

South Wales RIGS Group Site Record RIGS Description

SECTION A

General	South Wales
Site Name: Glyn-moch track section, Crychan Forest	File Number: Site_RAW_JRD_9
RIGS Number: 646	Surveyed by: J R Davies and R A Waters
Grid Reference: SN 8158 3760 to 8195 3765	Date of Visit: September 2010
RIGS Category: Scientific, historical, educational	Date Registered:
Earth Science Category: Stratigraphical, Palaeontological, Historical, Sedimentological	Owner: Forestry Commission Planning Authority: Carmarthenshire County Council
Site Nature: Forestry track cutting	Documentation prepared by: J R Davies
Unitary Authority: Carmarthenshire County Council	Documentation last revised: 27 th January 2011
OS 1:50,000 Sheet: 160	Photographic Record: Attached
OS 1:25,000 Explorer Sheet: 187	
BGS 1:50,000 Sheet: E212 (Brecon)	
<p>RIGS Statement of Interest: This site forms part of a network of early Silurian (Llandovery) sites (RIGS and GCR) in the international type area for the Llandovery Series. Collectively, these sites represent the key sections in the local geology that underpin its international importance and demonstrate recent scientific discoveries. The Glyn-moch RIGS section in Crychan Forest forms part of an existing GCR site described by Aldridge et al. (2000), but significant new discoveries have led to the radical re-evaluation of the site offered by Davies et al. (2010; in press). New graptolite finds have allowed the section to be reliably dated for the first time and confirm the presence of the Wormwood Formation as previously suggested by Cocks et al. (1984). However, it has now been shown that a major intra-Llandovery slide and slump complex truncates the upper part of the local Wormwood Formation succession. A basal slide plane that cuts out c.60 m of the underlying beds, and an overlying mélangé with blocks and pillows of sandstone are particularly well exposed at this site.</p> <p>The section is important in constraining the age of the Wormwood Formation and the position within the Type Llandovery stratigraphy of one of the key early Silurian fossil horizons – the <i>sedgwickii</i> graptolite Biozone. The impact of down slope sliding and slumping shortly after deposition is now known to have been significant in parts of the Type Llandovery area and the Glyn-moch site provides an important and accessible section revealing the style and scale of these effects.</p>	

Geological setting/context:

The Glyn-moch GCR site is an extensive, readily accessible, forestry track cutting, to the east of the now ruined Glyn-moch farm, that exposes a mid to late Llandovery succession (Photos. 1 & 2). This comprises largely south-eastwards dipping muddy sandstones with subordinate mudstones and sandy mudstones. The description of the GCR site by Aldridge et al. (2000) was based on the earlier account of the Type Llandovery stratigraphy of Cocks et al. (1984). The site was said to expose the Rhydings Formation and the overlying Wormwood Formation, both Aeronian (mid Llandovery) in age, and a succeeding late Llandovery (Telychian) unit, the Cerig Formation. However, reliable fossil data to support this interpretation was lacking. During the recent BGS re-survey of the region, usage of the term Rhydings Formation was revised (BGS, 2005 a, b and 2008). It was retained for some units of Aeronian mudstone, but associated sandstone-dominated units were included in a newly erected Cefngarreg Sandstone Formation. Thus, Barclay et al. (2005) included much of the Glyn-moch section in the Cefngarreg Sandstone Formation. Following new fossil discoveries, Davies et al. (2010) have confirmed that the easternmost sandstones exposed in the section are indeed correlatives of the Wormwood Formation as recognised by Cocks et al. (1984) to the south. More significantly, however, Davies et al. (2010) have shown that in easternmost parts of the GCR site, syndepositional slope failure has existed much of the original succession and upper parts of the formation now comprise slumped and de-stratified 'disturbed beds' (Figure 1).

The proposed Glyn-moch RIGS occupies the eastern part of the existing GCR site and reflects the new observations and interpretations. It includes, at its western end, the contact between the newly recognised Wormwood Formation and the older, underlying Cefngarreg Sandstone Formation; the whole of the exposed Wormwood Formation succession; the disturbed units and their transition, at the eastern limits of the site, into the overlying Cerig Formation. The succession consistently youngs to the south-east, but bedding orientations throughout the section vary from vertical to strongly overturned with south-westerly dips (NB. throughout the following account, the terms 'upwards', 'overlain' or 'succeeded' are used in the stratigraphical sense). Three thin, white-weathering, clay bentonite beds, representing diagenetically modified volcanic ash bands, are present in the section (Figure 1).

