Baltic Quarry, Powys

[SO 066 118]

Introduction

The Baltic Quarry GCR site is a disused quarry [SO 0659 1184], 5.5 km north of Merthyr Tydfil. It exposes a succession from the Courceyan–Chadian Abercriban Oolite Group to the upper part of the Arundian Llanelly Formation. It is important because it provides the best, safely accessible section of ancient river or lake deposits in the Clydach Halt Member at the base of the Llanelly Formation, and above these, fossil soils are preserved. The site complements that of nearby Odynau Tyle'r Bont in illustrating the complex features and variable preservation of early Carboniferous terrestrial deposits in what is predominantly a shallow marine limestone sequence. It also provides a thick section of the Abercriban Oolite Group and of the lagoonal and intertidal limestones of the Cheltenham Limestone Member (Llanelly Formation). The section has been documented by George (1954), and Dickson and Wright (1993) provide a simple log of the section, based on Sean (1988c).

Description

The base of the disused quarry exposes part of the Abercriban Oolite Group with, at the base, nearly 5 m of the Pwll y Cwm Oolite, a bioclastic, oolitic grainstone which exhibits calcite- and dolomite-filled vugs. Stratiform dolomites occur at the top of this unit and are overlain by a metre or so of the Pantydarren Beds. The remainder of the lower part of the quarry face is composed of the Blaen Onnen Oolite (approximately 23 m), possibly with the uppermost 6 m corresponding to the Coed Ffyddlwn Formation (Dickson and Wright, 1993). There are stratiform and irregular masses of dolomite within the Blaen Onnen Oolite, as well as some thin clay bands. The uppermost few metres of the Abercriban Oolite (Figure 9.15) have a rubbly appearance typical of the unit immediately below the Llanelly Formation throughout its area of outcrop. Due to intra-Carboniferous erosion and overstep, the upper units of the Abercriban Oolite Group-Clydach Valley Group are missing (Barclay *et al.,* 1988). The overlying Llanelly Formation has a conglomerate at its base ((Figure 9.13)b) which merges into the rubbly top of the Abercriban Oolite. This conglomerate is 0.5 m thick and contains mainly clasts of oolitic and bioclastic limestones derived from the underlying Abercriban Oolite. It is overlain by 1.25 m of interbedded thin green clays and finely laminated sandstones (Figure 9.15). The latter have laminae ranging from 0.5 mm to 6 mm thick, of quartz arenite and sub-litharenite, with very coarse-sand grade grains of oolitic grainstone. Many of the thinner laminae are graded and some have distinctive clay seams between them, resembling varves. The thicker and coarser laminae have scoured bases. These are overlain by 1.7 m of fenestral microsparitic limestones resembling calcrete palaeosols. Above these, the Cheltenham Limestone Member (Llanelly Formation) comprises 5 m of peloidal limestones containing superficial ooids and a restricted biota of ostracodes and vermiform gastropods (possible microconchids — see Weedon, 1990, 1991), although a thin bioclastic limestone at the base contains foraminifera, dasycladacean algae (*Koninckopora*) and oncoids (the Hendre Bed of Wright, 1981a).

Brachiopod and conodont evidence suggests that most of the Abercriban Oolite Group is of middle or upper Courceyan age, but the group is thought to straddle the Courceyan–Chadian stage boundary (Barclay *et al.,* 1988). Micro-faunas including foraminifera (Barclay, 1989) and conodonts (Stone, 1991) suggest that the Llanelly Formation is of Arundian age.

