

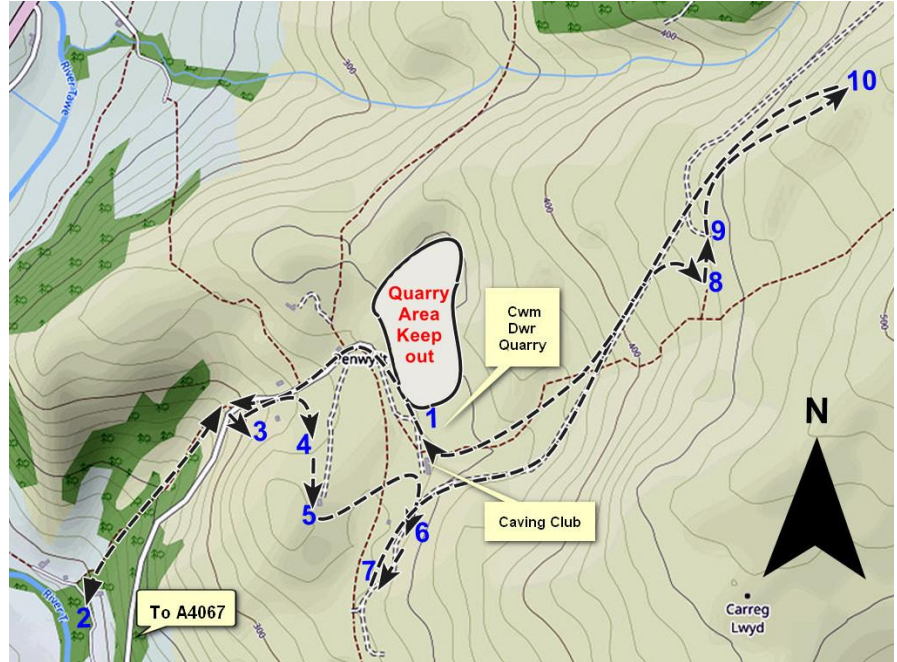


Geological Walks in Wales - Penwyllt and Ogof Ffynnon Ddu

This explores the area around Penwyllt, to examine the rocks, fossils and landscape of the upper Tawe Valley, especially that related to the Ogof Ffynnon Ddu (OFD) cave system, and geology related industrial archaeology. The full route is about 7 km long and could take up to a day, but can be reduced by over 1.5km and therefore half a day if you decide not to visit the cave resurgence (Locality 2).

Location: The start of the walk is at the Cwm Dwr quarry at Penwyllt is off the A4067, 40 km NE of Swansea. The car park is at grid reference SN 8559 1554, post code SA9 1GQ which involves driving on an old quarry road for the last 200m **Take it slowly!**

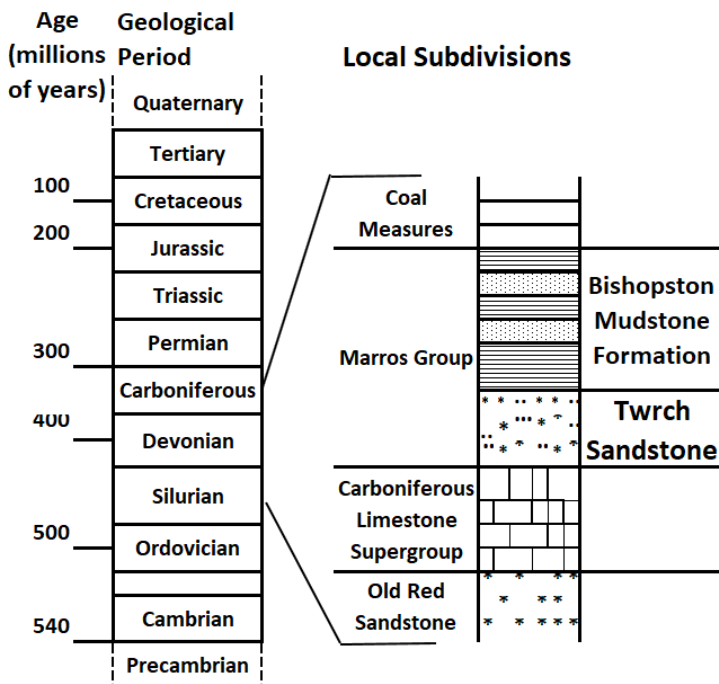
Maps: Ordnance Survey 1:50,000 Landranger sheet 160 (Brecon Beacons); Ordnance Survey 1:25,000 Outdoor Leisure sheet 12 (Brecon Beacons west); British Geological Survey 1:50,000 sheet 231 (Merthyr).



Basemap © OpenStreetMap contributors

Access: Paths are clear and easy to follow in fine weather. In mist or low cloud take extra care: take a map and compass and know how to use them. There is one moderately steep optional stretch. Penwyllt is exposed and often experiences a cold wind.