At the western end of the RIGS, thick beds of burrow-mottled green-grey Cefngarreg Sandstones Formation are overlain by a 10 m unit of grey mudstones with laminae and thin beds of orange-weathering shelly sandstone. Davies et al. (2010) recognised this as the basal Ydw Member of the Wormwood Formation (Photo. 1). From this unit they recovered *Stimulograptus sedgwickii*, *Neolagarograptus cf. tenuis* and *Rastrites* sp., an assemblage diagnostic of the lower *sedgwickii* graptolite Biozone. This is only the second site in the Type Llandovery area where this critical assemblage has been proven and the only site in central succession where loss of strata through erosion and non-sequence is not a factor (Davies et al., 2010; in press).

Together with its basal member, the exposed Wormwood Formation comprises a thickening and coarsening-upwards sequence. Levels of bioturbation increase rapidly above the Ydw Member and medium to thick beds of borrowed muddy sandstone dominate the remainder of the section in the formation. Davies et al. (2010) interpreted this facies succession as the product of a westward progradation of

shallower thoroughly bioturbated sands over deeper, less burrowed, more muddy facies.

The upper, strongly inverted parts of the exposed Wormwood Formation succession form the upper part of the cutting east of the bend in the forestry track. In contrast, lower levels of the cutting reveal a succession which includes a mélange of sandstone blocks and pillows set in a mudstone matrix, large rafts of bedded strata and disturbed grey mudstone. The sharp, irregular contact between this chaotic unit and the sandstones is interpreted as a cross-cutting synsedimentary slide plane that truncates the upper part of the Wormwood Formation (Figures 1 & 2; Photo. 2).

Though physically beneath the Wormwood Formation sandstones in the cutting, this disturbed unit is younger in age. It was the product of down-slope instability and slumping and the exposed contact is the northern margin a major submarine slide that affected the Wormwood Formation for several kilometres to the south (BGS, 2005b; Davies et al., 2010).

At the eastern end of the RIGS section, the more muddy upper parts of the disturbed succession are overlain by undisturbed, green, borrow-mottled mudstones typical of the Telychian Cerig Formation (Figure 1). Cocks et al. (1984) recovered the long-ranging graptolite *Pseudoclimacograptus* from these strata.

The effects of syndepositional sliding and slumping are now widely recognised in the Type Llandovery area and what was once thought to be an intact early Silurian succession is now known to include levels where strata has been displaced and/or removed. The Glyn-moch RIGS provides some of the best and most accessible exposures through such a disturbed level and its margin in the area. Recognition of the basal Wormwood Formation Ydw Member and its diagnostic *sedgwickii* Biozone fossils underlines the importance of the site in the context of the newly revised Type Llandovery stratigraphy and facies architecture proposed by Davies et al. (2010; in press) and makes the case for the current GCR designation to be revised and upgraded.

References:

ALDRIDGE, R J 2000. The Llandovery Series. 69-180 *in* British Silurian Stratigraphy. ALDRIDGE, R J, SIVETER, DAVID J, SIVETER, DEREK J, LANE, P D., PALMER, D and WOODCOCK, N H. (editors). *Geological Conservation Review Series*, No 19. (Peterborough: Joint Nature Conservation Committee).

BARCLAY, W J, DAVIES, J R, HUMPAGE, A J, WATERS, R A, WILBY, P R, WILLIAMS, M and WILSON, D. 2005. Geology of the Brecon district. *Sheet explanation of the British Geological Survey*. Sheet 213 (England and Wales).

BRITISH GEOLOGICAL SURVEY. 2005a. *Builth Wells*. *England and Wales Sheet 196*. *Solid geology, 1: 50 000*. British Geological Survey: Nottingham.

BRITISH GEOLOGICAL SURVEY. 2005b. *Brecon*. *England and Wales Sheet 213*. *Bedrock and Superficial Deposits, 1: 50 000*. British Geological Survey: Nottingham.

BRITISH GEOLOGICAL SURVEY. 2008. *Llandovery*. *England and Wales Sheet 212*. *Bedrock and Superficial Deposits, 1: 50 000*. British Geological Survey: Nottingham.







COCKS, L R M, WOODCOCK N H, RICKARDS R B, TEMPLE, J T and LANE P D. 1984. The Llandovery Series of the Type Area. *Bulletin of the British Museum (Natural History)*,

Geology Series Vol. 38, 131-182.

