The Arfon Basin

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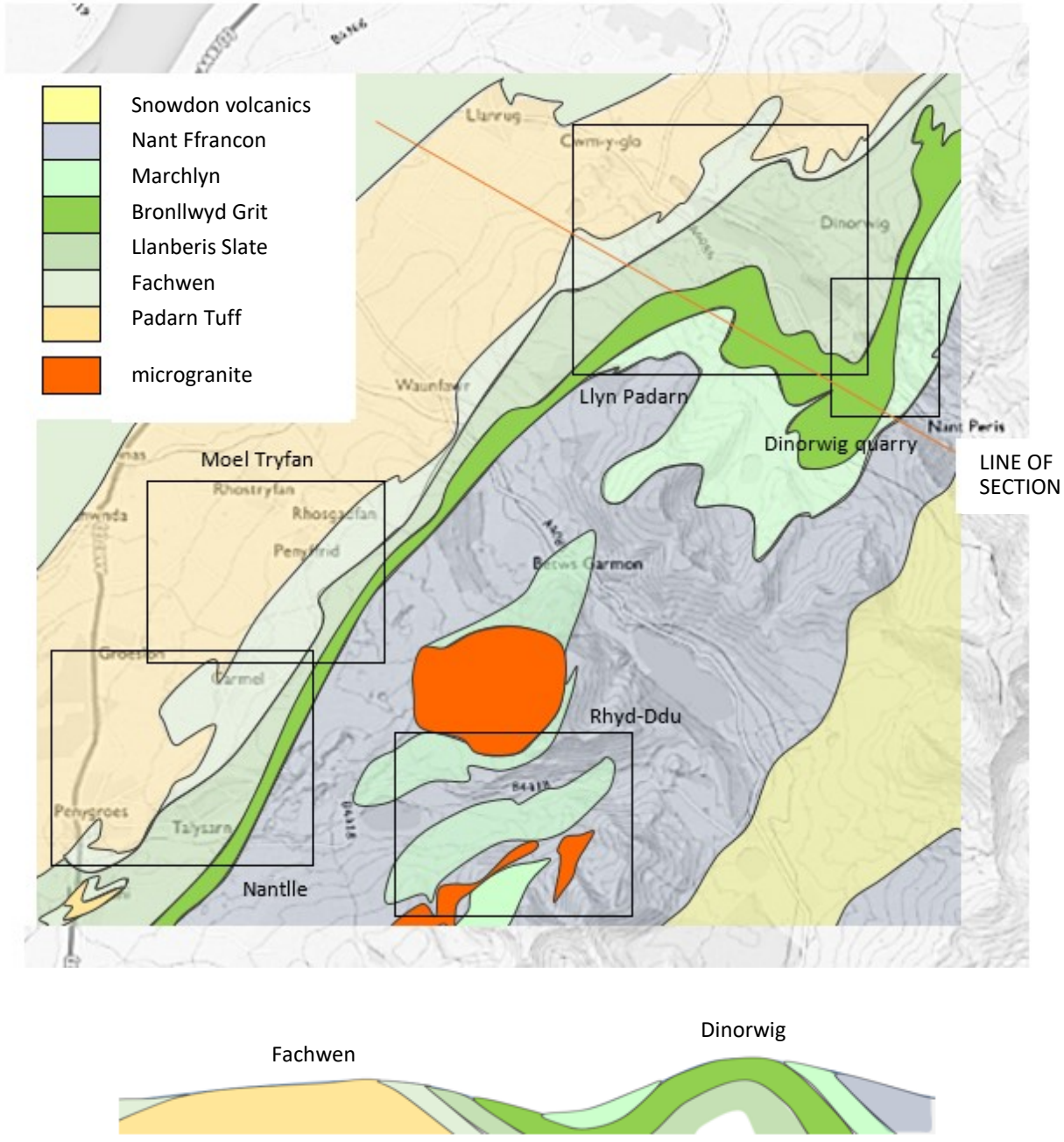


Figure 181: Field excursions

The excursions in this chapter examine a sequence of late Precambrian to Cambrian strata in northern Snowdonia which show significant differences to the turbidite-dominated sediments of the Harlech Dome and St Tudwal's peninsula. In particular, the sequence contains a thick succession of mudstones which have been converted to economically important slate deposits in the quarrying areas of Nantlle, Llanberis and Bethesda.

