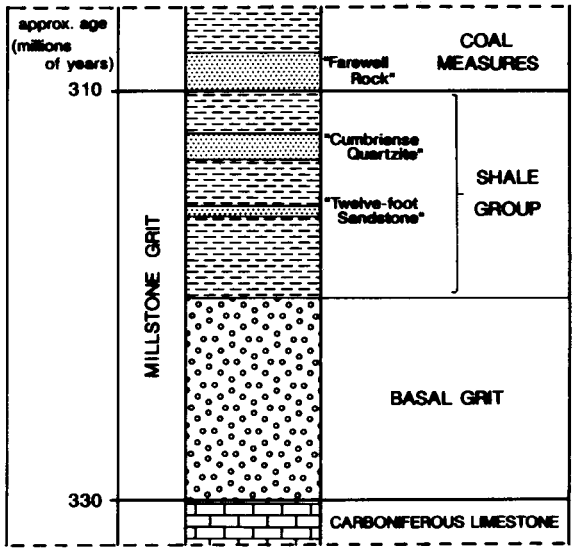
Retrace your steps to Pontneddfechan. If you have time, the path continues for 1km, criss-crossing the Pyrddin, to the tall waterfall of Sgwd Einion Gam, where the Farewell Rock is faulted against shale. Another path follows the River Neath past waterfalls in the Basal Grit to Pont Melin Fach.



The Carboniferous rock sequence in this area

GEOLOGICAL CODE

Follow the Geological Code of Conduct. You do not need to use a hammer on any of these rocks, but if you do you should wear goggles too. Take care on and beneath cliffs and river banks. Never climb cliffs.

Other walks of geological interest in this area include Craig y Ddinas (Carboniferous Limestone and Millstone Grit), Cwm Gwrelych (Coal Measures), Sgwd Clungwyn and the Mellte waterfalls (Millstone Grit) and Porth yr Ogof near Ystradfellte (Carboniferous Limestone). Details can be obtained from the Tourist Information Centre at Pontneddfechan. The Swansea Valley is not far away and there is an information centre at Craig y Nos Country Park.

If you want to know more about rocks, fossils and the geology of South Wales, the South Wales Geologists' Association provides field trips, talks and information for people like you. Contact them c/o Department of Geography, University College of Swansea.

OUTLINE OF THE GEOLOGY

When rocks of this area were formed, the distribution of land and sea was not as it is now. South Wales was part of a coastal plain, with land to the north and sea to the south. The area lay close to the equator: seas were warm and the coasts were covered by lush vegetation, much like present-day equatorial forests.

All are **sedimentary rocks,** which formed as mud, sand and gravel on the beds of rivers and the sea. As more sediments were laid on top, older layers (beds) were buried and cemented to form rock. **Shale** formed as mud in quiet water, mostly on the sea floor. Fossils occur mostly in thin layers known as **marine bands (localities 2** and **7),** or in non-marine **mussel bands (locality 4),** which represent coastal lakes. Sandstone and conglomerate were deposited as sand and gravel washed in by stronger currents. They represent times when sea-level fell, the coast built up and river deposits replaced the sea. The top surfaces of some sandstones contain fossil plant roots **(localities 8** and **12),** showing that these river deposits became colonised by swamps.

The rocks seen on this walk belong to a group known as the **Millstone Grit.** They formed during part of the **Carboniferous** period of geological time, between 330 and 310 million years ago. At the end of Carboniferous time, after the **Coal Measures** had also been deposited (about 290 million years ago), the whole region was squeezed by plate tectonic movements, like those which have formed the Alps and the Himalayas. The rock layers became **deformed** and uplifted, and since then they have been being worn away. As a result tilted beds are seen at the surface, with older rocks lower in the pile and younger ones higher up.

The older part of the Millstone Grit is called the **Basal Grit (localities 6, 7, 8 and 9).** This is 80m thick and comprises mainly hard, quartz-rich sandstone and conglomerate. The younger part is the **Shale Group (localities 2, 3, 4, 5,10,11** and **12),** 80m thick and made up of shale with a few thin sandstones, notably the **Twelve-foot Sandstone (localities 5, 10, 11** and **12)** and the **Cumbriense Quartzite (locality 3).** The Shale Group is overlain by a thicker sandstone (the **Farewell Rock - localities 1** and **2),** which represents a prolonged period of coastal plain conditions. This marks the base of the Coal Measures, which lie farther south.

The last 2 million years have been a period of alternating ice advance and retreat across Britain. Rivers have been provided with renewed vigour for cutting their valleys and the Rivers Neath and Pyrddin flow in deep, steep-sided, sometimes gorge-like clefts. In detail their course is closely related to the geology, which explains the positions of waterfalls and rapids.

Dr. Geraint Owen
Geologists' Association (South Wales Group) and Department of Geography, University College of Swansea 1991.