DAVIES, J R, WATERS, R A, ZALASIEWICZ, J A, MOLYNEUX, SG, VANDENBROUCKE, T R A and WILLIAMS, M. 2010. A revised sedimentary and biostratigraphical architecture for the type Llandovery and Garth areas, Central Wales: a field guide. *British Geological Survey Open Report*, OR/10/037.

DAVIES, J R, MOLYNEUX, SG, WATERS, R A, WILLIAMS, M, ZALASIEWICZ, J A, VANDENBROUCKE, T R A , SCHOFIELD, D I and WILSON, D. In press. A revised sedimentary and biostratigraphical architecture for the Type Llandovery area, Central Wales. *Geological Magazine*

SECTION B

PRACTICAL CONSIDERATIONS: Please score Accessibility and Safety Red Amber or Green			
Accessibility:			X 
Comment: Easily accessed forestry cutting. May be periodically inaccessible due to forestry operations			
Safety:			X 
Comment: Forestry track; need to be aware of periodic forestry operations and traffic			
Conservation status: GCR site in need of upgraded description and designation in the light of significant recent work			

OWNERSHIP/PLANNING CONTROL: Owner/tenant: Forestry Commission Planning Authority: Carmarthenshire County Council Planning status/constraints/opportunities: There are no known planning constraints or opportunities
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CONDITION, USE & MANAGEMENT: Present use: Forestry track section; part of GCR site Site condition: Good at the moment (recently cleared by FC/CCW) Potential threats: Prone to become overgrown and mudstone parts of the section to become degraded Site Management: Requires growth of vegetation to be controlled if critical contacts are to remain visible and access to key fossil localities maintained. However, clearing immediately prior to periods of study remains a viable, if time consuming option

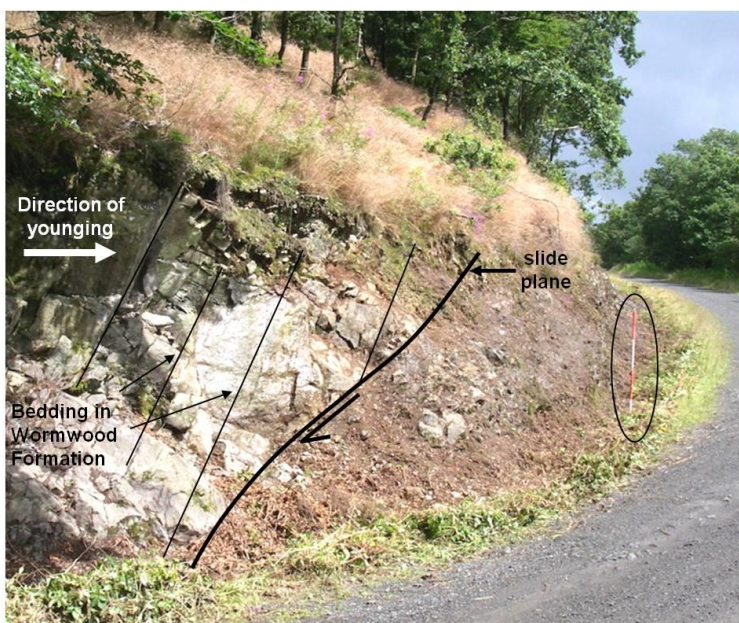
SITE DEVELOPMENT: Potential use (general): Potential use (educational): The site provides excellent exposures of the margin of a major synsedimentary slide complex and overlying disturbed facies that has value for university teaching
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Other comments:

Photographic Record

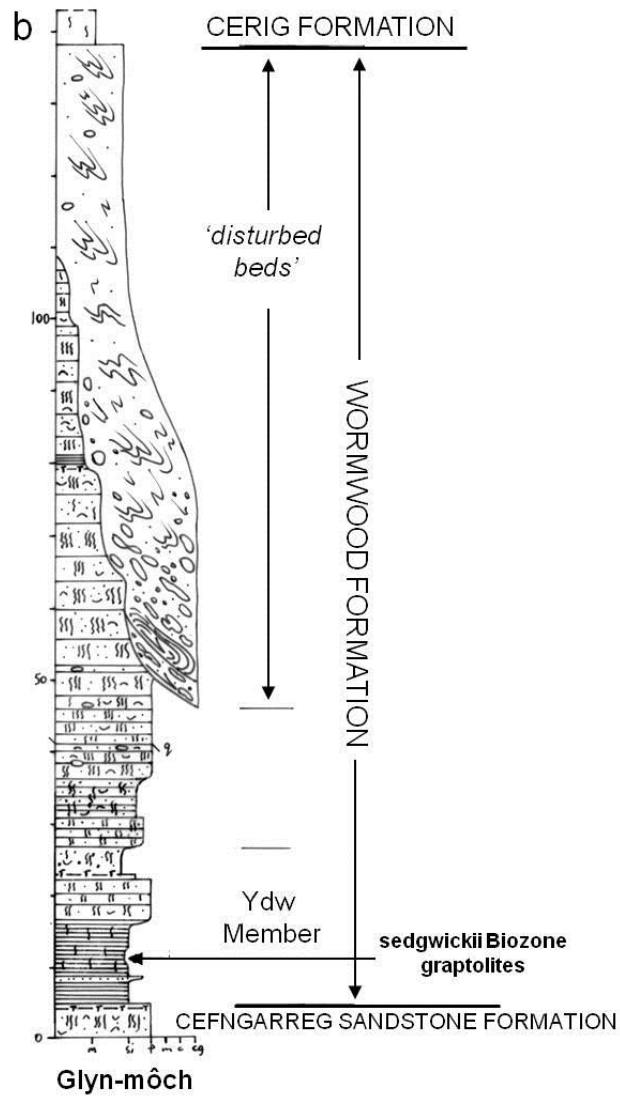


Photograph 1. Western part of the Glyn-moch track cutting, Crychan Forest, showing exposures in the basal Wormwood Formation Ydw Member (base arrowed); graptolites diagnostic of the *sedgwickii* Biozone have been recovered from between the two marker poles (note, strata are inverted and young from right to left).



Photograph 2. Mélange with blocks of sandstone (right) overlying basal slide plane of major synsedimentary slump truncating the Wormwood Formation (left), Glyn-moch track section [SN 8174 3751], Crychan Forest (note, strata are inverted and young from right to left).

Annotated Sketch











- KEY**
-  Burrow-mottled sandstone & muddy sandstone
 -  Slumped & disturbed strata
 -  Shell debris (inc. crinoid)
 -  Increasing levels of bioturbation
 -  Rottenstone nodules
 -  Tuff bed
 -  Synsedimentary slide plane
 -  Quartz vein
 -  Outsize pebbles & granules

Figure 1. Modified sedimentary field log of the Glyn-moch track section (For key to grain sizes at base of log see Site_RAW_JRD_6)

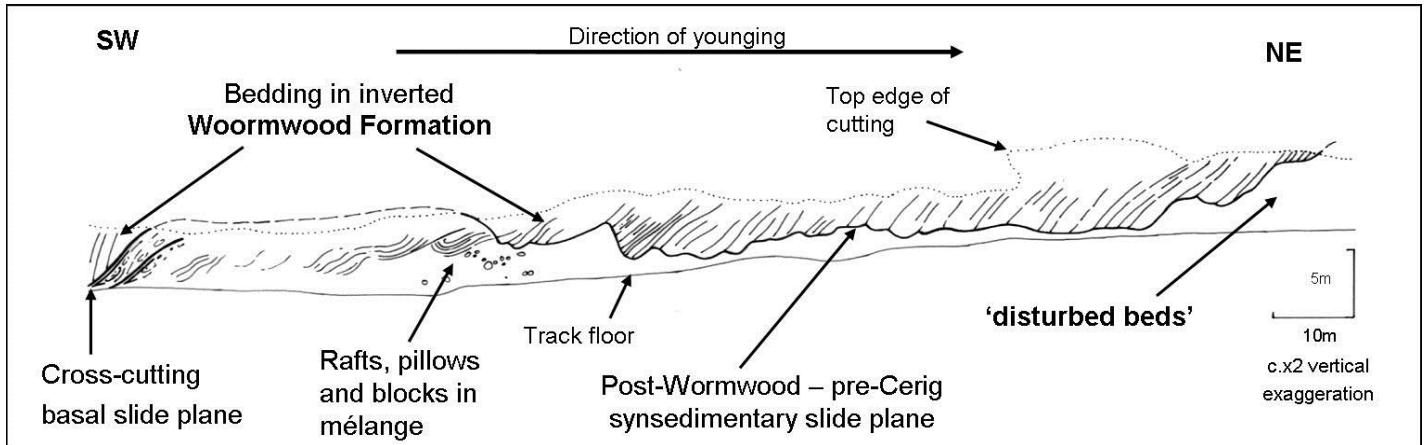


Figure 2. Synsedimentary slide and mélangé exposed in the upper part of the Glyn-moch track section.