Geological Walks in Wales - Porthcawl

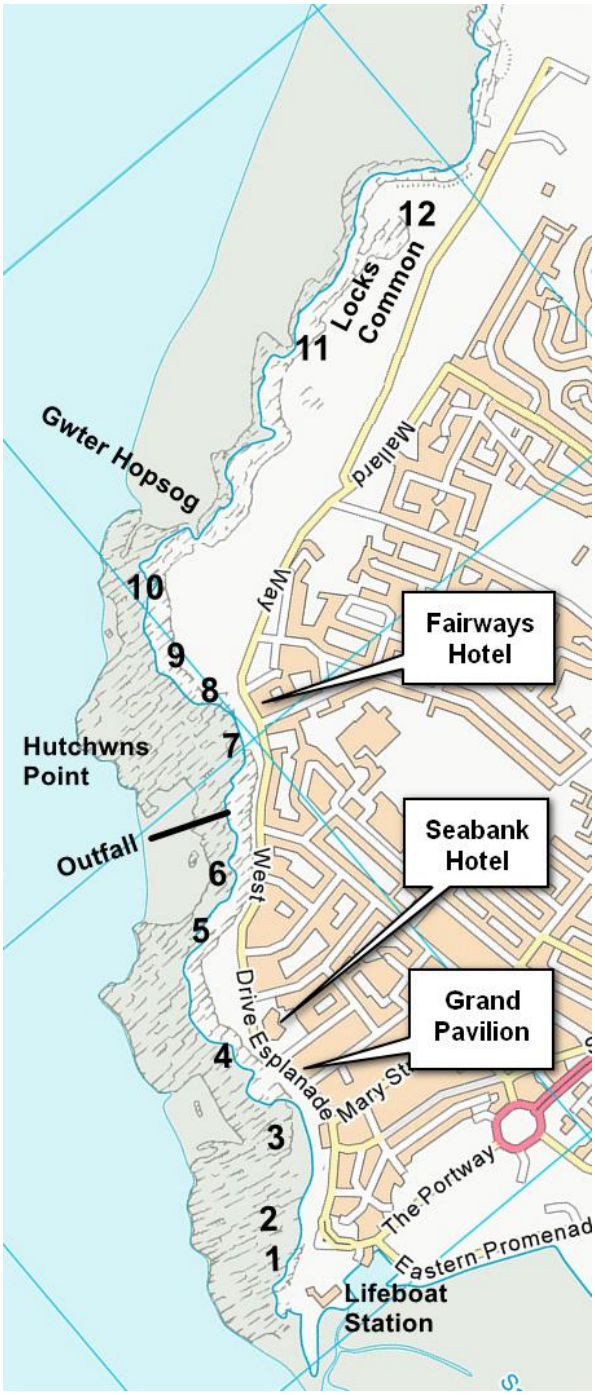
This short walk examines rocks, fossils and landscape along the coast from Porthcawl Harbour breakwater (SS 819 763, to Lock's Common (SS 804 777). Some features are best seen on the beach so it is advisable to follow this route on a falling tide.

Location: The coastal town of Porthcawl is 10km west of Bridgend and 14km south southeast of Port Talbot, in the County Borough of Bridgend. There is some roadside parking along the Esplanade and a number of car parks around the town. Approx Post Code CF36 3XA)

Maps: O.S. 1:50,000 Landranger Sheet 170 (Vale of Glamorgan and Rhondda); O.S. 1:25,000 Pathfinder Sheet SS 87/96/97 Bridgend (South) and Porthcawl; British Geological Survey 1:50,000 Sheet 262 (Bridgend)

Walking distance: is approximately 3km.

