Caeras Quarry, Carmarthenshire

[SN 607 167]

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Introduction

Caeras Quarry, 2 km north-west of the village of Llandybie (Figure 5.25), exposes conglomeratic sandstones at the top of the Brownstones Formation of the Lower Old Red Sandstone. Quartz pebbles predominate in the beds, but some larger pebbles are locally derived and provide evidence of tectonic movements causing local basement uplift and erosion. This contrasts with most of the Brownstones, which had a source area far to the north. This pebbly facies is only locally developed on the north crop of the South Wales Coalfield at this level, and this quarry provides the best exposure in the area. Similar pebbly sandstones and conglomerates are present to the east around Llyn-y-Fan Fawr [SN 834 216] in the Carmarthen Fans (Tunbridge, 1980a).

Description

Caeras Quarry provides the best exposures of conglomeratic sandstones that occur at the top of the Brownstones Formation in the west of the Cennen Valley, between Llandybie and Kidwelly, south-east Carmarthenshire (Strahan *et al.,* 1907; Squirrell and White, 1978). The conglomerates were formerly termed the 'Pebbly Beds' (Institute of Geological Sciences, 1977; Squirrell and White, 1978), but are here named the 'Caeras Conglomerate Member' to distinguish them from pebbly beds that occur at different levels elsewhere in the Brownstones. The quarry illustrates the variable nature of the succession, although overgrown at the time of writing, with the highest beds in the south wall providing the best exposures.

The Brownstones Formation in the area has been described by Squirrell and White (1978). It comprises a succession of interbedded red-brown sandstones and siltstones/mudstones, with rare, intraformational, calcrete-clast conglomerates. A few of the siltstone/mudstone beds contain calcrete nodules. Conglomerates are common in the west of the Cennen Valley area, and at Caeras Quarry they are interbedded with siltstone/mudstone beds containing abundant calcrete nodules. The overall proportion of sandstones and conglomerates in the succession is generally 50–65%, although ranging from 40% to 75%.

The Brownstones Formation forms the highest beds of the Early Devonian Lower Old Red Sandstone. Although unfossiliferous, it is assigned a late Pragian to Emsian age. It also belongs to the local Breconian stage, and is unconformably overlain by the Lower Carboniferous Lower Limestone Shale Group at Caeras. In the region of Caeras Quarry, the Brownstones are thickest in the east, reaching 610 m in the Sawdde Fechan and Clydach valleys, but attenuating markedly westwards to about 210 m south of Carreg Cennen Castle. To the west of there, they thicken again to about 370 m in the vicinity of Caeras Quarry. The Caeras Conglomerate thickens markedly from its feather edge at Blaengweche Farm about 3.5 km east of Caeras Quarry to its maximum development of 170 m at Caeras. It then thins from Caeras westwards to 90 m at Cannel [SN 5865 1660] and to about 50 m west of the Mon Dulais.

Squirrell and White (1978) recorded the section at Caeras Quarry. (Figure 5.26) shows the section graphically, modified in the light of a recent site visit, where only the topmost beds (Figure 5.27) remain well exposed. The beds dip about 45° SSE. Harrison (in Squirrell and White, 1978, their Appendix 1) gave details of some of the lithologies present.

About 13 m from the top of the section, within 5.2 m of sandstones noted by Squirrell and White, a grey-green, brown-weathered, quartzitic sandstone has a conglomeratic, pebbly base. A lens of grey mudstone with enclosed quartz pebbles occurs near the base of the sandstone, but it is not clear from the limited exposure whether it is a large reworked clast or the remains of an in-situ bed. Palynological analysis of the mudstone produced no dateable spores (M. Stephenson, pers. comm.).

The highest strata of the Caeras Conglomerate Member were formerly exposed at the nearby Cil-yr-ychen Quarry [SN 6165 1686], where basal olive-green sandstones of the Carboniferous Lower Limestone Shale Group rest on:

	Thickness (m)
Sandstone, red, massive, fine- to coarse-grained, commonly conglomeratic (quartz pebbles)	17.0
Siltstone, red, with many calcrete nodules up to 5 cm long	0.6
Sandstone, red, massive, medium-to coarse-grained, with quartz pebbles	4.0

Cantrill (in Strahan *et al.,* 1907, p. 63) recorded a conglomerate ('conglomeratic cornstone') in this quarry 8.2 m below the base of the Lower Limestone Shale Group. It contained a few pebbles of 'earthy limestone' containing what are probably *Camarotoechia nucula, Chonetes striatella?* and *Orthis* (*Dalmanella*)*elegantula.* Cantrill noted that the pebbles are from the Ludlow Series. Squirrell and White (1978) noted that the quarry is now partially filled and that no conglomerate is visible.