Caution: Do not enter caves or the recently closed quarry! Keep away from quarry and cliff faces!



Locality 1. The walk starts by looking at the rocks in the Cwm Dwr quarry in front of the car park. Here you can see the **Dowlais Limestone Formation** which is part of the **Pembroke Limestone Group** which is part of the **Carboniferous Limestone Supergroup** which is approximately 359 to 331 million years old. These sedimentary rocks are shallow-marine in origin. Comprising carbonate material (coral, shell fragments), forming beds and locally reefs.

In the quarry you can see a small iron doorway. This is the Cwm Dwr entrance into the OFD system. The cave system has a



total current known length of 60 km of passages and a vertical range of 309 m making it the deepest cave system in the UK from its highest to lowest point.

Return to the car park and walk out through the quarry road and left down to the road - take care with traffic. After 350m you will find a footpath going off to the right which descends to the valley below. This is an optional extension to see the lowest point of the cave system. At the bottom of the path turn left and continue past some houses on a lane for a further 100 m to a small wooden gate on the right.



Cwm Dwr Quarry Cave entrance in Dowlais Limestone Formation

Locality 2. Look down to the right to see a small river which joins the Tawe. This does not flow under the lane on the surface, but emerges from a cave - Ffynnon Ddu ("black spring") which gives the Ogof (= cave) Ffynnon Ddu system its name. Limestone dissolves in weak acids in rainwater and from decaying plant matter in soil which dissolves the rock along cracks. Eventually, whole rivers can flow underground in caves. This stream is the resurgence, where the water leaves the cave. It entered the ground at Pwll Byfre, 3 km NE of here.

Return to the wooden gate and follow the path back up the hill. Back at the top of the footpath. Once on the road go downhill for 25m into disused quarries on the left.

Locality 3. The bedding dips gently to the south, typical of the rocks away from the Swansea Valley Disturbance. Look for fossils, and for white crystals of calcite, a crystalline form of calcium carbonate. The crystals occur in veins - sheets of crystals filling joints - which formed from percolating solutions while the rocks were buried. There are also some blocks of brown sandstone, made of sand grains cemented together. The sand grains are made of the tough, hard, insoluble mineral quartz

Return to the road and walk uphill. Past a house on the right, follow the signposted footpath through a gate on the right. Continue straight ahead, across a broken stone wall, to examine the line of crags.

Locality 4. Near the top of the crags, a conspicuous bed of limestone is crammed with fossil brachiopods, like small overturned saucers. Above this is the brown sandstone seen at Locality 3. Its base is not flat, but fills deep hollows in the limestone surface. The sand was washed here by rivers, and the hollows are infilled potholes. The



Brachiopods (left) and sandstone (right) at locality 4

The limestone was raised above sea-level and eroded, then covered by river-borne sand before being submerged again to allow more limestone to accumulate. These changes in sea-level occurred many times during the accumulation of the Carboniferous Limestone Supergroup. Land lay not far to the north of present day Penwyllt, so this area was particularly sensitive to sea-level changes.



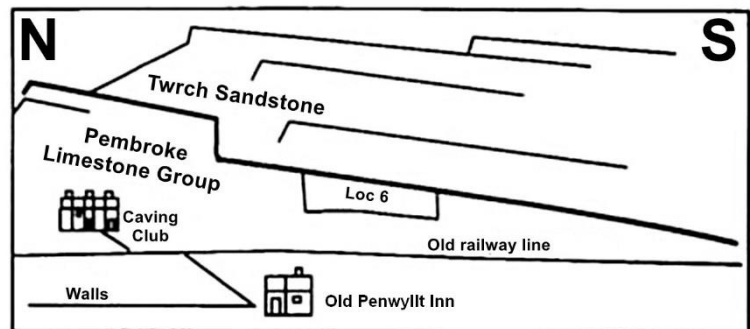
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Notice the deep hollows in the ground here. These are shake holes - depressions formed by collapse above caves. *Continue along the line of the footpath to another building (the Old Penwyllt Inn).*

Locality 5. The pale grey boulders above (west of) the building have fallen from the low hill. They are conglomerate - rounded pebbles of quartz cemented in a sandy background. This is the **Twrch Sandstone Formation** of the **Marros Group** (formerly known as the Basal Grit of the Millstone Grit) the rock unit above the Carboniferous Limestone Supergroup. After the limestone was deposited, pebbles were washed here by strong currents near the mouths of vigorous rivers draining the land to the north. The quartz-rich rocks of the Basal Grit are virtually pure silica and were quarried as a refractory material for lining furnaces.

The **Twrch Sandstone** is a tough rock which forms high ground. Beyond the cottages of the South Wales Caving Club ridges on the skyline slope gently to the right (south), following the bedding, with steep scarp slopes facing north. The contrast between sandstone country (right) and limestone country (left) is striking.