Caution: Much of this walk is along rock platforms on the upper shore or along the low cliff top. Many of these surfaces are rough, and can be slippery when wet. There are steep drops in places. Many localities are best examined on a falling tide. **Great care should be taken at all times!**



INTRODUCTION:

The rocks in this area are sedimentary rocks. They were laid down between about 359 and 201 million years ago as deposits of lime, mud, sand and pebbles. Over long periods of time these were compacted and solidified into rock - respectively limestone, shale (compacted mud), sandstone and conglomerate. Most of the rocks are hard, grey limestones that belong to the Oxwich Head Limestone (part of the Pembroke Limestone Group within the Carboniferous Limestone Supergroup) They were laid down about 350 million years ago in a warm, shallow, sub-tropical sea at a time when what is now Wales lay just south of the equator. They are rich in fossil remains of sea-dwelling animals, especially corals, crinoids (sea lilies) and brachiopods. Occasional earth movements during the accumulation of the limestones temporarily lifted the sea bed above sea level, causing erosion of some of the sediments. More rocks were deposited on top of the limestones, but about 300 million years ago movements in the Earth's crust deformed, bent (folded) and fractured (faulted) them and a long period of erosion began.

No new rocks were deposited until much later, during the Triassic Period (about 252 million years ago), when Wales had drifted north of the equator and the area was a hot desert with hills of limestone rising from the desert floor. Occasional violent storms washed debris down the hillsides, leaving some as piles of red coloured sands and conglomerates in channels cut into the limestone. Because of the gap in time between the deposition of these two sets of rocks the Triassic rocks are said to lie uncomformably on the Oxwich Head Limestone.

There is no further direct evidence of geological events in this area until the last Ice Age, which ended about 10,000 years ago. Fluctuating sea-levels caused by the growth and melting of ice sheets affected the shape of the landscape, and the coastline has been moulded into its present outline by both subaerial and marine erosion, both of which continue today.

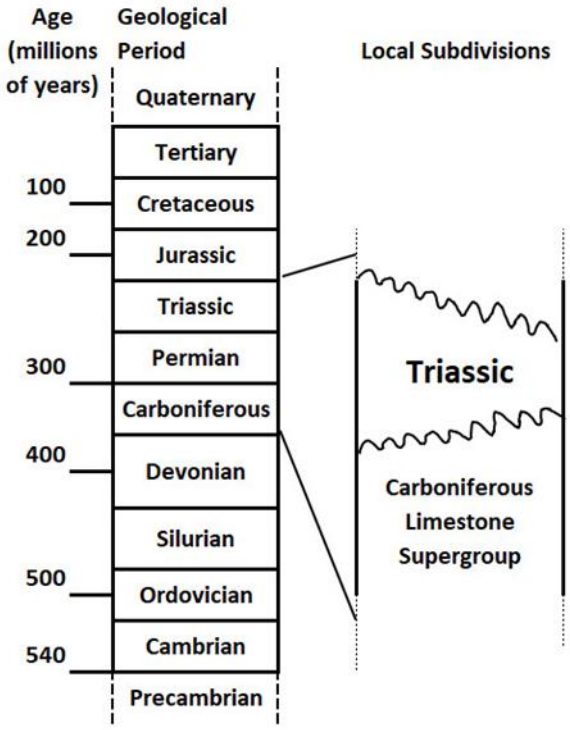
ITINERARY:

From the harbour breakwater, opposite the Lifeboat Station, walk down the steps onto the rocks below the old lighthouse.

Locality 1. Layers of dark, grey Oxwich Head Limestone tilt gently (dip) towards the southeast. They are rich in fossils, especially shells of large brachiopods. Many of the shells are upturned, indicating that they were rolled around on the sea bed after the animal died.

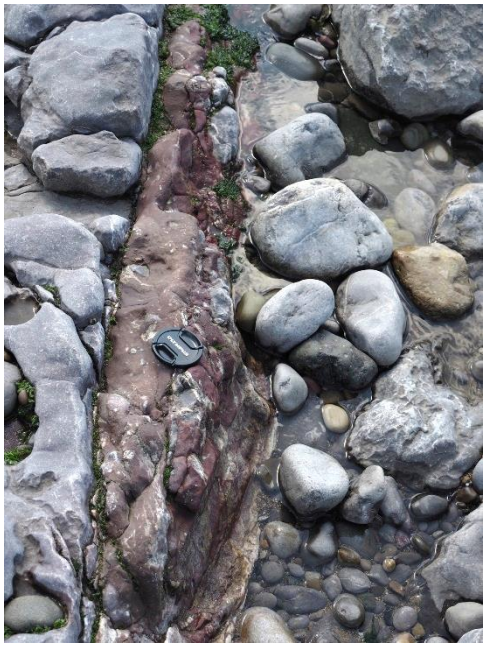
Walk westwards (towards the Grand Pavilion) along the beach for about 100m