Interpretation

The Brownstones of south Wales and the Welsh Borderland are broadly interpreted as the proximal fluvial deposits of a piedmont plain on the southern margin of the evolving Caledonian mountain chain. They represent the culmination of a Lower Devonian coarsening-upward off-lap succession (Allen, 1979; Allen and Williams, 1979b). Continuing uplift and southerly migration of the facies belts led to non-deposition and erosion in the Anglo-Welsh basin in Mid-Devonian times. Allen (1974a) provided a general interpretation of the sedimentation of the Brownstones. Allen and Crowley (1983) demonstrated that the source of the sediments was the outcrop of Lower Palaeozoic rocks in the Irish Sea-north Wales area. Tunbridge (1980a, 1981a) interpreted the sheet sandstones of the Brecon Beacons area as semi-arid sheet-flood deposits, deposited on extensive alluvial-fans. The mudstones and siltstones are interpreted as floodplain deposits, either deposited from flash-floods, or from slow-moving or still water bodies, although an aeolian origin for some is also possible (Tunbridge, 1981a). The carbonate nodules in the finer lithologies are interpreted as pedogenic calcrete formed on the alluvial floodplains and are indicative of a tropical, seasonally wet, semi-arid climate (e.g. Marriott and Wright, 2004).

Local pebbly facies similar to the Caeras Conglomerate Member occur elsewhere in the higher parts of the Brownstones Formation in south Wales and the Welsh Borderland. Allen (1974b) described the clasts in the Ross-on-Wye area. The pebble suite there comprises a range of igneous, sedimentary and igneous rocks ranging from Ordovician to early Devonian in age, with perhaps some Precambrian, and concluded that they were derived from north Wales. A similar pebble suite occurs in the Woodbank Series of Shropshire (Allen, 1974b), which is the stratigraphical equivalent of the Brownstones. The pebbles in the conglomeratic facies in the topmost 100 m of the Brownstones around Llyn-y-Fan Fawr [SN 834 216] about 24 km north-east of Caeras Quarry (Tunbridge, 1980a) are angular, and hence of local derivation. They include acid volcanic rocks, lithic arenites and vein quartz derived from the east, suggesting relatively short-lived uplift of older Lower Palaeozoic rocks. Tunbridge concluded that this is evidence of uplift caused by strike-slip movement along the Swansea Valley Fault 4 km to the south. Cope (1981) suggested that a Precambrian source lay in the vicinity, and may have supplied the volcanic and vein quartz pebbles, with Cambrian outcrops supplying the lithic arenites. The Caeras Conglomerate occurs south-east of, and in close proximity to, the Carreg Cennen-Llandyfaelog Fault, which, along with the Swansea Valley and Neath disturbances, makes up a suite of major NE-trending basement fractures. It is possible that the conglomerate provides evidence of late Early Devonian movement on the Carreg Cennen-Llandyfaelog Fault (Tunbridge, 1986), although the source of the pebbles remains problematic. The quartz pebbles may have been derived locally, as in the case of the Llyn-y-Fan Fawr deposits, or from north Wales, as deduced by Allen (1974b) for those in the Ross-on-Wye area, but the Ludlow pebbles at Cil-yr-ychen Quarry may have been derived from a closer, unknown source. The conglomerates such as those at Caeras and Llyn-y-Fan Fawr occur high in the Brownstones Formation and may herald the onset of the Acadian Orogeny.

