

LLANMADOC HILL

GOWER ROCKS AND SCENERY

Discover geology and landscape:
walking trails in rural Swansea

SCRATCHING THE SURFACE

CRAFU'R WYNEB

BRYN LLANMADOG

CREIGIAU A GOLYGFYDD GŴYR

Darganfod daeareg a thirwedd:
llwybrau cerdded yn ardal Abertawe

9.5 KM
4 HOURS
GPS COMPATIBLE



**START
GRID REF.**
SS 43987 93499

at the Whitford Beach car park
between Llanmadoc and Cwm
Ivy. Llanmadoc is served by bus.

PATH CONDITIONS

The trail follows marked paths. There
are several stiles. There is a steep
uphill section between A and B and
a longer, gentler climb to the summit
of Llanmadoc Hill (I).

MAPS



Ordnance Survey 1:50,000
sheet 159 (Swansea & Gower)
1:25,000 Explorer map 164
(Gower)
Geological Survey 1:50,000
Sheet 246 (Worms Head)



REFRESHMENTS

Community shop and pub
in Llanmadoc; seasonal
cafe at Lagadranta

SAFETY

Take care on roads. Grid references are for guidance only. Follow
the Countryside Code (<http://naturalresourceswales.gov.uk>) and
the Geological Fieldwork Code ([www.rockwatch.org.uk/geological_](http://www.rockwatch.org.uk/geological_code)
[code](http://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
Gower Society www.thegowersociety.org.uk
National Trust www.nationaltrust.org.uk
Wildlife Trust www.welshwildlife.org
Archaeology www.ggat.org.uk

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

A Guide to Gower edited by Don Strawbridge and
Peter J. Thomas (Gower Society, 1999)

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

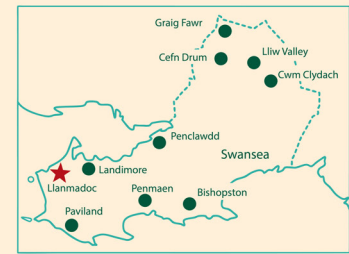
9.5 KM
4 AWR
YN CYDWEDDU
Â GPS

This strenuous trail explores
north-west Gower, following
the Wales Coast Path before
reaching one of the highest
points on the Gower peninsula
to discover how rocks influence
the Gower landscape. There are
spectacular views and delightful
picnic spots. The trail is 9.5 km
(6 miles); allow half a day.

Mae'r daith egniol hon yn
archwilio gogledd-orllewin Gŵyr,
gan ddiylun Llwybr Arfordir Cymru
cyn cyrraedd un o gopaon uchaf
Gŵyr er mwyn darganfod sut
y dylanwadodd y creigiau ar
dirwedd y penrhyn. Ar y daith ceir
golygfeydd trawiadol a lleoedd
picnic dymunol. Tua 9.5 km
(6 milltir) yw hyd y daith sy'n
cymryd hanner diwrnod.



Look for
other trails
in this series!



SCRATCHING THE SURFACE



CRAFU'R WYNEB

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walking trails in rural Swansea

Darganfod daeareg a thirwedd:
llwybrau cerdded yn ardal
Abertawe

© 2015 Geraint Owen and Siwan Davies (Swansea University)
email: g.owen@swansea.ac.uk #[scratchingthesurface](https://twitter.com/scratchingthesurface)
<http://geography.swan.ac.uk/scratchingthesurface/>





Turn right out of the car park. Pass the nature reserve entrance and some houses. Enter the National Trust Cwm Ivy property at a gate. Follow the lane to the second junction with the Wales Coast Path, by the entrance to Whiteford National Nature Reserve. [1.0 km; SS 43383 94079]

A Cwm Ivy Tor is made of Carboniferous Limestone. The layers (beds) formed as sediment on the floor of a sea that covered southern Britain 350 million years ago, in the early Carboniferous period. Much of the limestone is made of fossil shells. Many are related to creatures that live in warm, shallow seas today, showing that Britain was then in the tropics, south of the equator. Some of the lumpy patches have a cell-like structure and are fossil sponges called Chaetetes. The beds were originally horizontal, but are now tilted (dip steeply to the north).



Steeply dipping beds of Carboniferous Limestone

Follow the Wales Coast Path left across the dunes and up the wooded hillside. Notice how far uphill the wind-blown sand extends. Examine the rocky ground just after a gate. [1.4 km; SS 43133 93872]

B The limestone here contains fossil corals, brachiopods and crinoids. The Carboniferous Limestone in Gower is almost 1000 metres thick. It is not all the same, so geologists subdivide it. This is part of the Hunts Bay Oolite Group. Oolitic limestone is made of tiny spheres, each less than 1 mm across, which form in warm, shallow, wave-washed seas today. Look closely to see them.