Locality 2. On the shore below the beach a small fault cuts the beds of Oxwich Head Limestone lowering (downthrowing) those on the east side. The movement along the fault has steepened the dip of the rocks on the west side and the fault is filled with patches of red sand and large amounts of a white mineral called Calcite. Calcite is a crystalline form of lime (Calcium Carbonate) and was deposited here by lime-rich waters percolating through the fault.



Continue along the bottom of the beach, for about 200m, to a point opposite the Grand Pavilion.

Locality 3. The beds of Oxwich Head Limestone are cut by a shallow gully which runs down the beach towards the sea. The limestone of the gully sides is eroded and stained, whilst the bottom is filled by beds of red and yellow sandstones and conglomerates of Triassic age. The rounded pebbles of the conglomerate are grey Oxwich Head Limestones. These Triassic deposits were deposited by rivers in gullies - or wadis - during short periods of intense rainfall in an otherwise arid climate. A similar feature occurs 110m west of this Locality at the base of the asphalt sea defence.



Left. Red Triassic infill in the grey Oxwich Head Limestone

Leave the beach and continue along the Esplanade and cliff top to the edge of the grassy area opposite the Seabank Hotel.

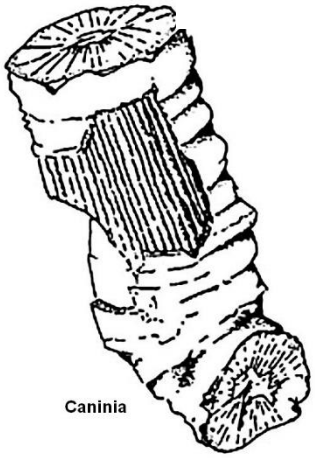
Locality 4. The limestone at the cliff edge, above the high-water mark, shows the effects of subaerial erosion. Two sets of regular cracks (joints) in the rocks have been widened by the action of rainfall and natural acids leaching out of the soil dissolving away the limestone. Below the high-water mark, the limestone has been heavily eroded by the sea into spectacular pinnacled surfaces.

Cross to the far side of the grassy area and descend onto the rock platform.

Locality 5. The prominent, near vertical cliff face, running NE/SW, is formed by another fault where the rocks to the west have been downthrown. The fault contains calcite and fine red sands which can be clearly seen at the base of the cliff. Movement along a fault crushes the rock in that zone, allowing it to be more easily eroded than the undisturbed rock on either side. Erosion of the crushed rock has formed a small gully at the back of the rock platform. The surface of the limestone on the downthrown side of the fault has a rough, nodular appearance, and contains many up-turned brachiopod shells.