The sequence begins with several thousand feet of acid volcanic rocks of the ***Padarn Tuff formation***. These include ignimbrite flows and pyroclastic ashes and were erupted subaerially. On Anglesey, rocks similar to the Padarn volcanics rest unconformably on Gwna mélange, so eruption and deposition of the volcanics probably took place onto an older Monian basement.

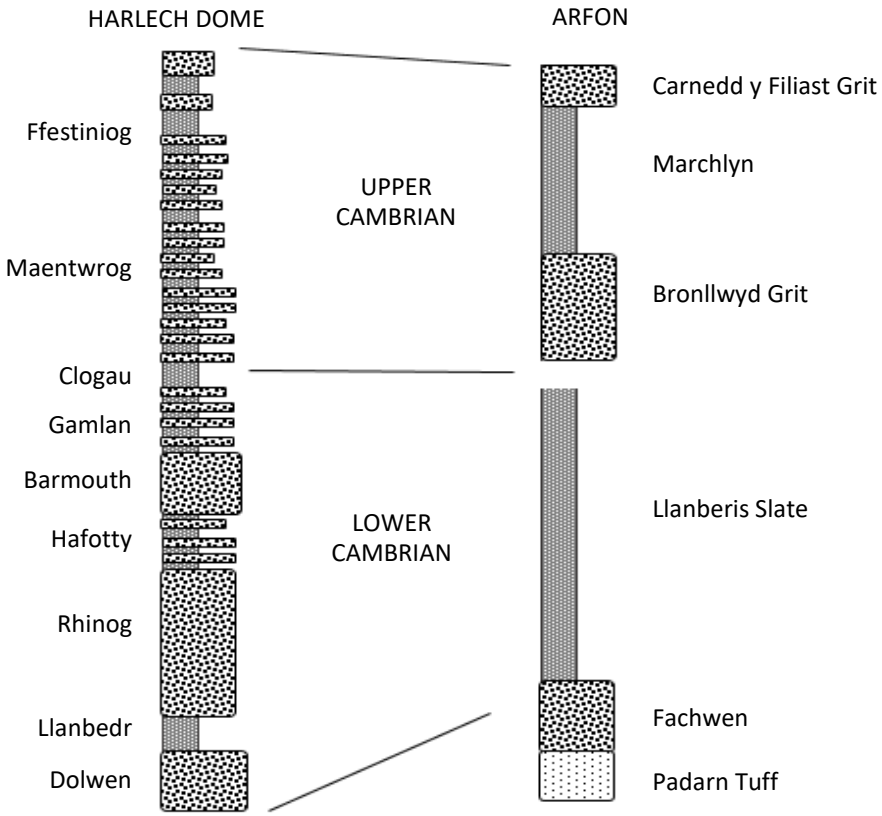


Figure 182: Comparison of stratigraphy of the Harlech Dome and Arfon Basin

The overlying sedimentary rocks were deposited in a small marine basin bounded by faults within the Menai fracture zone. The sedimentary sequence rests on the volcanics without any significant unconformity.

The lowest group, the ***Fachwen formation***, has a radiometric age of around 610 Ma which is near the top of the Precambrian. The Fachwen rocks contain a mixture of sandstones and coarse conglomerates, with pebbles derived mainly from the Padarn volcanics. Considerable local variations are seen in the sequence of sandstones and conglomerates, and the breaks in the depositional sequence.

