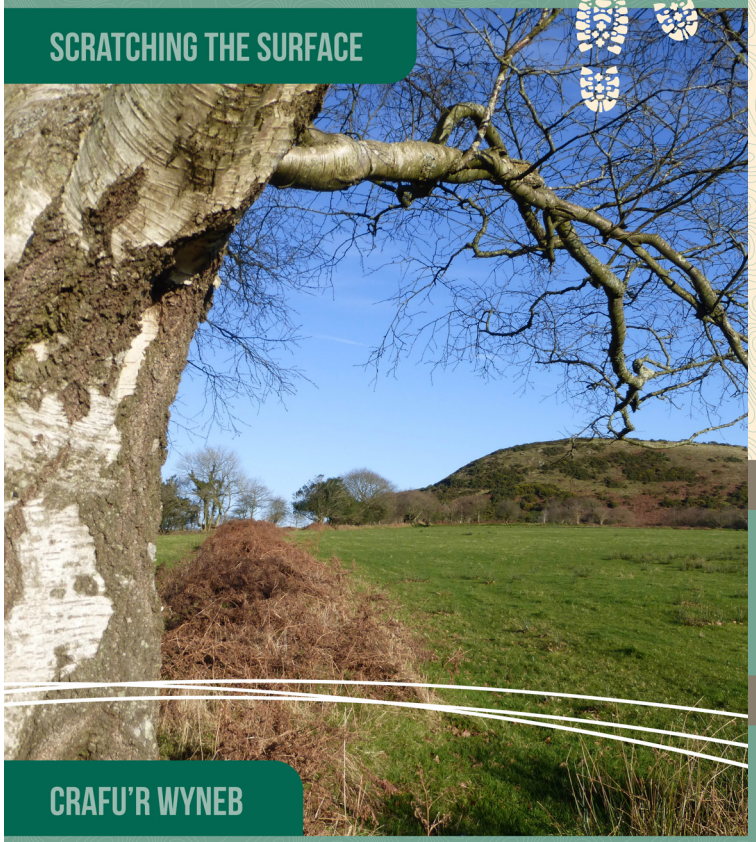
CWM CLYDACH AND GELLIONNEN CHAPEL

FORMING THE SOUTH WALES LANDSCAPE

Discover geology and landscape: walking trails in rural Swansea

9 KM
4 HOURS
GPS COMPATIBLE

SCRATCHING THE SURFACE



CRAFU'R WYNEB

CWM CLYDACH A CHAPEL GELLIONNEN

LLUNIO TIRWEDD DE CYMRU

Darganfod daeareg a thirwedd: llwybrau cerdded yn ardal Abertawe

9 KM
4 AWR
YN CYDWEDDU Â GPS

START GRID REF. SN 68274 02626

at the free car park for Cwm Clydach RSPB reserve. Buses to Craig-cefn-parc pass the reserve.

PATH CONDITIONS

The trail follows marked paths, which can be muddy. There are several stiles, and steep hills to reach B (up) and after H (down).

MAPS

Ordnance Survey 1:50,000 map 159 (Swansea & Gower)

1:25,000 Explorer map 165 (Swansea)

Geological Survey 1:50,000 Sheet 230 (Ammanford)

REFRESHMENTS

New Inn near the reserve entrance

SAFETY

Take care near the river. Grid references are for guidance only. Follow the Countryside Code (http://naturalresourceswales.gov.uk) and the Geological Fieldwork Code (www.rockwatch.org.uk/geological_code). Respect people, protect the environment and stay safe. Wear sensible clothing and footwear.

