



South Wales RIGS Group Site Record RIGS Description

SECTION A

General	South Wales
Site Name: Lock's Common, Porthcawl	File Number: Site_RAW_JRD_47
RIGS Number: 621	Surveyed by: RA Waters & JR Davies
Grid Reference: SS 8030 7800 to 8100 7680	Date of Visit: October 2010
RIGS Category: Scientific, educational, aesthetic	Date Registered:
Earth Science Category: Stratigraphic, palaeontological, sedimentological	
Site Nature: Coastal cliffs and platforms	Owner: Unknown Planning Authority: Bridgend County Borough Council
Unitary Authority: Bridgend County Borough Council	Documentation prepared by: Jerry Davies
OS 1:50,000 Sheet: 170	Documentation last revised: 1 st February 2011
OS 1:25,000 Explorer Sheet: 151	Photographic Record: Embedded in text
BGS 1:50,000 Sheet: E262	
<p>RIGS Statement of Interest: This forms part of a network of key sites (RIGS & GCR) which collectively present a synthesis of facies development of the lower Carboniferous (Dinantian) carbonate ramp/platform in South Wales including a number of sites of historical and educational interest.</p> <p>The coastal cliffs in the Porthcawl area were the first in which intra-Carboniferous emergent features were recognised and the Lock's Common section was one of the key localities cited by Tiddeman (in Strahan and Cantrill, 1904 and Wilson et al., 1990). It allows the textural variations of the limestones between these surfaces and their fossil assemblages to be examined and is a key section in the Oxwich Head Limestone Formation in the Vale of Glamorgan.</p> <p>The site exposes a cyclical succession of shallow water limestones typical of the late Dinantian Oxwich Head Limestone Formation in South Wales. Distinctive hummocky bedding planes display the effects karst and soil development and record periods when sea level fell, limestone deposition was interrupted, and the platform surface became emergent. The limestones overlying these surfaces formed as sea levels rose and the platform was re-submerged. Locally abundant fossils including corals and other shell remains, together with microscopic foraminifera, allow the rocks to be dated and confirm an Asbian Stage age.</p>	

Geological setting/context:

The late Dinantian Oxwich Head Limestone has its type section in Gower, but also crops out extensively in the Porthcawl area of South Wales. It records tropical limestone accumulation on a shallow-water, low gradient, equatorial platform (Wilson et al., 1990). It was during the Geological Survey's early mapping of the formation's eastern succession that significant discoveries about the nature of this rock unit were made. Tiddeman (in Stahan and Cantrill, 1904) was the first to recognise that distinctive hummocky surfaces with associated red clay seams and rubbly zones were the product of penecontemporaneous emergence followed by soil and karst formation. The number of such surfaces showed that limestone accumulation was frequently interrupted. Following work in South Wales and elsewhere (e.g. Vaughan, 1905; Dixon & Vaughan, 1912; George, 1933, 1974) such surfaces were shown to be widespread within strata then referred to as *Dibunophyllum* Zone age and at other key levels in the regional Carboniferous Limestone succession. Subsequent research showed that these 'palaeokarstic' levels record periods when global Dinantian sea level fell; limestone deposition only resuming when sea levels rose again and the platform surface was re-submerged (Ramsbottom, 1973). The late lower Carboniferous succession in South Wales, subsequently labelled Asbian in age (George et al., 1976), was thus shown to be cyclical in nature. Systematic variations in the limestone facies from lower units rich in lime mud (wackestones and packstones) to strongly winnowed grainstones shows that each cycle, between its defining palaeokarstic surfaces, records an upwards shallowing. Diagenetic effects such as pseudobrecciation and mottling, a feature of Asbian limestones, as also well seen.

The costal cliffs at Lock's Common afford an accessible and well exposed section in these cyclical strata (Photos 1 to 4). Gentle dips and minor faulting allow the same beds to be examined at several different points and the variations in limestone type within each cycle to be assessed. More significantly, extensive bedding plane exposures of the cycle-defining palaeokarstic surfaces display the relationship of overlying red fossil soils (paleosols) and associated alteration effects (calcretisation) within the immediately underlying limestones (Wilson et al., 1990).