Coral



Brachiopod

Oolitic limestone



Crinoid

Follow waymarks to the summit of Hills Tor, where the coast path turns left. [1.7 km; SS 42902 93959]

C Sand dunes forming the spit of Whiteford Point to the north are founded on a glacial moraine. This is debris that built up in front of a glacier in the Loughor valley during the last glacial episode. After the ice melted, Cwm Ivy Tor and Hills Tor were coastal cliffs, but wind-blown sand has built up against them and on Whiteford Point.



Whiteford Point

Follow the coast path towards Prissen's Tor. Zig-zag down towards the caravan park and turn right on a wide track behind the dunes. After a grassy area go through a gate and, after 50 metres, through another gate on the right to the beach. [2.8 km; SS 42442 93276].

D There are wind-blown sand dunes all around the Gower coast. Where did the sand come from? About 20,000 years ago, most of Britain was covered by an ice sheet. Sea level was 100 metres lower than today because so much water was locked up as ice. Meltwater streams deposited sand on what is now the floor of the Bristol Channel. As the ice retreated, sea level rose, pushing the sand landwards. Sand blown off the beaches formed dunes. Marram grass colonises shifting sand, stabilising the dunes, and the sand, salt, peat and limestone provide rich habitats for plants.



Sand dunes in Broughton Bay

Villages and churches on Gower were abandoned in medieval times because of sand encroachment. The cause may have been stormy conditions coinciding with the "Little Ice Age" when glaciers in the Alps and Scandinavia expanded, or overgrazing which removed vegetation.

The limestone around the foot of Prissen's Tor to your right has many fossils of creatures that lived in the Carboniferous seas 350 million years ago. Caves have yielded the bones of animals that lived here during the glacial episode, 20,000 years ago.

Follow the Wales Coast Path for 700 metres. Llanmadoc Hill, on the left, is your destination. Leave the Coast Path along a marked path on the left just before a caravan park. Go uphill through fields then through 2 gates onto a gravel track. [3.9 km; SS 42178 92659]

E Three rock types form the gravel: grey limestone, red sandstone, and conglomerate with white pebbles of quartz. The sandstone and conglomerate are from the Old Red Sandstone, which forms Llanmadoc Hill.



Conglomerate

The track becomes a surfaced lane: be aware of traffic. Pass houses on the left and stop just before houses on the right (Cockstreet) opposite a small quarry: do not enter. [4.7 km; SS 42600 92060]

F Red sandstone with horizontal beds can be seen in the quarry face and just outside the gate. This is part of the Old Red Sandstone, which is older than the Carboniferous Limestone, underlying it in the rock succession. It formed during the Devonian period, when rivers deposited sand, gravel and mud across Wales from the erosion of mountains in the north. A similar setting today is the Ganges plain in northern India. The quarry probably provided stone for local buildings and tracks.



Cockstreet quarry

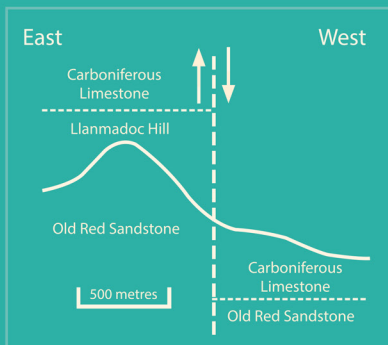
Just after the buildings, leave the lane along a gently rising grassy path. Stop under the telegraph wires. [4.8 km; SS 42674 91965]

G From left to right, the view includes Rhossili Down (Old Red Sandstone), Worms Head (Carboniferous Limestone) and sand dunes of Llangennith Burrows, backed by the drained marshy area of Llangennith Moors. Burry Holms (Carboniferous Limestone), at the north end of Rhossili Beach, is an island at high tide.



Rhossili Bay

The lane has followed the line of a fault, a fracture across which rock layers have been offset. The fault trends north-south, and rocks to the west have dropped over 200m, placing Old Red Sandstone next to Carboniferous Limestone. The movement occurred hundreds of millions of years ago and erosion has almost levelled the rocks on each side, but Old Red Sandstone is more resistant to erosion and forms a hill. A parallel fault forms the steep western face of Rhossili Down.



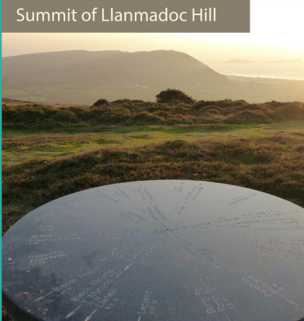
Cross-section of the fault

Continue gently uphill for 300 metres, passing 2 crossroads, to a junction where the path levels off. Turn sharp right, past a gorse thicket to some crags. [5.2 km; SS 42935 91769]

These are made of white quartz pebbles cemented together, forming conglomerate. They are part of the Old Red Sandstone and the pebbles were carried here by fast-flowing rivers. Beds near here dip gently south, towards Llangennith. This contrasts with the direction of dip at Cwm Ivy Tor and in the quarry at F.