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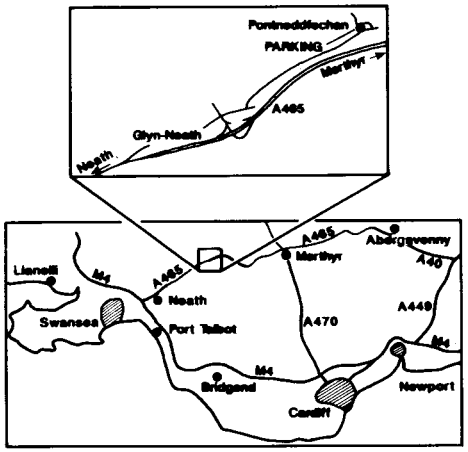
WAP F2997

PONTNEDDFECHAN: THE AFON NEDD AND SGWD GWLADUS A GEOLOGICAL WALK

This is an easy walk alongside the rivers Neath (Afon Nedd) and Pyrddin, which flow through beautiful wooded country just south of the Brecon Beacons National Park. The route is 4km long and is a pleasant half day's stroll. The rocks are sandstones, conglomerates and shales with fossils. They formed during the Carboniferous period of time, about 320 million years ago. South Wales was then a tropical coast, sometimes flooded by the sea. The scenery includes waterfalls, gorges and rapids.

The walk begins at Pontneddfechan, which is 2km from the westernmost exit (Glyn-neath) of the dual carriageway on the A465 Heads of the Valleys road. There is parking near the Angel Inn, opposite the Tourist Information Centre. The riverside path is entered through a swing gate behind the Angel Inn.



The walk is covered by Ordnance Survey 1:50,000 map sheet 160 (Brecon Beacons) and 1:25,000 Outdoor Leisure sheet 11 (Brecon Beacons Central), and by British Geological Survey 1:50,000 Sheet 231 (Merthyr Tydfil). The parking area is at Grid Reference SN 9004 0763.

ITINERARY

Terms marked * are explained in the geological outline.

Locality 1. 50m from the swing gate hard sandstone* and softer shale* are exposed alongside the track. They belong to the **Farewell Rock*** and are clearly layered: the beds* tilt (dip) towards the south. The track follows the line of a mineral railway and the rock has been blasted to make a cutting - you can see the ends of old drill holes.

Locality 2. An overhanging cliff near the base of the Farewell Rock is fenced off. On the underside of the main overhang you may make out ribbed oblong markings. These are fossil logs (*Calamites*) and represent a log jam in a river channel. From here, a path on the right leads back from the main track to where the river enters a narrow gorge as it flows onto harder rocks. The Farewell Rock forms a small overhang and overlies softer, dark grey shale, the *Gastrioceras subcrenatum* **marine band*.** It is named after a **goniatite,** one of the kinds of fossil shells found in it, which are extinct sea creatures related to octopus and squid. The Farewell Rock represents a period when sea-level fell and the sea was replaced by a coastal plain. On the opposite bank it shows **cross-bedding:** layers are tilted relative to the bedding, representing sand washed over the front of an underwater dune. This shows that currents flowed from north to south.

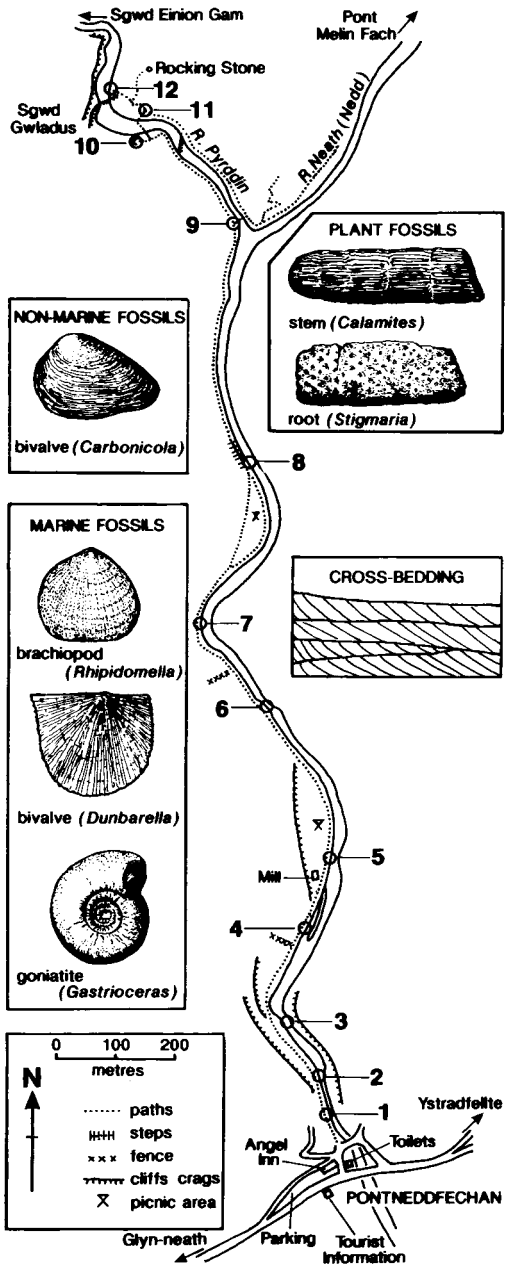
Locality 3. Continue on the main track for 50m alongside a cliff of Farewell Rock. A minor path opposite a wooden bench leads to rocks by the river. This rock is **quartzite** - a pure, hard sandstone - and this is one of the sandstones in the **Shale Group*.** Its base can be seen on the opposite bank, downstream of a stone abutment, abruptly overlying shale. Fossils from the shale include various sea shells (**bivalves** and **brachiopods**) and another kind of **goniatite** - *Gastrioceras cumbriense:* the quartzite is known as the **Cumbriense Quartzite*.** Where the minor paths meet the rocks, the beds are finer-grained, with thin dark shales rich in plant fossils. The Cumbriense Quartzite represents another (earlier) episode when seas were replaced by a coastal plain.