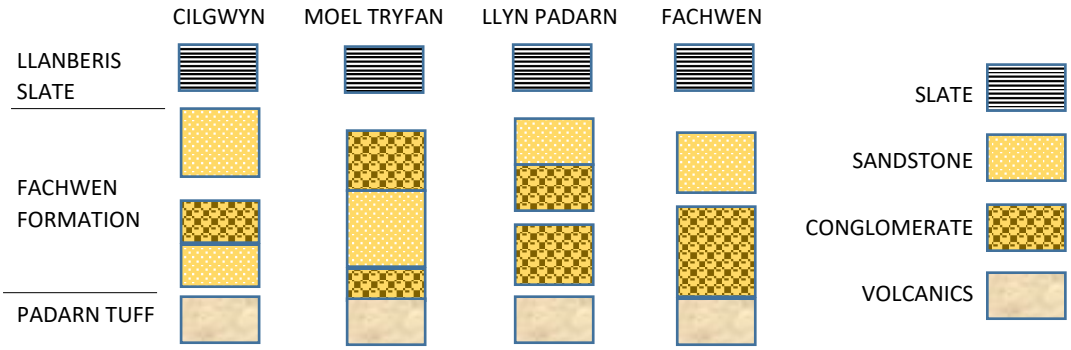


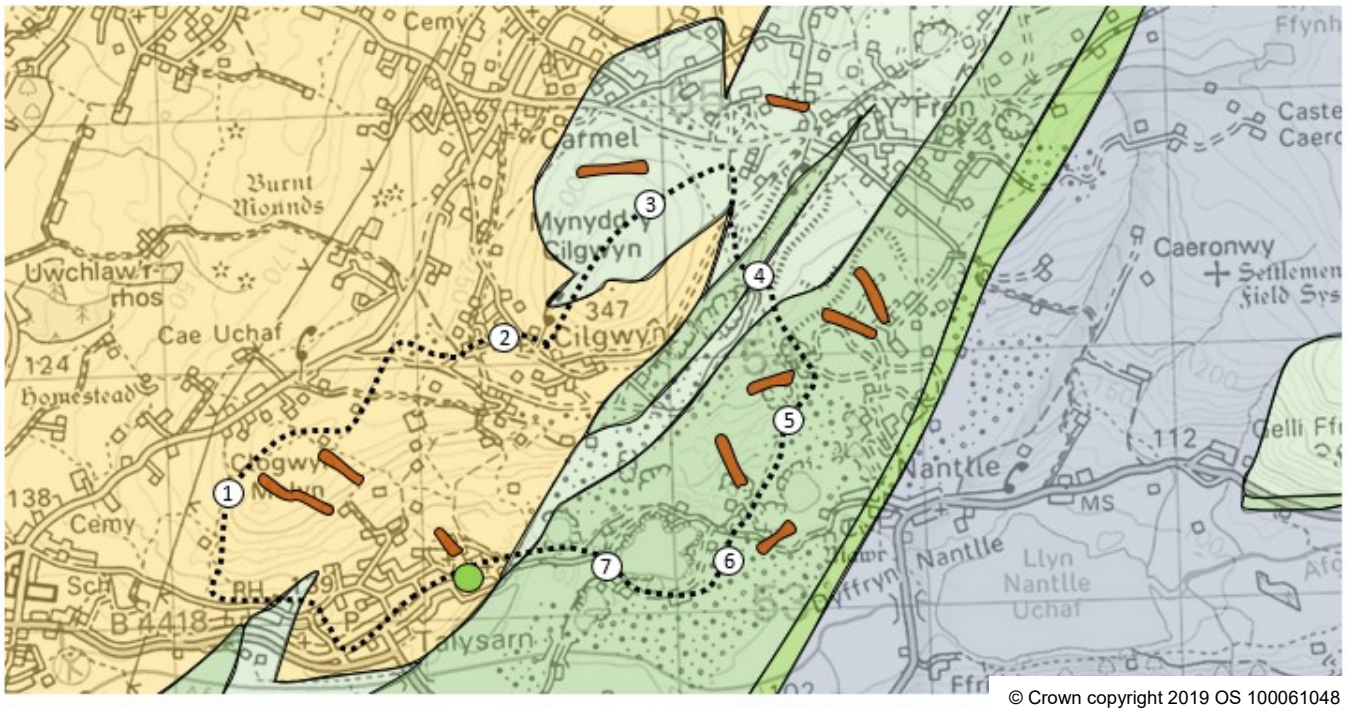
Figure 183: Variations in lithology in the Arfon Basin.