The Prominent fault seen at Locality 5

lithostrotionid coral

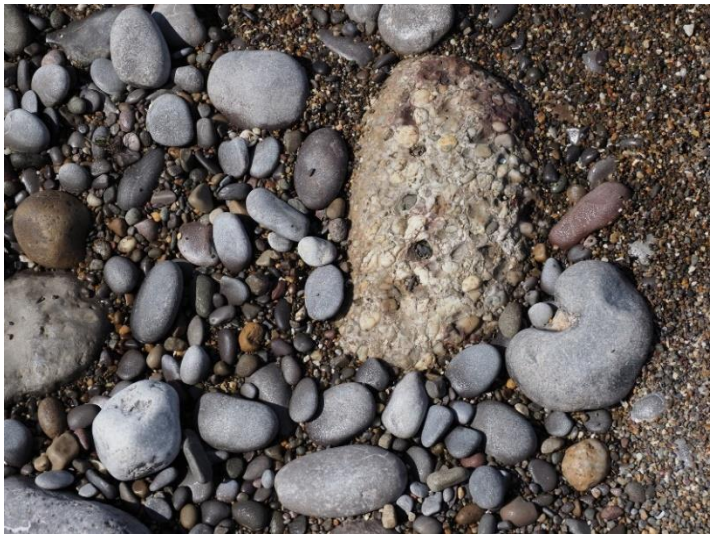


Caninia

Locality 6. Between Locality 5 and the stormwater outfall specimens of a long, cylindrical coral - Caninia - can be seen amongst the brachiopod shells. Some beds of limestone appear to contain angular pebbles and have a very rough surface. These are pseudobreccias and are caused by changes in the mineralogy of the limestone during its formation.

Continue along the shore to the beach beyond the outfall

Locality 7. The beach is composed of cobbles and pebbles, most of which are derived from fairly local rocks. The majority are grey Oxwich Head Limestones but others are of brown sandstones and conglomerates containing white, rounded pebbles of the mineral quartz, derived from the coalfield; soft, red sandstones derived from the local Triassic and harder pink/red sandstones of the Old Red Sandstone from the north also occur. About 50 m below the beach another gully has been cut into the Oxwich Head Limestones and filled by red and yellow Triassic sandstones and conglomerates, some of which are particularly coarse in places. This gully has a number of side branches some of which are visible higher up the shore farther west.



Large Conglomerate pebble with Grey Limestone and Red Sandstone

Leave the beach by the steps and continue along the cliff top.

Locality 8. Semicircular holes cut into the limestone at the cliff edge are solution pipes. They were formed by running water dissolving away the limestone as it passed through the rock. Evidence of erosional features in limestone areas, such as these, are generally referred to as karst.

Continue along the cliff top to the Tip of the headland and descend onto the lower of the two rock platforms.

Locality 9. The surface of the limestone on the platform is highly undulating and appears rippled. The overlying beds in the cliff above rest abruptly on this surface and infill the hollows. The undulations were caused by uplift of the sea bed and weathering of the surface before the overlying beds were deposited. This is called palaeokarst.

On the surface of the rock platform above a number of large specimens of the coral Caninia are exposed. Some are straight but many are bent. The bending indicates that some corals, which grew upwards towards the light, were knocked over by underwater currents and then started to grow again.

Bent Caninia

Continue along this surface for about 60m.

Locality 10. Two faults cut through the limestone and are marked by deep gullies. In the base of the second, wider gully, is a coarse conglomerate with grey limestone pebbles encased in crystalline calcite. Much of the calcite is stained pink and in some places has grown into a pyramidal crystal form known as dog-tooth spar, from its resemblance to dogs' teeth. On the surface of the limestone beyond these faults are a number of specimens of branching colonial forms of lithostrotionid coral.

Continue along the cliff top to the far side of the next bay, adjacent to the rock shelter, and descend onto the second rock platform below the grassy cliff edge.

Locality 11. The deep gully in the corner of the bay is eroded along a fault which has downthrown the rocks to the north. The limestone surface is nodular and contains large brachiopod shells. Towards the north is a good palaeokarst surface, the crests of which contain fine debris of both shells and crinoids (sea-lilies). Pseudobreccias and cross sections of corals can be seen in the face of the limestones resting on this surface.

Return to the cliff top and continue northwards to the summit of Locks Common

Limestone Pavement at Locality 12

Locality 12. The deep gullies passed after Locality 11 are again eroded along faults. The limestone on the cliff top shows the typical effects of subaerial erosion. A relatively bare limestone surface, such as occurs around the summit plateau, is known as a limestone pavement. Dissolution of the limestone along the joints has produced blocks of limestone separated by deep clefts. The raised blocks are called clints and the clefts grikes. Notice how rich the grikes are in plant growth compared to the bare limestone surface.

Return to Porthcawl Harbour along the cliff path.

Updated 2022 from an original Leaflet by S. R. Howe, 1997. Produced by the Geologist's Association - South Wales Group: Cymdeithas y Daearegwyr - Grwp de Cymru.

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