



South Wales RIGS Group Site Record

RIGS Description

SECTION A

General	South Wales
Site Name: Breinant	File Number: Site_DIS_1
RIGS Number: 640	Surveyed by: D I Schofield
Grid Reference: SN 6525 2248 to SN 6581 2236	Date of Visit:
RIGS Category: Scientific	Date Registered:
Earth Science Category: Stratigraphical	Owner: Unknown Planning Authority: Carmarthenshire County Council
Site Nature: Stream section	Documentation prepared by: D I Schofield
Unitary Authority: Carmarthenshire County Council	Documentation last revised:
OS 1:50,000 Sheet: 159	Photographic Record: Attached
OS 1:25,000 Explorer Sheet: OL12	
BGS 1:50,000 Sheet: E212	
<p>RIGS Statement of Interest:</p> <p>The site forms part of a succession of sediments of Middle Ordovician age (deposited between around 470 to 560 million year old) that are unique in the geological record of the UK and record a snapshot of environmental conditions at that time that are critical for the scientific understanding of Lower Palaeozoic geography and evolution of southern Britain. The formation itself is of historic interest, being first recognised as important by the seminal British geologist Sir Roderick Impy Murchison in his treatise 'The Silurian System' published in 1839, and underlies the lower part of the former British stratotype of the Llandeilo Epoch (Williams, 1953).</p> <p>The formation underlying this site is poorly exposed except in incised stream sections such as Breinant and as such this locality preserves the best section through this succession in the area.</p>	

Geological setting/context:

The Breinant site is underlain by rocks of middle Ordovician age that form part of the succession associated with the historical stratotype area for the Llandeilo Epoch in British Stratigraphy. The significance of these rocks, largely exposed within the Carn Goch Anticline and complex faulted syncline underlying Dynefor Park, was first recognised by Murchison in *'The Silurian System'* (1839). Subsequent work undertaken during the survey of the Ammanford district to the south by the Geological Survey of England and Wales (Strahan et al., 1907) established a stratigraphic framework for the area that was adopted by Williams (1953) in his seminal account of the geology of the Llandeilo area.

The type Llandeilo comprises a unique sedimentary succession deposited in shallow marine to near shore environments. It overlies earlier Ordovician offshore sediments and passes up into the thick, Late Ordovician to Early Silurian basinal succession that forms the main part of the lower Palaeozoic Welsh Basin. Recognition of this succession, entrained as it is within fault strands of the Welsh Borderland Fault System, has been critical in understanding the palaeoenvironmental and palaeogeographic evolution of the region. Subsequent studies from the type sections in Dynefor Park and the Ffairfach railway cuttings have largely focussed on biostratigraphy and palaeoecology (e.g. Williams et al., 1981; Wilcox & Lockley, 1981; Bergström et al., 1987). Largely as a result of the detailed study at these localities, the Ffairfach Railway cuttings and Dynefor Park have been established as GCR sites and as such are described in detail by Owens in Rushton et al. (1999).

Following the stratigraphy of BGS (2008) and Schofield et al. (2009) the general succession in the area comprises a lower Abergwilli Formation of anoxic and oxic facies mustones, overlain conformably by massive arkosic sandstone of the Ffairfach Grit Formation locally containing rhyolite and felsic tuff of the Coed Duon Formation in its upper part, in turn passing up into interbedded sandstone mudstone and limestone of the Llandeilo Flags Formation.

The Abergwilli Formation was formerly known as the *Didymograptus bifidus* Beds, named after the abundant tuning fork-shaped graptolite fossils preserved at certain horizons (Strahan et al., 1909). At the principal locality for the *Didymograptus bifidus* Beds in Llanvirn Quarry (SM7980 3076) (included in the Ordovician GCR site for Abereiddi Bay reported in Rushton et al., 1999), strata of equivalent age are included within the Aber Mawr Formation. However recognition of significant horizons of burrow mottled, oxic facies horizons within the shales exposed between the Carn Goch Anticline and the Meidrim road section to the southwest (SN287 203 to SN289 208) during the recent resurvey of these areas by the BGS (BGS, 2007; 2008; Wilby et al., 2007; Schofield et al., 2009) led to them being included in a separate Abergwilli Formation. The relationship between these two lithostratigraphic units has yet to be established.

Breinant comprises an incised stream section with the bed, and locally the banks of the stream being entirely exposed for a distance approximately across strike of around 1 Km. The formation is of Lower Llanvirn, Abereiddian age (Williams, 1953) and comprises brown-weathering, black mudstone interlayered with units of micaceous, dark grey mudstone with prominent large burrow mottles and laminated hemipelagic mudstone. The site also preserves scattered thin structureless beds of

fine grained sandstone, fine to coarse grained tuffaceous sandstone containing abundant clasts of feldspar and mafic minerals as well as thin horizons of soft bentonitic clay interpreted as former air fall volcanic ash deposits. The formation was interpreted by Schofield et al. (2009) as having been deposited in a sediment starved distal shelf environment under largely dysaerobic conditions where periodic oxygenation allowed burrowing benthos to become established.

References:

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RUSHTON, A W A, OWEN, A W, OWENS, R M, and PRIGMORE, J K. 1999. *British Cambrian to Ordovician Stratigraphy*. Geological Conservation Review Series, 18. (Peterborough: Nature Conservancy Council).

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type Llandeilo (Ordovician), Wales. *Palaeogeography, Palaeoclimatology, Palaeoecology*, Vol. 34, 285-314.

WILLIAMS, A. 1953. The geology of the Llandeilo district, Carmarthenshire. *Quarterly Journal of the Geological Society, London*, Vol. 108, 177-205.

WILLIAMS, A, LOCKLEY, M G, and HURST, J M. 1981. Benthic Palaeocommunities represented in the Ffairfâch Group and coeval Ordovician successions of Wales. *Palaeontology*, Vol. 24, 661-694.

SECTION B

PRACTICAL CONSIDERATIONS:

Please score Accessibility and Safety Red Amber or Green

Accessibility: Red



Comment: The section is located on private land so permission should be sought before entering. The stream section is deeply incised with banks that are wooded and overgrown. The section require walking along the river bed for much of its length.

Safety: Amber



Comment: Care should be taken when entering the stream as the banks are locally overgrown and slippery. Care should also be taken when walking the section as the rocks can be slippery and there are locally deep pools which may require exiting onto the banks to negotiate. Carte should also be taken after periods of high rainfall, after which high water levels and flow rates may make the stream impassable.

Conservation status:

There are no known conservation designations of this RIGS

OWNERSHIP/PLANNING CONTROL:

Owner/tenant: Unknown

Planning Authority: Carmarthenshire County Council

Planning status/constraints/opportunities:

There are no known planning constraints or opportunities

CONDITION, USE & MANAGEMENT:

Present use:

Site condition: Overgrown banks can make for difficult access

Potential threats: None known

Site Management: could benefit from a clear access point

SITE DEVELOPMENT:

Potential use (general): Academically important

Potential use (educational):

Other comments:

Photographic Record



Typical exposure of Aberwilli formation cleaved mudstones in the Breinant stream section



Typical exposure of Aberwilli formation cleaved mudstones in the Breinant stream section



Pale grey bentonite horizon.