It seems that the Arfon Basin contained an enclosed large lake or inlet of the sea during at this time, with sediments accumulating in beach and shallow shelf environments. The sediment variations represent changes in the position of the shoreline and periods of localised uplift and subsidence, probably related to crustal movements in the Menai fracture zone.

It seems that the Arfon Basin contained an enclosed large lake or inlet of the sea during at this time, with sediments accumulating in beach and shallow shelf environments. The sediment variations represent changes in the position of the shoreline and periods of localised uplift and subsidence, probably related to crustal movements in the Menai fracture zone.

Nantlle

4 miles: approximately 2 hours



- Nant Ffrancon siltstone
- Bronllwyd Grit, sandstone
- Llanberis Slate, sandstone, siltstone, mudstone
- Fachwen sandstone, conglomerate
- Padarn Tuff, felsic
- Microgabbro

Figure 184: Field excursion.

In this excursion we make a traverse through the lower part of the Arfon Basin succession, from the Padarn Tuff to the Fachwen formation and Llanberis Slates.

The Fachwen Formation grades upwards into mudstones of the ***Llanberis Slate Formation***, which has a definite Cambrian age. The Llanberis Slates were deposited over a considerable time period, with occasional periods of non-deposition and erosion. The slates consist mainly of mudstones but some greywacke grits are also present. The grits show graded bedding which passes upwards into parallel lamination, characteristic of deposition from a turbidity current.

Start: A small car park is available in Talysarn village [SH492532].

1: Walk through the village to the start of the footpath which ascends towards the summit of Clogwyn Melyn.

In crossing the hillside, we pass outcrops of the Clogwyn Volcanic Group. The rocks are tuffs and ignimbrites, composed of ash particles and recrystallized shards of volcanic glass.

Figure 185: Clogwyn volcanics, of the Padarn Tuff formation, Clogwyn Melyn. The dip of ash layers is indicated.

Dips of around 30° can be picked out in the layering of the ash. This structure was formed by glass shards which became flattened and welded together during deposition from an ignimbrite flow. This is known as a **eutaxitic texture**. The rocks also exhibit a near-vertical cleavage which was imposed during the earth movements which produced folding in the region much later during Devonian times.

2: Continue to Cilgwyn village.

3: Ascend Mynydd Cilgwyn.

On entering the area of rough pasture below Mynydd Cilgwyn, bedded tuffs are again seen. However, the ascent of the hill takes us upwards in the geological succession onto outcrops of sediments of the Fachwen formation. These have been subdivided in the Nantlle area into the Tryfan Grits at the base, Cilgwyn Conglomerate and Glog Grit at the top.

The Tryfan Grits consist of coarse cross-bedded sandstones and greenish siltstones. Small outcrops show the grits have a strong cleavage. This is due to the presence of the mica-like mineral **sericite**, which may have been produced by low grade metamorphism of feldspar grains.

The grits are followed by the Cilgwyn Conglomerate which contains well rounded pebbles, composed of rock types found in the Padarn Volcanics or the underlying Monian succession of Lleyn and Anglesey. Pebbles of rhyolite, jasper and quartzite can be identified.

Figure 186: Cilgwyn conglomerate, containing pebbles of Padarn Volcanics.