FURTHER INFORMATION

Local walking groups www.swansea.gov.uk/walking
Local geology www.swga.org.uk
For junior geologists www.rockwatch.org.uk
Geology and geological maps www.bgs.ac.uk
RSPB Cwm Clydach nature reserve www.rspb.org.uk/cwm_clydach
Gellionnen Chapel www.gellionnenchapel.org.uk
Clydach Heritage Centre www.clydachheritagecentre.com
Clydach Historical Society www.clydachhistoricalsociety.co.uk
Coal-mining heritage www.welshcoalmines.co.uk

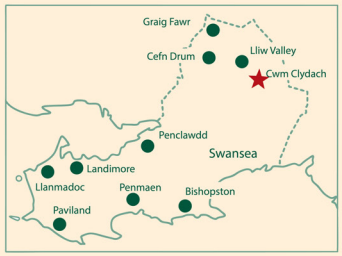
The Geology of South Wales: A field guide
by Gareth T. George (gareth@geoserv.co.uk, 2008)

Text and images: Geraint Owen, Siwan Davies (Swansea University)
Welsh translation: Dyfed Elis-Gruffydd
Design: iconcreativedesign.com

The wooded valley of Cwm Clydach, once the site of several coal mines, is now a nature reserve. This trail explores the valley and surrounding upland pastures, reaching remote Gellionnen Chapel, to explore how these landscapes have been shaped by the underlying geology. The trail is 9 km (5½ miles); allow half a day.

Mae dyffryn coediog Cwm Clydach, a oedd unwaith yn safle sawl pwll glo, bellach yn warchodfa natur. Mae'r daith hon yn archwilio'r dyffryn a'r ffriddoedd amgylchynol ac yn cyrchu capel anghysbell Gellionnen, er mwyn ystyried sut mae'r creigiau sy'n sail i'r ardal wedi dylanwadu ar y tirweddau hyn. Tua 9 km (5½ milltir) yw hyd y daith sy'n cymryd hanner diwrnod.

Look for other trails in this series!



SCRATCHING THE SURFACE

Discover geology and landscape: walking trails in rural Swansea

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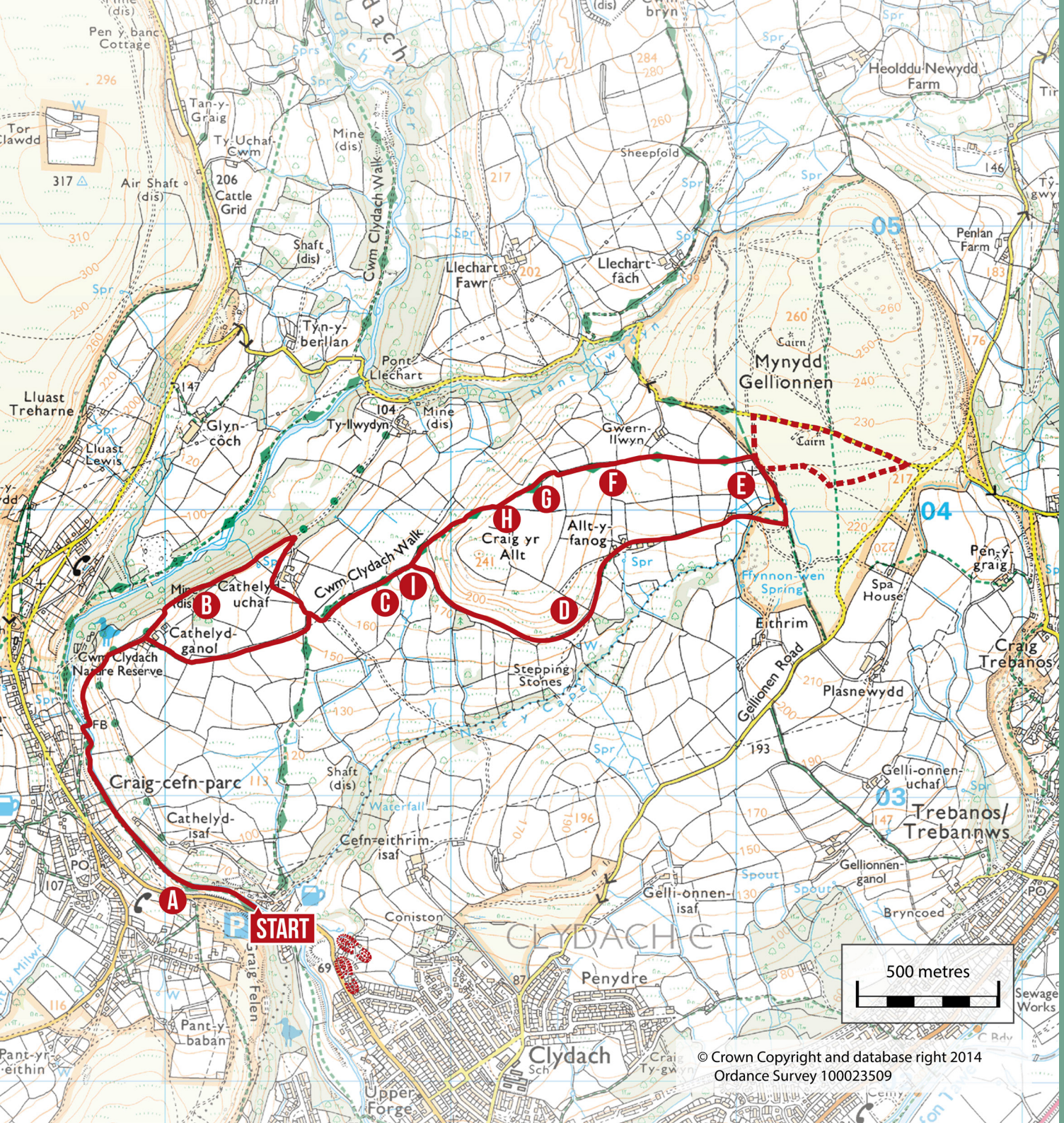
Darganfod daeareg a thirwedd: llwybrau cerdded yn ardal Abertawe

