded sets. At the second locality (Hall *et al.,* 1973; Taylor and Thomas, 1974), the section is:

	Thickness (m)
Conglomerate with mudstone clasts, abundant fish fragments and a few quartz pebbles in a purple, fine-grained sandstone matrix	0.1
Sandstone, fine-grained, purple to grey, with a layer of pebbles and fish fragments at the base, which is channelled down into the underlying unit	0.6-1.0
Sandstone, fine-grained, purple to grey, trough cross-bedded	0.7
Conglomerate, friable, with quartz pebbles, red-brown mudstone clasts and abundant fish fragmen	0.15

Holoptychius sp. and *Bothriolepis* sp. have been found at these localities (Taylor, 1972; Hall *et al.,* 1973). No marine fossils have been found in the section, but lingulids occur above the level of the Mon y Waen Fish Bed in the nearby Cefn Esgair South Borehole [SN 9845 1353] and in Nant Mawr [SN 9519 1572] 2.5 km to the north west. The fish bed was taken by Hall *et al.* (1973), Taylor and Thomas (1974, 1975) as a marker bed, subdividing the Plateau Beds into Lower and Upper units, and these units are shown on the Institute of Geological Sciences (1979) map of the area.

Above the fish bed, 4.57 m of fine- to medium-grained quartzitic sandstone are overlain by thinly bedded, deep purple, fine-grained, argillaceous sandstones and red-brown mudstones. Blue-grey, fine-grained, ripple cross-laminated sandstones close above were correlated with the Grey Grits Formation by Hall *et al.* (1973), but included in the Plateau Beds by Lovell (1978a).

Brachiopods recovered elsewhere from the Plateau Beds include *Lingula* sp., *Cyrtospirifer verneuili,* cf. *Ptychomaletoechia omaliusi, Leptodesma* cf. *lichas* and *?Pterinopecten* sp.. In addition to *Bothriolepis* sp. and *Holoptychius* sp., fish remains include cf. *Pseudosauripterus anglicus* and cf *Sauripterus* sp.. Trace fossils include cf. *Planolites* and *Rusophycus.* All of the brachiopods were recovered from the topmost part of the formation.