The conglomerates are overlain by the Glog Grit Group, which consists of coarse and fine sandstones and quartzites, which again show cross-stratification produced by deposition as advancing sand ripples in relatively shallow water. The rocks are mainly light coloured sandstones composed of quartz and feldspar. Low grade metamorphism has again converted some feldspar to sericite, and a cleavage has developed which gives the rock the appearance of a **phyllite** or low grade schist.

4: Follow the path to Cilgwyn upper quarry. The Cilgwyn quarries have been used in recent years by the local authority for landfill waste disposal, but rock exposures can be examined around the entrance to the quarry.

Figure 187: Cilgwyn upper quarry.

The Llanberis Slate formation has a faulted boundary with the Fachwen formation, with the vertical fault plane forming the back wall of the quarry (fig.187).

Figure 188: Green and purple slates of the Llanberis Slate formation. Lighter bands within the purple slates indicate the original bedding.

The clearly dominant structure in the rocks is the near-vertical slaty cleavage along which the roofing slates were split. Cross-cutting the cleavage at a gentler angle is the bedding, often picked out by colour variations from purple to green. These colours represent variations in the oxidation state at the basin floor which controlled the precipitation of green ferrous or red ferric iron minerals within the clay deposits (fig.188).

A large rock mass extending from the quarry face, which has remained unworked by the quarrymen, is the Dorothea Grit. This is one of the occasional turbidite grit bands within the Llanberis Slate formation. The massive grits show graded bedding, with quartz granules at the base fining upwards into coarse sand. The grit is overlain by current bedded silt, before a return to the main succession of slates.

5: Descend around the Pen y Bryn quarry and spoil tips to reach the ruins of the mill buildings. From this point, an access tunnel ran through the hillside to the quarry pit.

Figure 189: Pen y Bryn quarry.

Follow the incline which descends towards the flooded Twll Mawr quarry. The Dorothea Grit and the purple and green slates can again be seen in the walls of Twll Mawr.

6: Join the footpath leading to the Dorothea Quarry.

7: Take the path to the Dorothea engine house.

Figure 190: Dorothea quarry and engine house.

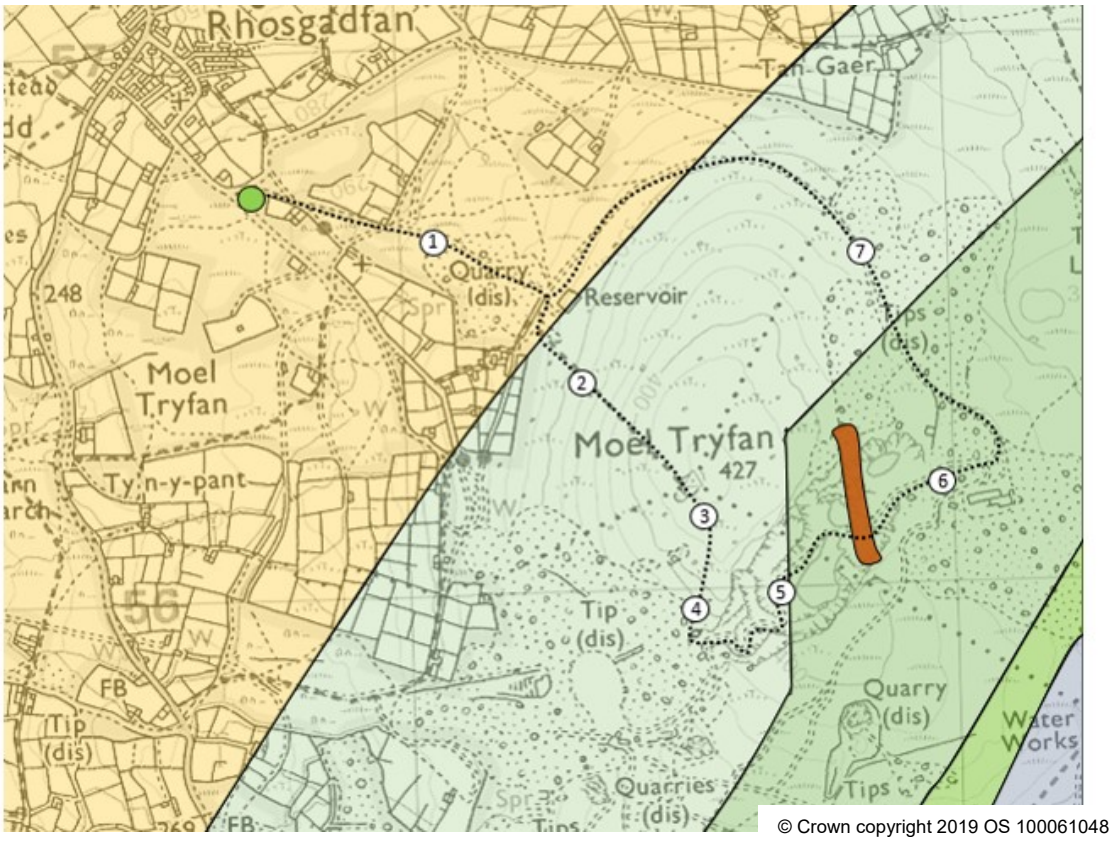
The Dorothea quarry opened in 1820 and remained in production until 1970. The large flooded pit seen today has developed by the amalgamation of a number of smaller quarries.