email: g.owen@swansea.ac.uk #scratchingthesurface
http://geography.swan.ac.uk/scratchingthesurface/

Swansea University Prifysgol Abertawe
City and County of Swansea Dinas a Sir Abertawe
Cronfa Amaethyddol Ewrop ar gyfer Datblygu Gwledig: Ewrop yn Buddsoddi mewn Ardaloedd Gwledig
The European Agricultural Fund for Rural Development: Europe Investing in Rural Areas
Llywodraeth Cymru Welsh Government



Follow the path through the RSPB reserve for 300 metres to a small bridge. [0.3 km; SN 68063 02696]

A The trail follows the route of a tramway serving coal mines that operated until the 1970s. You have passed old walls from mine buildings. Red water in some streams is due to a reaction between water flooding old workings and iron-rich minerals that are common in coal-bearing rocks, causing an environmental problem called acid mine drainage.

The cliff on the left is made of sandstone and mudstone. Similar rocks underlie the entire area. They are part of the Pennant Sandstones, formed in the Carboniferous period, 320 million years ago. The cliff is unstable and small landslips are common. Pieces of rock near the path contain fossil plants that grew at that time.

Acid mine drainage

Rock in the river bed is formed of horizontal layers (beds). The path edge by the river exposes coal-rich mining waste used to level the track bed. Coal is compressed peat, made from plant remains. Coal layers (seams) separated by beds of sandstone and mudstone form a sequence over 1.5 km thick in South Wales. Erosion has cut into this pile of rocks, forming today's land surface. The Graigola coal seam in Cwm Clydach is about 1.5 metres thick. It lies close to the valley floor, where it is covered by soil, and continues beneath the hills on either side.

Cwm Clydach

Continue on the path. Cross the river on a bridge, turn left and take the right fork, climbing out of the valley. At the top, go left along a lane. Keep left of the buildings (Cathelyd-ganol) on a grassy path marked Pont Llechart for 250 metres to a gate. [1.7 km; SN 68061 03705]

B There used to be coal mines in the valley below here, but evidence is now obscured by the woodland. Some trees may never have been cleared because of the steep valley sides, which are typical of valleys carved rapidly by flowing water.