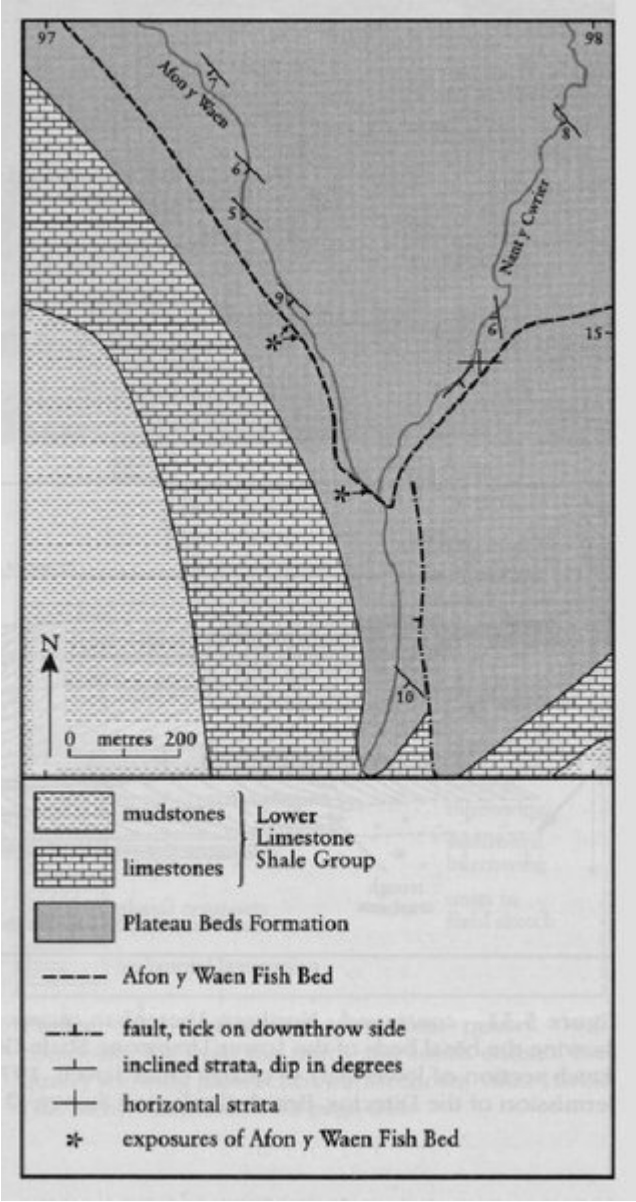
Interpretation

In a detailed sedimentological analysis of the Plateau Beds, Lovell (1978a) recognized three subdivisions (A, B and C). Division A is present only to the west of Mon y Waen, where it comprises a laterally variable succession of trough cross-bedded, pebbly sandstone and conglomerate with red mudstone interbeds. It was tentatively interpreted by Lovell (1978a) as the deposits of a southerly flowing braided stream system. Division B consists mainly of thin- and medium-bedded, red-brown sandstones, with local planar cross-bedded sandstones indicating southerly derivation. Lovell (1978a,b) suggested an aeolian origin for the latter, with the former being fluvial, possibly wadi sediments. The Mon y Waen section lies entirely within Division C. This is a heterolithic unit of interbedded, channelized, pebbly and conglomeratic sandstones, fine-grained sheet sandstones and mudstones. Cross-bedding indicates SE-directed palaeocurrents. A marginal marine environment is suggested (Allen, 1965b; Taylor and Thomas, 1975; Lovell, 1978a,b), with evidence of supratidal, tidal-flat and possibly subtidal environments (Lovell, 1978b). All of the marine fauna recovered from the Plateau Beds comes from this uppermost division. Lovell (1978a) noted that the Mon y Waen Fish Bed is a lenticular horizon of limited lateral extent. Similar channel-bottom lag deposits elsewhere, of which there are several, probably occur at slightly different stratigraphical levels, and the bed is not a continuous marker bed as envisaged by Hall *et al.* (1973) and Taylor and Thomas (1974, 1975). Similar facies occur above and below the Mon y Waen Fish Bed. The brachiopods and fish remains recovered from the formation suggest a Frasnian to Famennian age for the Plateau Beds.