The valley location produced various operational difficulties for the quarry. The first of these, in the wet climate of Wales, was flooding of deep workings. This was overcome at Dorothea by the installation of a huge Cornish beam pumping engine with coal fired boilers.

A second major difficulty was the disposal of waste rock, which can be seen in the extensive tips around. This unfortunately resulted in large areas of good quality slate being buried and no longer workable, contributing to the eventual decline and closure of the quarry.

Moel Tryfan

2 miles: approximately 1½ hours



Nant Ffrancon siltstone
Bronllwyd Grit, sandstone
Llanberis Slate, sandstone, siltstone, mudstone
Fachwen sandstone, conglomerate
Padarn Tuff, felsic
Microgabbro

Figure 191: Field excursion.

In this excursion, we again make a traverse from Padarn Volcanics, through the Fachwen formation, to Llanberis Slates. We will visit a spectacular outcrop of Fachwen conglomerate at Moel Tryfan which has an important historic connection with Charles Darwin, and Alexandra Quarry which was another major open pit quarry in the Llanberis Slate formation.

Start: Park at Rhosgadfan [SH507568].

1: Follow the track to the disused quarry below Moel Tryfan. Here we see Padarn tuffs similar to the outcrops at Clogwyn Melyn in the previous excursion. A dolerite dyke of Tertiary age cuts through the volcanics.

2: Continue past the concrete reservoir building and climb the path to the summit.

The Padarn Tuff is overlain by the Tryfan Grits and Cilgwyn Conglomerate of the Fachwen Formation, with beds generally towards the south-east.

3: Examine the conglomerates in the outcrop near the summit. An information panel describes the visit of Charles Darwin to this outcrop, and the scientific deductions which he made from the rocks.

The outcrops are of conglomerates which are poorly bedded and show evidence of shearing. The pebbles appear to have been rotated during earth movements so that their long axes now lie in the direction of the cleavage planes. Pebbles consist of rhyolites of probable Padarn Volcanics origin, and quartzite and jasper similar to rock types found in the Monian.

Figure 192: Fachwen conglomerate, Moel Tryfan.

Within the outcrop area of Moel Tryfan there appear to be two horizons of coarse conglomerate separated by finer quartz-feldspar grits. This variation may represent changes in the position of a shoreline, or variations in the pebble and sand character of a beach, over a period of time.

Clearly, the coastline of the Arfon Basin lay at or close to this point during Fachwen Formation times.

4: Descend across the grassy hillside to the track at the southern entrance of the Alexandra quarry.

Figure 193: Alexandra quarry, with a pillar of Dorothea Grit in the middle distance.