Note the disused quarry behind and to the right of the caving club - this is Locality 6. Follow the stone wall towards the caving club, passing a row of limekilns with their loading platform. Cross the line of the old railway to reach the caving club buildings. Turn right and enter the quarry seen from Locality 5.



Locality 6. This quarry exposes the uppermost beds of the Carboniferous Limestone Supergroup. Fossils are common at the end nearest the caving club, where a cave opening has been exposed in the quarry wall - **do not enter without proper equipment and experience**. Round black lumps of hard material (try scratching them and the limestone with a penknife blade) are chert. This is similar to quartz in composition but differs in structure. It formed by chemical processes after the limestone had been deposited, when silica-rich fluids percolated from the Twrch Sandstone. The contact between the limestone and the Twrch Sandstone is clearly visible along the top of the quarry and blocks of conglomerate lie on the ground.

From here you can examine other quarries to the south, which worked the Twrch Sandstone. The rocks include conglomerate, quartz rich sandstone and beds of friable, fine-grained silt/mudstone, some of which yield fossil plants.

Continue south from this quarry and you will see old walls from the Penwyllt brickworks

Locality 7. These are the remnants of the Penwyllt Dinas Silica Brick company workings which made high quality furnace bricks (which could withstand the high temperatures of industrial furnaces). They originally used the 'silica rock' (the Twrch Sandstone) from this hillside, but later from Pwll Byfre some 2.5km north east.

The works closed in 1935 and the remains were demolished in the 1980's. You can see remnants of the old round brick kilns with some of the blocks having glassy surfaces caused by the intense temperatures needed to fire these bricks. You can also see an impressive wall here, built with the Penwyllt bricks.



Return towards the Caving Club cottages and take the tram

Remains of the Brick Kilns and detail of the wall - Do Not climb or



road which ascends to the north east. Once it has passed through a small narrow section, you will find a path leading off to the right. Over a low crest you will find another iron doorway.

Locality 8. This is the "Top Entrance" into the OFD system. Nearly 260 m above the resurgence level, but still below the level where water enters the system further north at Pwll Byfre. Inside the entrance are a huge number of passages and chambers that are popular with cavers of all levels and abilities.

Continue upwards 150 m to another disused quarry.

Locality 9. Here you can see calcite with red iron stains where water has run down the quarry faces. This is formed by water running through very small gaps in the limestone, picking up minerals and then evaporating when it reaches the surface.

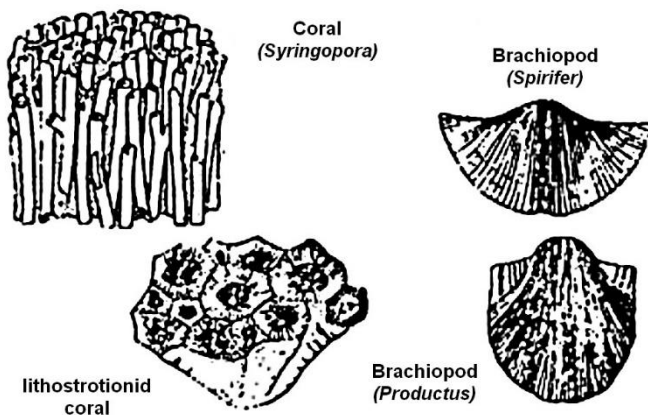


Water drains from the quarry face at locality 9, limestone pavement at 10

The water can then not carry as much mineral so it crystallises out. This is the same process through which stalactites and stalagmites are formed.

Continue upwards 350 m to where the path starts to level off.

Locality 10. The limestone here has been etched by chemical weathering to form limestone pavement (corals are easy to see in the pavement).



The grassy land just beyond the wall is underlain by the **Avon Group** (formerly known as the Lower Limestone Shale) the oldest part of the Carboniferous Limestone Supergroup. Beyond that area are limestone crags with bedding which dips to the north. The Avon Group is in the core of an anticline, the crest of which has been eroded away.

Standing here you can see the high ground of the Brecon Beacons to the north which is underlain by the Old Red Sandstone, river deposits which are older than and underlie the Carboniferous

Limestone Supergroup. Across the valley is the long ridge of Fan Hir. During a short-lived cold spell peaking about 22,000 years ago (which may have lasted only 500 years) after the end of the last major Ice Age, a small glacier built up beneath this ridge. Mounds at the foot of the slope are moraine - material eroded from the slope and transported a short distance by the ice.

Descend via the tramroad and reach a point where a clear path goes off to the right. Take this right-hand path and continue to the right of the Caving Club cottages back to the Cwm Dwr car park.

Produced by the Geologists' Association South Wales Group. Updated 2022 from an original leaflet by Dr. Geraint Owen 1996.

Follow the Country Code and the Geological Fieldwork Code. Do not cause damage. Do not stray from paths. Collect from loose material rather than from fresh rock.