Interpretation

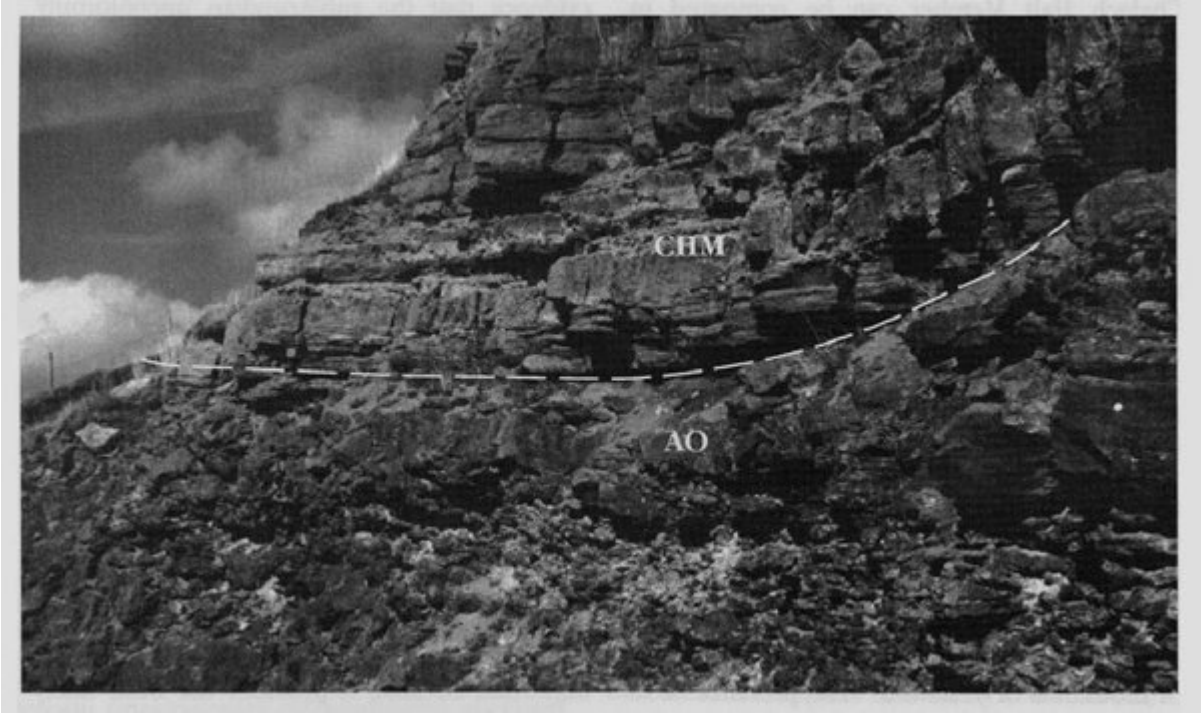
Besides providing a clear succession in the Abercriban Oolite, the site is important because of the presence of siliciclastic facies in the Clydach Halt Member. There are thicker examples of this facies in the Daren Cilau area to the north-east but these exposures are on steep slopes beneath unstable cliffs. This site is a substitute for these other outcrops. The rubbly top of the Abercriban Oolite has been interpreted as a palaeokarstic horizon, caused by a period of rain-water dissolution following a sea-level fall. The erosion of the top of the Abercriban Oolite Group–Clydach Valley Group limestones took

place prior to this dissolution phase. The style of dissolution suggests that a humid climate prevailed at that time (Wright, 1982a). The overlying conglomerates of the Clydach Halt Member have been interpreted as either ephemeral stream-flood deposits or possibly colluvium. The partly gradational nature of the contact between the rubbly oolite and this unit suggests that local colluvial material was being reworked by short-lived streams. The overlying sandstones probably formed in part from suspension, and partly from traction currents. These sandstones and clays probably represent overbank (floodplain) or distal alluvial-fan sheet-flood deposits, associated with ponded waters in which graded and clay laminae settled from suspension. Although only a few metres thick, these provide further insights into the types of terrestrial environments that developed on the land surfaces during Courceyan and Arundian times. The overlying calcrete horizons are somewhat unusual in being distinctly fenestral, but represent prolonged periods of soil development in a semi-arid climate. A climate change took place after the dissolution of the Abercriban Oolite to drier conditions. A rise in relative sea level led to the flooding of the area with the development of restricted, very shallow marine conditions of the Cheltenham Limestone Member.