Continue along the path. At a road, turn sharp right through a kissing gate on a marked path. Follow the path up the field, keeping right of the buildings, through 5 more kissing gates to a grassy track. Go along this for 50 metres. Go left through a gateway and follow the line of a bank then a hedge towards the hill of Craig yr Allt, to a kissing gate. [2.9 km; SN 68815 03798]

C The view over upper Cwm Clydach is a good place to consider our need for energy. Woodland conceals the scars from mining coal. The pylons carry electricity from power stations fuelled by oil, a buried pipeline carries gas, and some of the underlying rocks may host shale gas or coal-bed methane. Coal, oil and natural gas (methane) are fossil fuels, with finite stocks. Their use releases carbon dioxide into the atmosphere that has been stored in rocks for millions of years. Electricity can be generated from renewable sources like the wind turbines on the skyline, but these have a visual impact. All forms of energy come at a cost!

The flat-topped hill left of the wind turbines is underlain by tough sandstone, like Craig yr Allt ahead. Notice its stepped slope facing north (right). The cliff is the scar of a landslide and the buildings at its foot are on the slipped material. Large landslides occurred after the last glacial episode, about 20,000 years ago, when melting glaciers left steep valley sides unsupported.

Landslide west of Cwm Clydach

Go through two kissing gates, turn right and follow a path close to a fence on the right along the foot of Craig yr Allt, with views to the Swansea valley over 150 metres below. Stop 100 metres after joining a grassy track. [3.7 km; SN 69459 03609]

D The blocks along the path are sandstone. Some have impressions of fossil plants and if you look closely you can see sand grains cemented together. Sand was carried here over 300 million years ago by large rivers like today's Amazon.

The sandstone bedrock is covered by angular blocks of sandstone surrounded by loose sand. This is glacial till, deposited from melting ice as climate warmed at the end of the last glacial episode. Bedrock is only exposed where rivers, landslides or human activity have removed the till.

Fossil plants

Continue along the track. Cross a stile at a gate, keep right of a wall, left of a barn, and bear right onto a gravel track. Look for fossil plants in the rocks on the track. Go through a gate, cross a stream and bear left across rough ground to a gravel track. Turn left to Gellionnen Chapel. [4.8 km; SN 70080 04173]

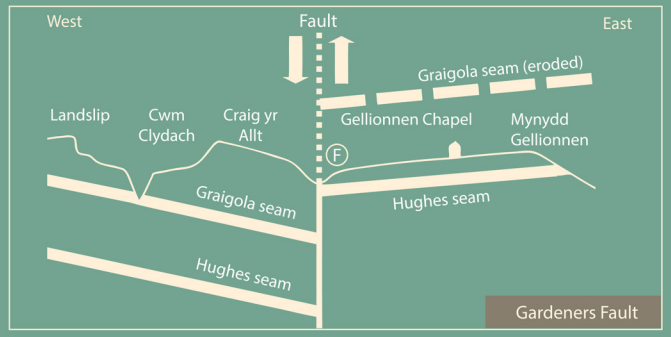
E Sandstone slabs near the chapel were smoothed by glaciers. Grazing in the last few hundred years has probably removed the soil and till. The track is covered with limestone chippings that have been quarried and brought here. The churchyard wall is made of quarried slabs of local sandstone, but the capping stones are white pebbly sandstone rich in the hard mineral quartz. This is Twrch Sandstone, which underlies the Coal Measures in the rock succession. The nearest exposures are over 20 km to the north and these rounded boulders were carried by glaciers and deposited near here as erratics when the ice melted. Gravestones in the churchyard are made of many different rock types; notice how the amount of weathering and lichen cover vary with rock type and headstone ages.

Gellionnen Chapel

Mynydd Gellionnen is underlain by another coal seam, the Hughes seam. Although you are over 150 metres above the floor of Cwm Clydach, the Hughes seam belongs 200 metres below the Graigola seam in the rock succession; you will find out why at F. If you want to explore Mynydd Gellionnen, follow the track past the chapel for 200 metres to a road. Turn right for 300 metres to an information panel. Continue 350 metres further along the road for a fine view of the Swansea Valley and the Brecon Beacons. Return to the chapel.