At the northern end of the section, in the vicinity of Gwter Gryn-y-locs, pale grey grainstone units with ooids exposed at the base of the cliff, below the lowest exposed palaeokarstic surface, record deposition under high energy conditions in very shallow water (Photo 1). These are succeeded by darker, thinner bedded packstones with mud-rich seams and partings. These were deposited in the deep waters and provide evidence for a rising sea level. These pass up into paler, thick-bedded packstones and grainstones with abundant rolled and abraded corals, including species of *Dibunophyllum*, *Palaeosmilia*, *Siphonodendron* (*Lithostrotion*) and *Syringopora*, and productid brachiopods. These levels, which display diagenetic mottling, record the higher energy conditions associated with subsequent shoaling. Abundant foraminifera present in these beds include the forms *Bibradia inflata* and *Nibelia nibelis*, both consistent with an Asbian age. The palaeokarstic surface which caps this cycle is well seen both at the northern end of the section and to the south, near Hutchins Point, where bedding plane exposures reveal its hummocky form and the locally rubbly nature of the underlying limestone (Photo 2). Impressions of fossil plant roots (*Stigmara*) have been recorded at the southern exposure in places where the overlying red clay paleosol has been eroded away. The base of the next cycle

comprises a irregular unit dark, shelly packstone which laps over the underlying palaeokarstic topography and marks the return of deeper conditions once more. The overlying packstones and grainstones include well developed pseudobrecciated and mottled zones (Photo 3) as well as rubbly levels with simple cylindrical and branching *thalasinoides*-like burrow systems. The uppermost beds of the section host a modern limestone pavement, but the presence of dark brown calcretised rootlets (rhizocretions) confirms that this is a palaeokarstic level as well.

The section at this site also exposes numerous minor faults with associated breccias and radial fibrous calcite veins formed during Mesozoic extensional tectonics. Examples of these are particularly well seen in the vicinity of Gwter Hopsog (Photo 4).

The Lock's Common cliffs provide accessible and excellent exposures in late Dinantian (Asbian) limestone cycles and allow systematic upwards changes in limestone facies to be examined. Fossils are common and age diagnostic; and the effects of Mesozoic faulting well displayed. This combination of features makes the site ideal for A level and undergraduate teaching purposes.

References:

- DIXON, E E L and VAUGHAN, A. 1912. The Carboniferous succession of Gower (Glamorganshire). *Quarterly Journal of the Geological Society of London*, Vol. 67, 477-571.
- GEORGE, T N. 1933. The Carboniferous Limestone Series in the west of the Vale of Glamorgan. *Quarterly Journal of the Geological Society of London*, Vol. 89, 221-271.
- GEORGE, T N. 1974. Lower Carboniferous rocks in Wales. 85-115 in T R OWEN (editor): *The Upper Palaeozoic and pot Palaeozoic rocks of Wales*, Cardiff: University of Wales Press.
- GEORGE, T N, JOHNSON, G A L, MITCHELL, M, PRENTICE, J E, RAMSBOTTOM, W H C, SEVASTOPULO, G D and WILSON, R B. 1976. A correlation of Dinantian rocks in the British Isles. *Special Report of the Geological Society of London*, No. 7.
- RAMSBOTTOM, WHC. 1973. Transgressions and regressions in the Dinantian: a new synthesis of British Dinantian stratigraphy. *Proceedings of the Yorkshire Geological Society*, 41, 261-291.
- STRAHAN, A and CANTRILL, TC. 1904. The geology of the South Wales Coalfield. Part VI. The country around Bridgend. *Memoir of the Geological Survey of Great Britain*, Sheet 262.
- WILSON, D, DAVIES, JR, FLETCHER, CJN and SMITH, M. 1990. The geology of the South Wales Coalfield, Part VI, the country around Bridgend. *Memoir of the British Geological Survey*, Sheet 261 and 262 (England and Wales).
- VAUGHAN, A. 1905. The palaeontological sequence in the carboniferous Limestone of the Bristol area. *Quarterly Journal of the Geological Society of London*, Vol. 61, 181-305.

SECTION B

PRACTICAL CONSIDERATIONS:

Please score Accessibility and Safety Red Amber or Green

Accessibility:



Comment: Easily accessible coastal cliffs and platforms served by coastal footpaths; access to parts of the section is tide dependant

Safety:



Comment: Steep cliffs; intertidal tidal parts of the section are prone to rapid inundation by rising tides; exposed to strong winds and storms

Conservation status:

There are no known conservation designations of this RIGS

OWNERSHIP/PLANNING CONTROL:

Owner/tenant: Unknown

Planning Authority: Bridgend County Borough Council

Planning status/constraints/opportunities:

There are no known planning constraints or opportunities

CONDITION, USE & MANAGEMENT:

Present use: Coastal cliffs with cliff top paths for recreational use

Site condition: Excellent

Potential threats: Rising global sea levels could eventually impact on accessibility

Site Management: Natural processes should maintain the site in good condition

SITE DEVELOPMENT:

Potential use (general):

Potential use (educational): Features on display provide a good educational resource for A level and undergraduate teaching

Other comments:

Photographic Record



Photograph 1. View of lowest limestone beds in the Lock's Common section exposed at Gwter Gryn-y-locs.



Photograph 2. Hummocky palaeokarstic surface overlain by red clay paleosol, near Hutchins Point, Lock's Common



Photograph 3. Pseudobrecciated limestones the upper part of the Lock's Common



Photograph 4. Mineralised Mesozoic fault and fault breccia exposed near Gwter Hopsog, Lock's Common