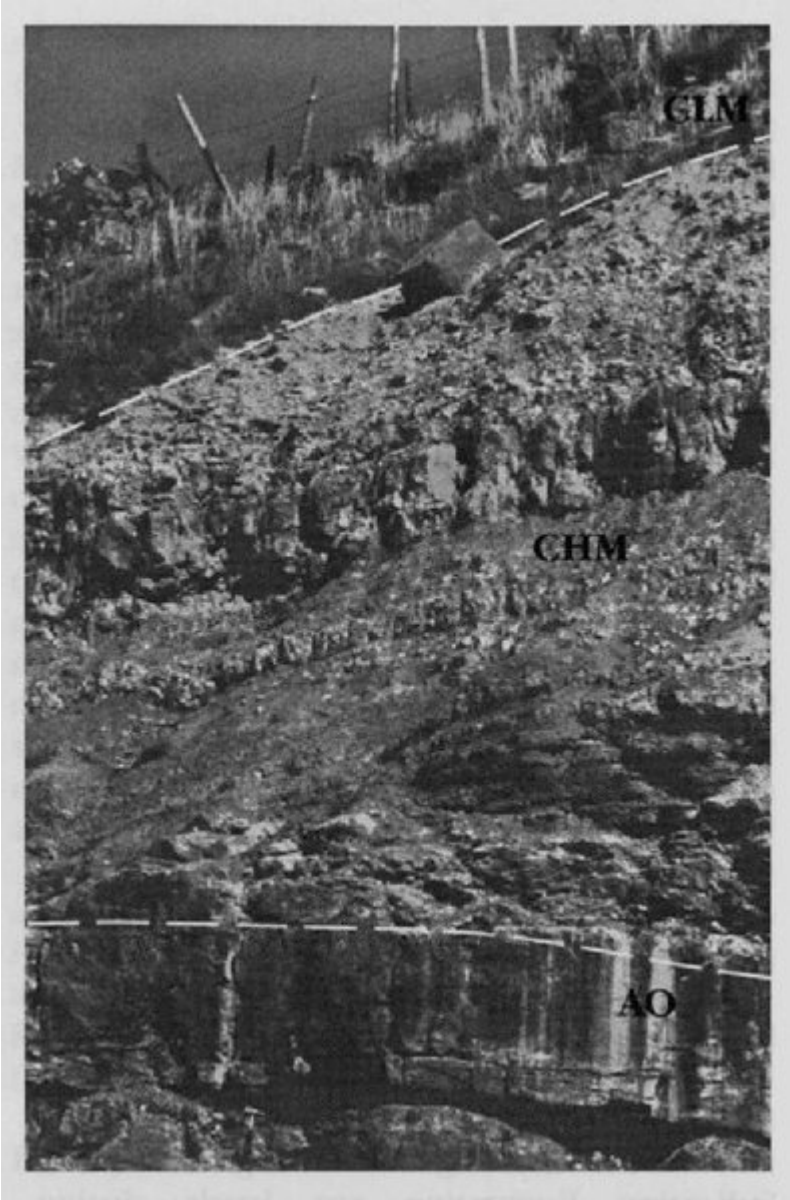
Conclusions

The site provides the only safely accessible site in the Clydach Halt Member (Llanelly Formation) that exposes colluvial, stream and sheet-flood deposits, as well as fossil soils. This thin terrestrial unit contains evidence of complex changes in landscape development during a period of time in which shallow-water marine conditions generally predominated. The section complements those seen at Odynau Tyle'r Bont and Clydach Halt Lime Works (see GCR site reports, this chapter).

References



(Figure 9.15) Alluvial deposits in the Clydach Halt Member (CHM) of the Llanelly Formation at Baltic Quarry. The rubbly top to the Abercriban Oolite (AO) is seen towards the middle of the figure. Note the hammer for scale (centre). (Photo: P.J. Cossey.)



(Figure 9.13) Comparative log sections of the Clydach Halt Member (Llanelly Formation) at (a) Odynau Tyle'r Bont and (b) Baltic Quarry, illustrating the development of multiple calcrete palaeosols of the Tyle'r Bont Pedocomplex. Such calcretes are found today forming in semi-arid regions and require extended periods of time in which to develop. The presence of stacked calcrete horizons of this type indicate that the land surfaces aggraded in stages, but it is likely that between each phase the land surface remained stable for possibly hundreds of thousands of years. Note the development of fluvial siliciclastic deposits (conglomerates and sandstones) associated with fenestral calcretes in the Clydach Halt Member at Baltic Quarry. See text for further details. After Wright (1982b).