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# Auchensail Quarry, West Dunbartonshire

[NS 342 799]

Potential ORS GCR site

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## Introduction

Auchensail Quarry (Figure 3.34) near Cardross, West Dunbartonshire exposes sandstones and mudstones/siltstones of the Teith Sandstone Formation (Strathmore Group) of the Lower Old Red Sandstone. It has yielded some of the best-preserved plant fossils of Emsian (Early Devonian) age in Britain (Morton, 1976; Scott *et al.*, 1976). The sandstones contain an abundance of plant material, including exceptionally well-preserved examples of *Sawdonia* and the youngest examples of *Prototaxites* known in Britain, some of which reveal considerable anatomical detail (Rayner, 1983, 1984, 1995). The site is already an established GCR site for its Palaeozoic palaeobotany (Cleat and Thomas, 1995) and a brief summary is presented here. In plant material of similar age from Ballanucater Farm GCR site, the outer protective skin (cuticle) of the plants is preserved (Rayner, 1995).

The geology of the quarry was described by Scott *et al.* (1976) and summarized by Rayner (1995). The quarry exposes strata of the Teith Sandstone Formation of the Strathmore Group (Armstrong and Paterson, 1970). The strata are typical of the 1000 m-thick Teith Sandstone Formation, and illustrate the sedimentological character of this fluvial unit (Paterson *et al.*, 1990). Spores recovered from the formation belong to the *annulatus–sextantii* Biozone (Emsian) (Richardson *et al.*, 1984).

## Description

The quarry exposes a thin, east-trending, basaltic dyke intruding about 20 m of interbedded sandstones and argillaceous beds (Figure 3.35), (Figure 3.36). The sandstones are green, fine- to medium-grained and well indurated, and arranged in upward-fining units up to 2 m thick, some with trough cross-bedding and lateral accretion surfaces. They have conglomeratic bases with cobbles and pebbles of intraformational red mudstone. Large rafts of spiny plant axes at the top of units are aligned parallel to the palaeocurrent direction. Primary current lineation trending N60°E is recorded at a nearby exposure. Plant fossils are abundant in the sandstones. Mats of coalified plant compressions occur mainly within the upper part of the sandstone units, whereas discrete pyrite petrifications occur throughout. The floral assemblage comprises *Drepanophycus spinaeformis*, *Dawsonites* sp., *Prototaxites* sp., *Sawdonia ornata*, ?*Sporogonites* sp. and *Zosterophyllum* sp.. It is typical of the Emsian Strathmore Group and similar to those in grey, coarse-grained sandstones and blue-green mudstones at Ballanucater Farm, Callander. A discussion on the plant fossil assemblages is given by Rayner (1995).

The argillaceous beds are of red siltstone and mudstone up to 2 m thick, comprising stacked fining-upward units 0.2–0.3 m thick. Most of the units are tabular, but some lenticular ones fill abandoned palaeochannels. No plants are preserved in this facies, but a single specimen of the trace fossil *Beaconites* Vyalov is recorded in a loose block and fish remains are recorded nearby. Desiccation-cracked bedding surfaces are common.

## Interpretation

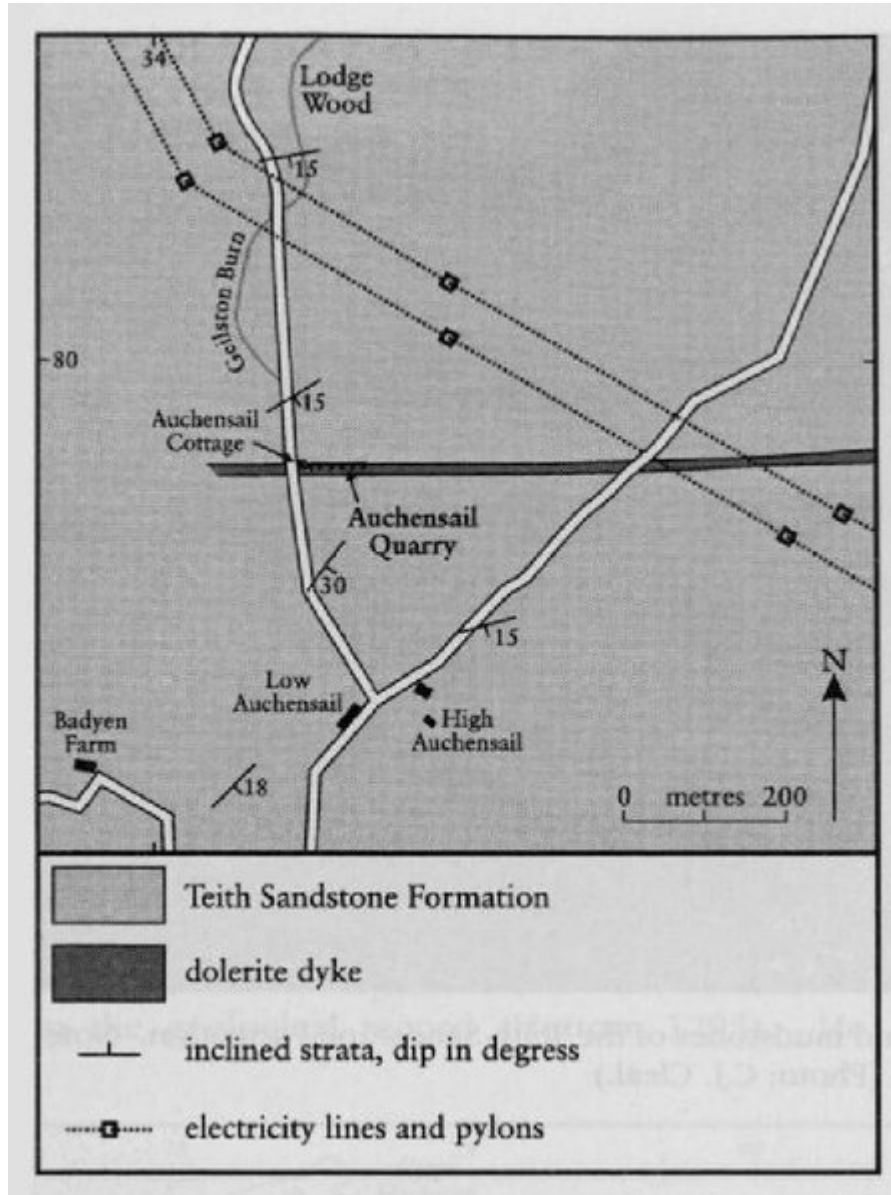
The lithofacies in Auchensail Quarry are interpreted as fluvial deposits (Scott *et al.*, 1976). The sandstones were the point-bar deposits of medium-size, meandering rivers; the mudrocks were floodplain deposits. The plants occur only in the sandstones, suggesting that they lived within the margins of the river channels, perhaps on the point bars. No plants occur in growth position. However, post-depositional oxidation may account for their absence in the red floodplain beds. *Beaconites* has been interpreted as the locomotory or temporary resting burrow of amphibians or reptiles. The burrows