Locality 4. The main track is paved with stone sleepers, each with two holes where rails were attached. The Cumbriense Quartzite is exposed above a broad cave on the left. 20m beyond a stile, the river bank is protected by a wall with rocks **(slippery when wet!)** exposed at its base. They can be reached from here or along the river bank from locality 5. They are dark shales with abundant flattened impressions of fossil **mussels** called *Carbonicola.* These were fresh-water mussels and the rocks accumulated as muds in a coastal lake.

50m farther along the track, a bench is built into a low stone wall. The shales here are typical of the Shale Group. They rarely yield fossils.

The track soon passes a ruined mill. The millstones are made of the Basal Grit* (see locality 6).

Locality 5. The river narrows where it crosses another hard band of quartzite - the **Twelve-foot Sandstone*.** Its top surface contains prominent cracks **(joints).** A shallow depression 5m long by 20cm wide



is probably the cast of a fallen tree trunk. The river bank now opens into a broad grassy field. This is an old floodplain developed at a time before the river had cut down to its present level. The shales the the Twelve-foot Sandstone can be seen in the cliff on the opposite bank.

Locality 6. 300m beyond locality 5 a ridge of hard rock nearly blocks the river, which flows through a deep, sheer-sided cleft. The hard white rock contains pebbles of quartz and is a **conglomerate*** belonging to the **Basal Grit*.** The sheer sides of this cleft mark the line of a **fault,** where the two sides once slid past each other.

Locality 7. Just beyond a wooden stile, a low cave on the left enters a flooded silica mine. Silica is the material of which quartz is made and the pure quartzites of the Basal Grit were mined to make bricks for lining furnaces. 70m farther along the track there is a brick-vaulted passage which is another mine - **these workings are dangerous and must not be entered.** Shale in the stream above quartzite yields fossils from another marine band*, including a scallop-like bivalve called *Dunbarella.*

Locality 8. Follow either of two tracks across another broad level area, until some steps are reached. At the foot of these steps, leave the track and follow the river bank upstream for about 30m to some prominent crags. The rocks are conglomerate of the **Basal Grit*.** Shallow depressions are the remains of plant fossils, such as stems, trunks and roots. Continue a further 200m alongside the river to rejoin the main track, or else return to the steps.

Locality 9. A metal footbridge crosses the Pyrddin where it joins the River Neath. Conglomerate of the Basal Grit is exposed in the river banks. Continue upstream along the Pyrddin for 150m, without crossing the bridge. Small cascades mark harder beds, which now dip upstream: the rocks here have been deformed into a gentle arch **(anticline).** A prominent rib crossing the river obliquely is the top of the Basal Grit, forming a small waterfall. Above this the rocks belong to the Shale Group, like those seen at localities 2-5.

Locality 10. Steps lead to a viewing platform for **Sgwd Gwladus.** This graceful waterfall has formed where the River Pyrddin tumbles over a ledge of Twelve-foot Sandstone. Shales beneath yield fossils. They have been eroded, so that the more resistant sandstone above forms an overhang. The towering cliff above the waterfall exposes more of the shale that dominates this part of the Millstone Grit.

Locality 11. Cross the river by stepping over some large stones, or use the footbridge at locality 9. The Twelve-foot Sandstone can be seen in the face of Sgwd Gwladus, and in the crags to either side. Its base is sharp but undulating, indicating erosion of the sea floor before the sands were deposited. The path winds up the side of the waterfall to an open grassy area where the Rocking Stone - a huge boulder of Basal Grit conglomerate - no longer rocks.

Locality 12. Here, the top surface of the Twelve-foot Sandstone, a smooth, pale, hard quartzite, can be seen. Creamy patches are **fossil roots,** some of which can be recognised as *Stigmaria.* They show that this surface became emergent and was colonised by plants.