



## South Wales RIGS Group Site Record RIGS Description

**SECTION A**

General	South Wales
<b>Site Name:</b> Afon Bran river cliffs and quarry	<b>File Number:</b> Site_RAW_JRD_13
<b>RIGS Number:</b> 650	<b>Surveyed by:</b> RA Waters & JR Davies
<b>Grid Reference:</b> SN 7421 2814	<b>Date of Visit:</b> 2010
<b>RIGS Category:</b> Scientific, historical	<b>Date Registered:</b>  <b>Owner:</b> Mandinam Farm <b>Planning Authority:</b> Carmarthenshire County Council
<b>Earth Science Category:</b> Stratigraphy, Palaeontology, Historic	
<b>Site Nature:</b> Track floor and quarry section	<b>Documentation prepared by:</b> Jerry Davies
<b>Unitary Authority:</b> Carmarthenshire County Council	<b>Documentation last revised:</b> 31 <sup>st</sup> January 2011
<b>OS 1:50,000 Sheet:</b> 160	<b>Photographic Record:</b> Attached
<b>OS 1:25,000 Explorer Sheet:</b> OL12	
<b>BGS 1:50,000 Sheet:</b> E212	
<p><b>RIGS Statement of Interest:</b> This site forms part of a network of early Silurian sites (RIGS and GCR) in the type area for the Llandovery Series. Collectively, these sites represent the key sections in the local geology that underpin its international importance and demonstrate significant recent discoveries.</p> <p>The richly fossiliferous nature of strata exposed along the Afon Bran attracted the attention of 19<sup>th</sup> century collectors and, in the 20<sup>th</sup> century, of Jones (1925, 1949) and Williams (1951). As a result, the type specimens of many Silurian brachiopod species were obtained from these beds. The shelly and graptolite fossil assemblages obtained by Jones and Williams underpinned their regional synthesis of the Llandovery stratigraphy. This strongly influenced the later work of Cocks et al. (1984), and, as a consequence, has a major impact on international correlation. The sections are now degraded, but recent work by BGS has confirmed the importance of the fossils they contain. Key species of the brachiopods <i>Eocoelia</i> and <i>Stricklandia</i> have been shown to pre-date the first appearance in the Llandovery area of <i>sedgwickii</i> Biozone graptolites (Davies et al. in press). In their revised stratigraphical model, the effects of erosion and overstep in this southern sector of the Type Llandovery area are shown to have been important.</p> <p>Fossiliferous river cliff, track floor and quarry sections in the region of the Afon Bran are of historic importance in context of Silurian stratigraphy and, in supporting an alternative stratigraphical interpretation that questions existing correlations, these sections and their faunas continue to have international relevance.</p>	

### Geological setting/context:

The importance of currently degraded exposures along the south bank of the Afon Bran to the understanding of early Silurian geology in the Llandovery area and internationally cannot be underestimated. Highly fossiliferous levels were collected by early workers (see Jones, 1925) and, following further work by Jones, his student Alwyn Williams (1951) and the taxonomic revisions of Cocks (1978), they were established the type sections for many Silurian brachiopod species. Moreover, the discovery by Jones (1925) of *sedgwickii* Biozone graptolites was fundamental to the stratigraphical model he erected for the early Silurian succession of the region. In allowing key brachiopod species to be dated by graptolites, these rocks provided a 'fixed point' in the local stratigraphy that went unchallenged during subsequent investigations (Jones & Williams, 1949; Cocks et al., 1970; 1971) including those that culminated in the selection of the Llandovery area as the global standard for early Silurian rocks (Cocks et al., 1984; Cocks, 1989). Hence, Jones' (1925) discoveries continue to influence international correlations which require brachiopod assemblages to be related to the standard graptolite biozonation now in place for the Silurian (Bassett, 1989; Bassett & Rong, 2002; Zalasiewicz et al., 2009). The site has been described in field guides by Cocks (1971) and Siveter et al. (1989), however its absence from the Geological Conservation Review undertaken by Aldridge et al. (2000) marks a serious omission.

Recent work by BGS on the Afon Bran sections has cast doubt on these earlier stratigraphical interpretations, but, in so doing, further highlighted the importance of these exposures (Davies et al., 2010; in press). Jones (1925) recognised a sandstone-dominated succession that was strongly inverted and which, though dipping to the north-west, younged to the southeast. In ascending stratigraphical sequence he identified strata of his A division, succeeded by units he assigned to his C1 division. It was from the latter that he recovered the *sedgwickii* Biozone graptolites and from levels within this same unit that other workers have obtained the stratigraphically important brachiopods *Stricklandia lens progressa* and *Eocoelia haemispherica*. From a key level in the local stratigraphy, the so called 'Sefin Shales', Williams (1951) described a rich and distinctive brachiopod fauna that included abundant *Leptostophia tenuis* and *Giraldiella protensa*; these beds were also included in Jones' C1 division. Cocks et al. (1984) termed the A division strata Goleugoed Formation and included the C1 beds in their Rhydings Formation.