may be similar to those in the beds of wet-dry, seasonal streams in modern deserts, such as the dry season burrows of the lungfish (Scott *et al.*, 1976).

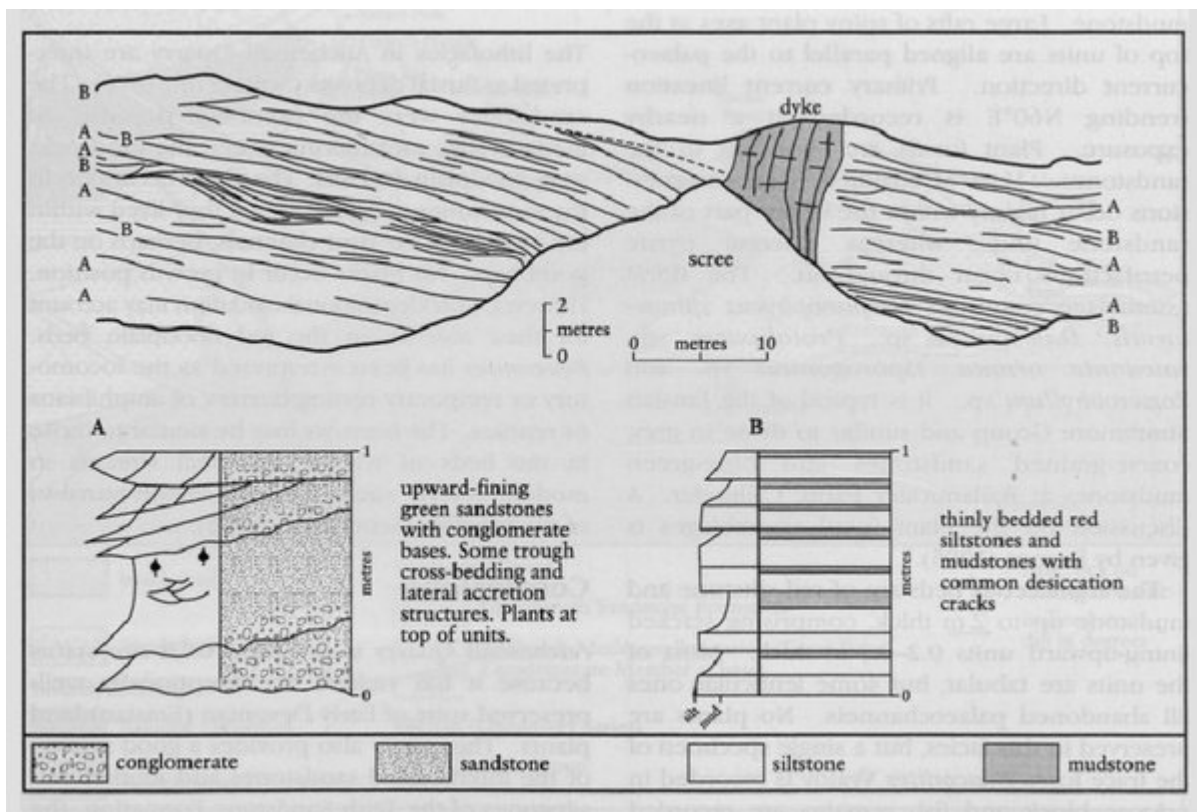
## Conclusions

Auchensail Quarry is accorded GCR site status because it has yielded an exceptionally well-preserved suite of Early Devonian (Emsian) land plants. The quarry also provides a good section of the interbedded sandstones and mudstones/siltstones of the Teith Sandstone Formation, the youngest Early Devonian formation in the Midland Valley of Scotland.

## References



(Figure 3.34) Location and geology of Auchensail Quarry. After British Geological Survey 1:10 560 manuscript map NS 37NW (1984).



(Figure 3.35) Sketch of Auchensail Quarry and its facies associations. After Scott et al. (1976), reproduced by Cleal and Thomas (1995).



(Figure 3.36) Auchensail Quarry: sandstones, siltstones and mudstones of the Teith Sandstone Formation. Note the igneous dyke just to the left of centre of the quarry. (Photo: C.J. Cleal.)