Follow the track into the quarry, passing through a gap cut in a microgabbro dyke. The dyke is oriented north-south and is vertical.

Cleavage in the slate is near-vertical. The track skirts around the flooded quarry pit, passing a pillar of thick greywacke sandstone of the Dorothea Grit member. This is one of the occasional turbidite deposits within the Llanberis Slate formation. On reaching the lower level of the quarry, bedding planes visible in the underlying slates indicate a tight anticlinal fold. The eastern back wall of the flooded pit is again composed of Dorothea Grit.

5: Follow the track through the quarry, examining outcrops of the Cambrian strata in the quarry faces and in fallen blocks.

Figure 194: Anticline in slates, Alexandra quarry.

Blocks of Dorothea Grit show graded bedding and cross bedding characteristic of proximal turbidites. Groove casts may be found on the bases of the graded grits. Mud pellets may also be present, representing material ripped from the walls of submarine channels during turbidite discharges.

As seen earlier, the succession of mudstones and grits has been subjected to tight and intense folding along a north-east to south-west axis.

Fold compression in a horizontal direction has been accompanied by vertical stretching and shearing in the fold limbs. Pale green spots produced by localised chemical conditions within the sea floor muds, and originally circular in shape, may be deformed into an oval shape. Examples suggest a vertical to horizontal ratio of between three and four times, which gives an indicationof the extent of crustal compression and thickening during the Devonian earth movements.

Figure 195: Sedimentary structures at Alexandra quarry:

(above left) Dorothea Grit turbidite A units, overlain by cross-bedded sandstone.

(below left) Stretching of reduction spots in Llanberis slate.

(right) Boudinage in Dorothea Grit.

By the time of the Devonian earth movements, the sequence of sea floor muds may still have been soft and could deform plastically. However, the massive grit beds would have experienced lithification processes which cemented the grains together to form a solid rock. As a result, the grits have deformed in a brittle manner during folding with beds fracturing into separated blocks and muds infilling the gaps. This produces a structure known as **boudinage**.

Structural evidence from this and the previous excursions allows us to produce a model for deformation in north Snowdonia during the Acadian orogeny. It is likely that the ridge of Padarn Volcanics, which had been uplifted along the Menai Straights fracture zone, presented an obstruction to the basin sequence of muds and sands as they were compressed from the south-east.

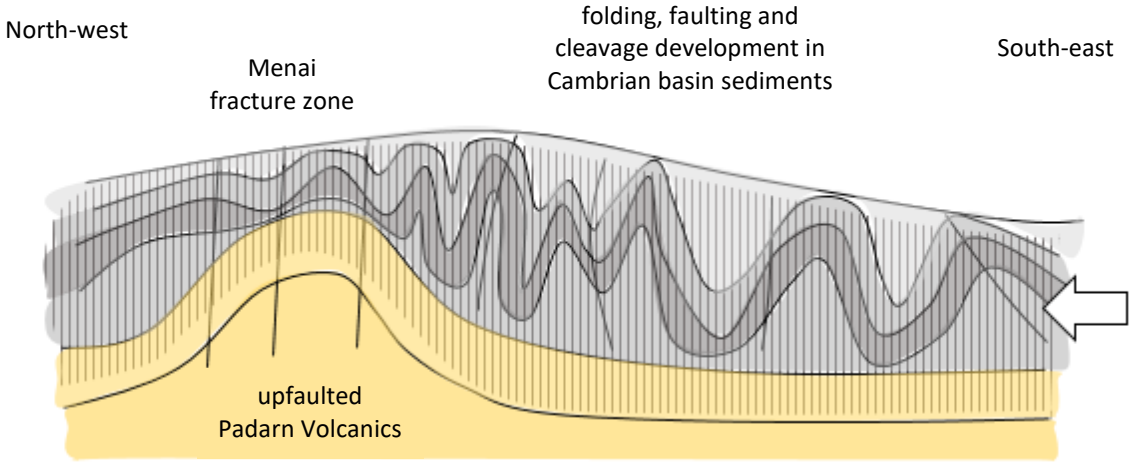


Figure 196:
A model for Acadian deformation in northern Snowdonia.