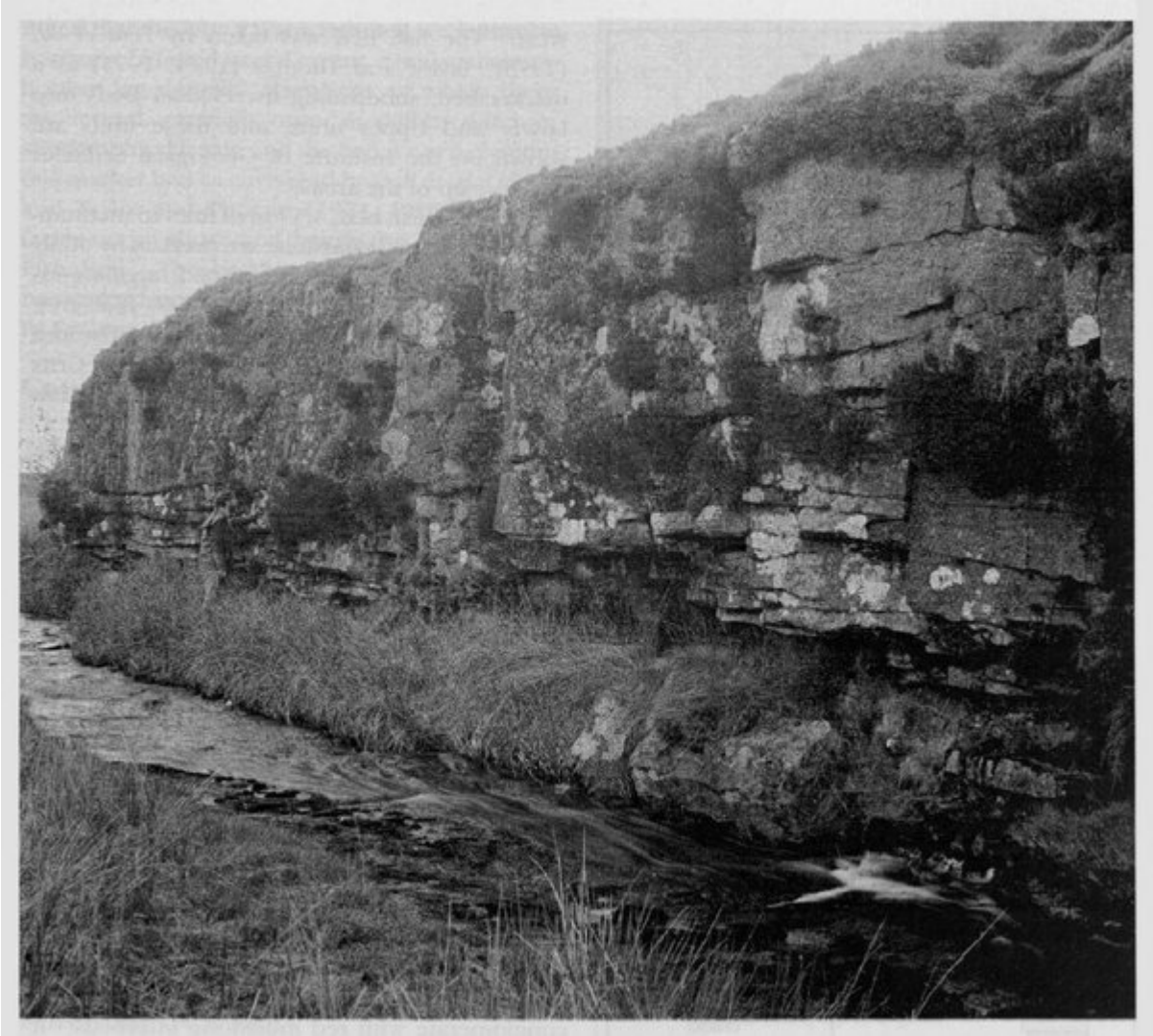
Conclusions

The Mon y Waen section exposes beds characteristic of the upper part of the Plateau Beds Formation of the Upper Old Red Sandstone. The section is the type locality of the Mon y Waen Fish Bed, a lenticular conglomerate that has yielded fragments of the Late Devonian fish *Bothriolepis* and *Holoptychius.* The strata are of continental, Old Red Sandstone red-bed facies, but at nearby localities include marginal marine deposits that presage the marine transgression which led to the establishment of marine environments in Early Carboniferous time. Future research at the site will include the search for marine fossils known to occur at this level elsewhere.

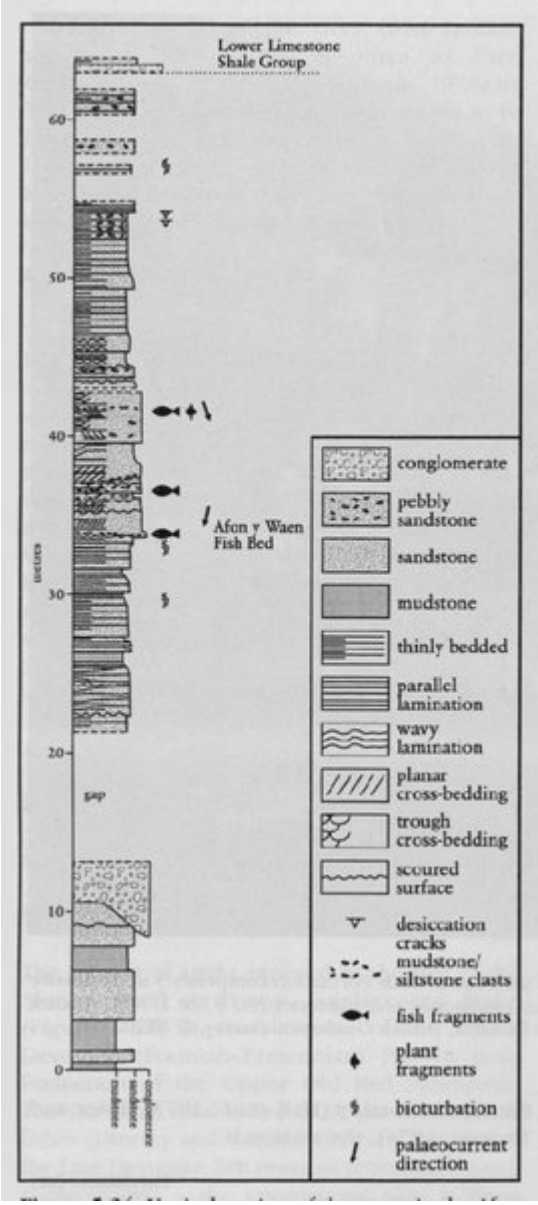
References



(Figure 5.32) Geological map of Afon y Waen potential GCR site. After British Geological Survey 1:10 560 manuscript maps SN 91NE and SN 91SE (both 1973).



(Figure 5.33) Cwar Llwyd, Mon y Waen. The basal bed of the Plateau Beds Formation comprises 3 m of massive quartz pebble conglomerate above 1.5 m of thinly bedded sandstones and siltstones [SO 9720 1730]. (Photo: BGS No. A12010, reproduced with the permission of the Director, British Geological Survey, NERC.)



(Figure 5.34) Vertical section of the strata in the Mon y Waen. Basal 13 m after Hall et al. (1973), upper part after Lovell (1978a).