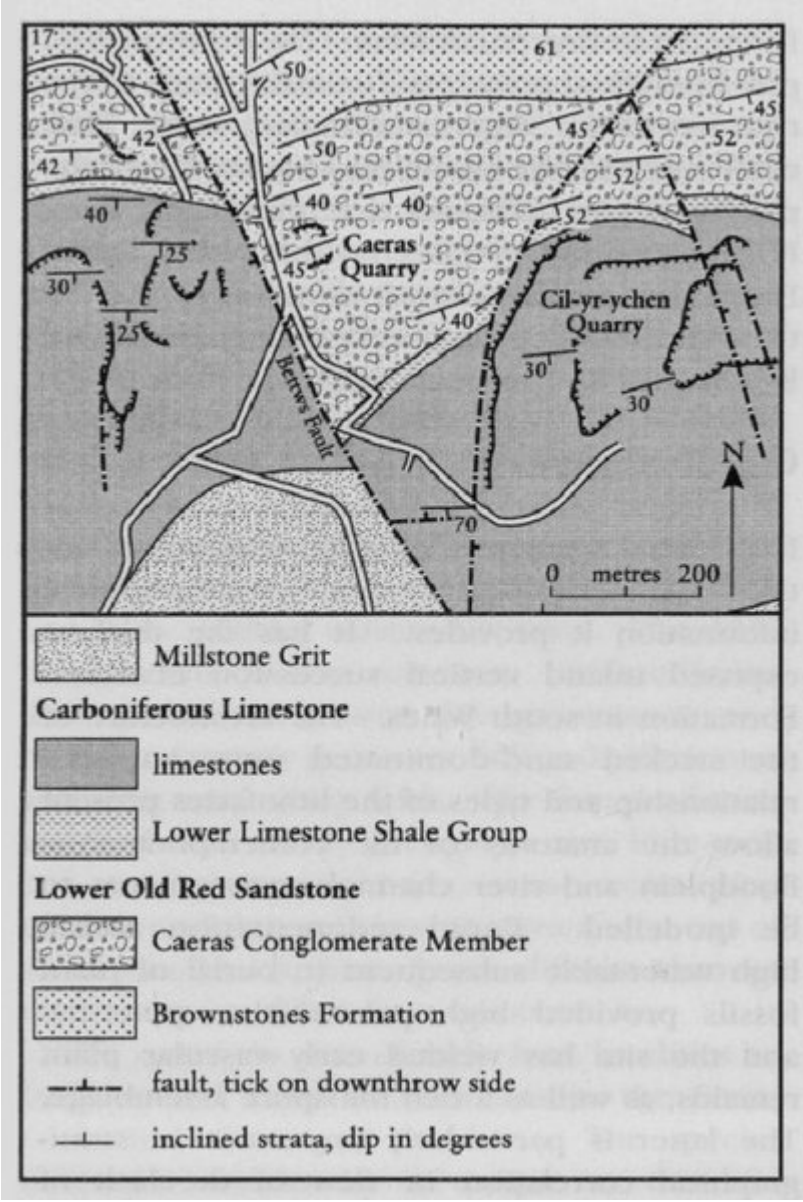
Some doubt remains concerning the age and correlation of the Caeras Conglomerate Member. Allen (1974a) noted that the pebbly beds vary widely in position relative to the top of the Senni Beds, which underlie the Brownstones, but everywhere underlie the Carboniferous sequence. He suggested that they might therefore belong to the Upper Old Red

Sandstone and to be of late Devonian to early Carboniferous age. Squirrell and White (1978), however, retain the beds as part of the Brownstones Formation.