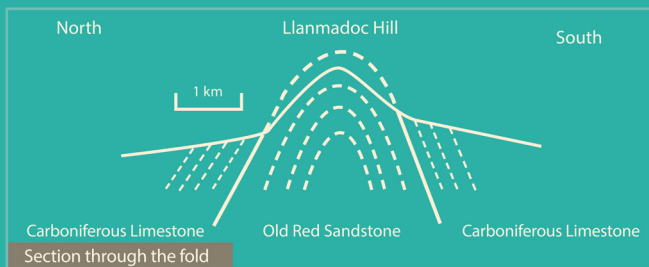
The lower beds of the Old Red Sandstone on Gower are sandstone like at F. Above them is conglomerate, like you see here. Rhossili Down, Hardings Down and Cefn Bryn are all made of Old Red Sandstone. The lower ground between them is underlain by Carboniferous Limestone. But Old Red Sandstone should be beneath Carboniferous Limestone, so how can this be? To solve the problem, look at the blocks on the path as you climb towards I.

Go back to the path junction. Cross the path you were on and take a path to the right, rising gently and keeping left of the telegraph wires. 350 metres from the junction, shortly after a building comes into view, turn left uphill on a track. Climb easily to the cairn, toposcope and trig point on the summit of Llanmadoc Hill. [6.3 km; SS 42988 92424]

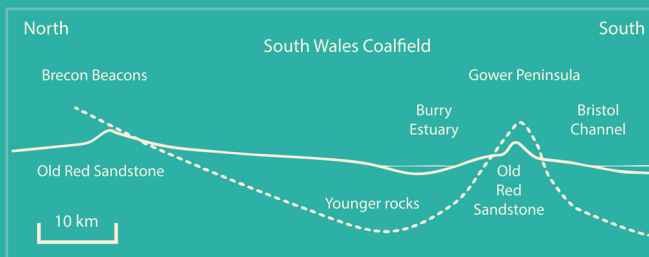


Summit of Llanmadoc Hill

Most blocks lower down the hillside were conglomerate, but there is hardly any conglomerate here. Llanmadoc Hill is underlain by sandstone in its centre and conglomerate on its flanks. Rocks on the north side dip north while those in the south dip to the south. The rocks have been squeezed and bent into an arch-like fold, or anticline. Erosion has sliced through the fold, like cutting open an egg, exposing the older, "inner" layers in the centre. The limestone has worn down more than the sandstone and conglomerate, so the anticline forms a hill. The other hills on Gower are also anticlines. The positions of the rocks in the Gower landscape relate to their deformation and resistance to erosion more than their original order. Enjoy the panoramic view from here.



The hills across the Loughor estuary are Pennant Sandstone, which is younger than Carboniferous Limestone and overlies it in the rock succession. The Brecon Beacons are made of Old Red Sandstone like the rocks beneath your feet. Between Gower and the Brecon Beacons the Old Red Sandstone is buried beneath several kilometres of younger rocks. The rocks have been deformed into a trough-like fold, the South Wales Coalfield syncline. The folding occurred 300 million years ago in a mountain-building event called the Variscan Orogeny caused by the collision of continents, like India and Asia have collided more recently, forming the Himalayas.



Section across the South Wales Coalfield

Follow the ridge of Llanmadoc Hill past the trig point for 1 km to a second summit marked by piles of stones. [7.4 km; SS 44000 92715]

These are prehistoric cairns, although much disturbed. The blocks are Old Red Sandstone. Many have delicate internal lamination.

Carry on to the ramparts of The Bulwark, an Iron Age hillfort. At the fourth ditch, just before the central enclosure, follow the ramparts left to a rocky outcrop. [7.8 km; SS 44293 92833]

These rocks are Old Red Sandstone conglomerate. The beds dip north; you are back on the north side of the fold.

The Loughor estuary is sheltered from the open sea by the spit of Whiteford Point. The tidal range is more than 10 metres and at low tide you can see sand bars shaped by tidal currents. Burry Pill drains the Old Red Sandstone hills, washing sediment into the estuary to form mud flats which become colonised by salt-tolerant plants. Part of the salt marsh was protected from seawater several hundred years ago by the construction of a sea wall, behind which Cwm Ivy Marsh provides good pasture.



Whiteford Point, Cwm Ivy Marsh and Landimore Marsh

Continue along the ramparts to rejoin the main path. [8.1 km; SS 44387 92780]

Ahead and far below, the steep-sided, wooded valley of Burry Pill was probably cut by meltwater during the last glacial episode. The stream flows from east to west, then turns north to the estuary, picking out weak rocks along a fault like you saw at G. The area is explored in a Scratching the Surface trail at Landimore.



Burry Pill

Turn left on the path then left on a gravel track. Follow this downhill, curving left. Leave it where it bends sharply right and continue ahead to Llanmadoc and the start point.

FINISH