Leave the churchyard, turn left, cross a stile at the end of the wall and follow the hedge on the left. Cross 2 stiles to a third on top of a low stone wall in a dip. [5.4 km; SN 69594 04176]

F The dip marks the line of a fault. Movements of the rocks on either side of a fault generate earthquakes, but this fault is no longer active. Although erosion has worn the land surface on both sides of the fault to similar levels, rock layers on the west (ahead) are about 300 metres lower than on the east. This is why the coal seams beneath Mynydd Gellionnen are not continuous with those beneath Cwm Clydach. Broken rocks along the fault have been eroded to form the dip. This is the Gardeners Fault, one of many in the South Wales Coalfield.



Cross the stile and keep left of the fence, crossing to the right at a stile. Continue uphill with the fence on the left to a corner in the fence. [5.7 km; SN 69321 04114]

G Looking back, the hills forming the skyline above Gellionnen Chapel have short, steep slopes facing left and longer, gentler slopes to the right. They are made of sandstone and mudstone. Erosion easily removes the mudstone, but the bedding is not flat; the beds are tilted (dip) gently to the south (right), so the long, gentle slopes are dip slopes following sandstone bedding surfaces.

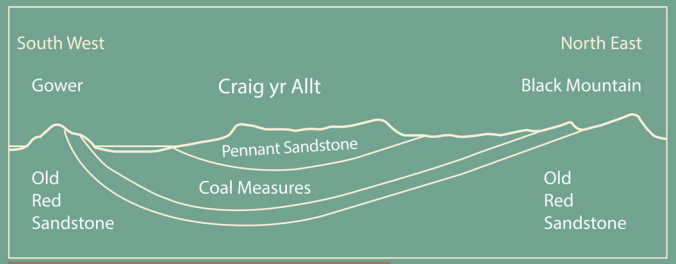
Scarp and dip slopes

Leave the fence and continue in the same direction, initially following a line of posts. Keep left of the gorse and a fence along a level path to a gap in a fence that crosses the path. [6.0 km; SN 69086 03955]

H The shape of Cwm Clydach bears witness to changing climate. A narrow inner valley is set within a broader, steep-sided valley, the typical U-shape of valleys carved by glaciers. In the last glacial episode, ice reached as far as Swansea Bay. It flowed from cold, upland areas to warmer, lower areas where it wasted away, carving the landscape as it did so. A larger glacier eroded the floor of the Swansea Valley to below today's sea level. When the ice melted, Cwm Clydach formed a "hanging valley" well above the Swansea Valley. There was probably a waterfall at the valley lip and the river rapidly cut the inner valley.

Lower Cwm Clydach

You may be able to see the Gower peninsula and Loughor Estuary. The spit of Whiteford Point is built on glacial moraine, debris that melted out at the edge of a glacier. The highest ground on Gower, and in the Black Mountain to the north, is underlain by Old Red Sandstone, which formed during the Devonian period, 400 million years ago. Here on Craig yr Allt, Old Red Sandstone is about 3000 metres beneath your feet! Before the rocks were uplifted and eroded 300 million years ago, they were squeezed into a downwarp, or syncline. Erosion has cut through this fold, leaving Coal Measures and Pennant Sandstones in the centre (the South Wales Coalfield) and older rocks to the north (Black Mountain) and south (Gower).



Section across the South Wales Coalfield

Upper Cwm Clydach

Go through the gap, turn right and follow the steep path down to the kissing gate you came through earlier. [6.3 km; SN 68868 03815]

I Look back at Craig yr Allt. The hill is asymmetrical like the skyline seen from G. But the steepest slope faces south, so the bedding dips to the north. Craig yr Allt is near the centre of the Coalfield syncline, where the dip of the rocks changes.

Craig yr Allt

Return through the 2 kissing gates, cross the field and turn right on the track. After 50 metres, at the next gate, turn left through a kissing gate, then shortly right through another kissing gate. Follow the hedge ahead across 3 fields and join a stony track to pass Cathelyd-ganol farm. Turn left down the lane then right on the path down to the bridge. As you return through the nature reserve, try to imagine the noise, bustle and smell just a few decades ago as people exploited the riches beneath the surface.

FINISH

Gellionnen Chapel