The BGS work has confirmed the inverted nature of the succession and presence of bioturbated muddy sandstones with scattered, thin only partially burrowed sandstone beds, at the base, comparable to Jones' A division (Goleugoed Formation). The Rhydings Formation has been revised and sandstone-dominated parts now constitute the Cefngarreg Sandstone Formation (BGS, 2008; Schofield et al., 2009). Parts of Jones' C1 division exposed near the former site of a footbridge, to the north-west of small tributary stream and farm track, comprising muddy, strongly burrow-mottled sandstones with highly fossiliferous decalcified bands and lenses, are now assigned to this unit. It is in these fossiliferous levels that key species of *Stricklandia* and *Eocoelia* are abundant and which widely acknowledged to have yielded the type locality for *S. lens progressa*. However, BGS viewed these beds as occupying a level in the local stratigraphy equivalent to Jones' C2 or C3 divisions. BGS recognised track floor and stream exposures in the succeeding 'Sefin Shales' as the basal part of Jones' C4 division – the Ydw Member of the Wormwood Formation (Schofield et al.,

2009). It is from both this shale unit, and the overlying fossiliferous, dark grey, muddy sandstones exposed in a degraded trackside quarry, that the key graptolite taxa *Stimulograptus sedgwickii* and *Neolagarograptus tenuis* have been obtained (Cocks, 1970; Davies et al., 2010). Work elsewhere in the type area has confirmed that it is the Ydw Member that marks the entry of such *sedgwickii* Biozone graptolites (Davies et al., in press).

This revised stratigraphical interpretation has important implications; it shows that key brachiopod taxa previously thought to first appear in the *sedgwickii* Biozone are present in earlier beds; and that throughout the Type Llandovery area strata equivalent to Jones' C1 division (viz Rhydings and Cefngarreg Sandstone formations) and the shelly fossils they contain are significantly older than this biozone. The role the Afon Bran section has played in the understanding of the Type Llandovery stratigraphy underlines its historical significance, but recent revaluation of exposures and their fossils demonstrates its continuing importance as site of stratigraphical and palaeontological interest that need to be conserved for future study. However, this importance is not reflected in the current state of the exposures which are extensively overgrown and degraded.

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## SECTION B

### PRACTICAL CONSIDERATIONS:

Please score Accessibility and Safety Red Amber or Green

#### Accessibility:

x

Comment: Access to parts of the section north of the tributary stream and track is made difficult by fallen trees; access to the trackside quarry is also hindered by a fallen tree.

#### Safety:

x

Comment: Fallen trees and slippery slopes need to be negotiated in parts of the section

**Conservation status:** There are no known conservation designations of this RIGS

### OWNERSHIP/PLANNING CONTROL:

**Owner/tenant:** Mandinam Farm

**Planning Authority:** Carmarthenshire County Council

#### Planning status/constraints/opportunities:

There are no known planning constraints or opportunities

### CONDITION, USE & MANAGEMENT:

**Present use:** River cliffs, tributary stream, track floor and trackside quarry exposures

**Site condition:** Middle parts of the section (Cefngarreg Sandstone exposures) are extensively degraded and overgrown; Wormwood Formation exposures in the trackside quarry are becoming overgrown.

**Potential threats:** Continued vegetation growth will render parts of the section in accessible.

**Site Management:** Requires urgent attention to reduce current vegetation cover and improve access; ongoing monitoring of the site is required.

### SITE DEVELOPMENT:

**Potential use (general):** Fossiliferous river cliff, track floor and quarry sections in the region of the Afon Bran are of historic importance in context of Silurian stratigraphy and are of interest to international researchers.

**Potential use (educational):** Potentially important as site for higher education research.

### Other comments:

Failure to make this section a GCR site was a missed opportunity to signal its historical and ongoing importance and need for conservation. Any future revisiting of the GCR process should seek to include the Afon Bran site.

## Photographic Record



Photograph 1. Trackside quarry in Wormwood Formation south of Afon Bran; group are stood on track floor exposures in Ydw Member (= 'Sefin Shales' of Williams, 1951)