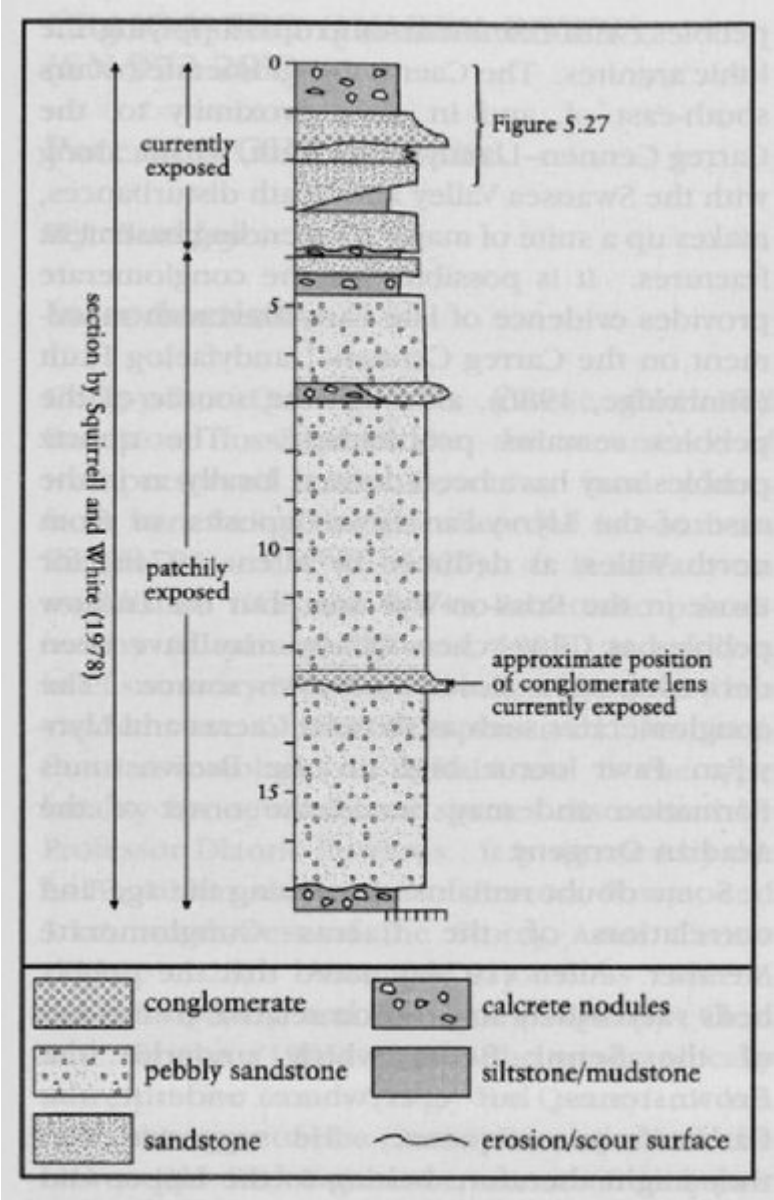
Conclusions

Caeras Quarry provides the best exposure of locally developed pebbly beds (the Caeras Conglomerate Member) lying at the top of the Brownstones Formation. There is some debate as to whether the beds belong to the topmost Brownstones or the overlying Upper Old Red Sandstone, and the site merits palynological examination to resolve this, as well as a detailed sedimentological study. The section illustrates the variable nature of the beds, comprising interbedded sandstones, pebbly and conglomeratic sandstones and siltstones/ mudstones with calcrete nodules. Some of the pebbles may have been of local derivation, providing evidence of late Early Devonian movement on the major NE-trending lineaments and erosion of Precambrian and older Lower Palaeozoic basement outcrops.

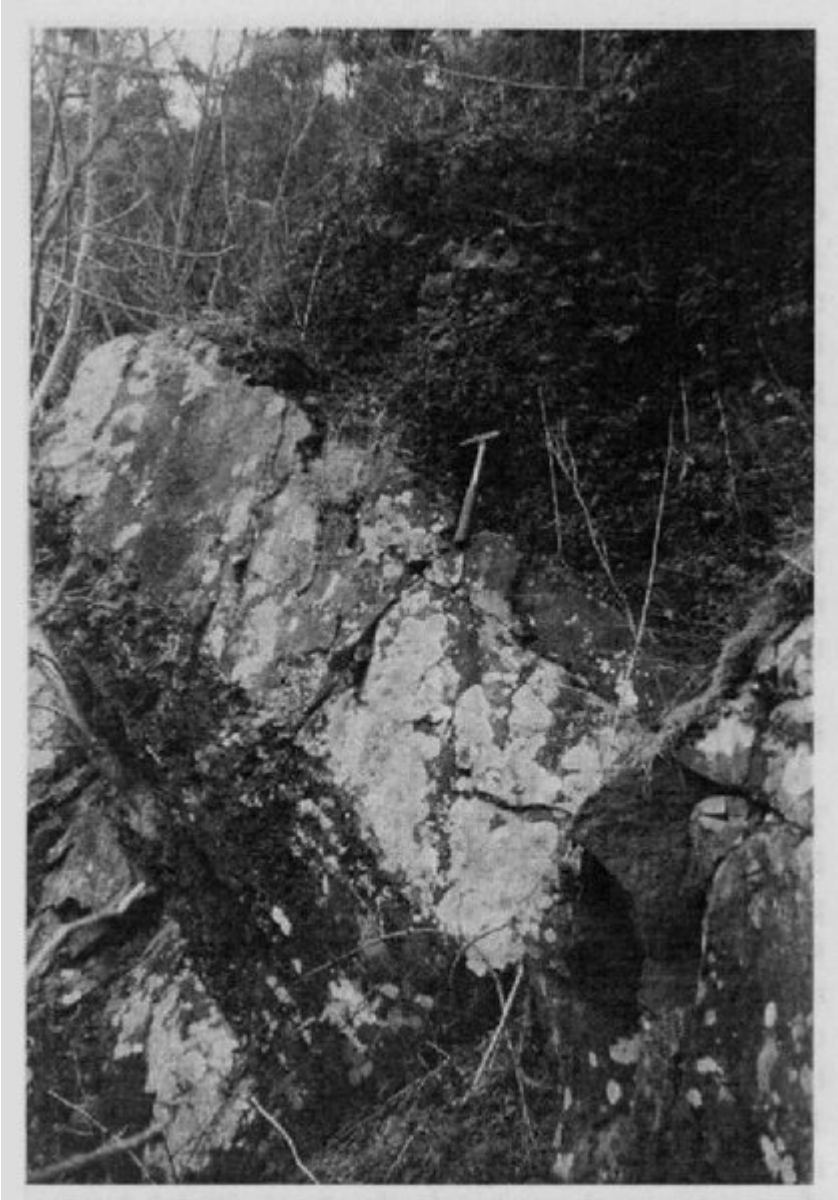
References



(Figure 5.25) Geological map of the area of Caeras Quarry. After British Geological Survey 1:10 560 Sheet SN 61NW (1973).



(Figure 5.26) Graphic section of part of Caeras Quarry. After Squirrel(and White (1978).



(Figure 5.27) Topmost beds exposed in Caeras Quarry; red mudstone/siltstone with calcrete nodules rests on sandstone. The hammer is 0.3 m in length. (Photo: W.J. Barclay.)