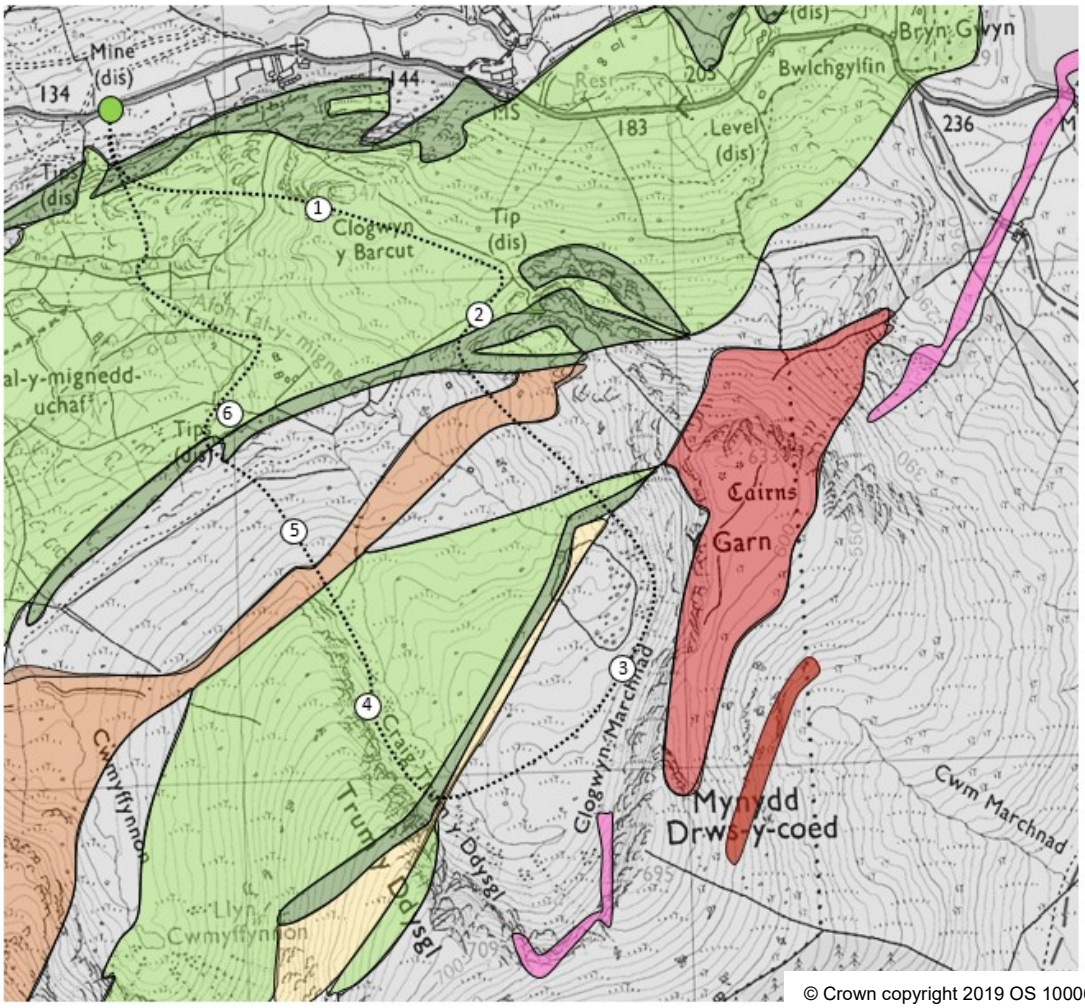
The sedimentary sequence was folded, with faults developing when stresses became too intense. Low grade regional metamorphism accompanied the earth movements, with recrystallization of clay minerals taking place to produce a regional cleavage perpendicular to the direction of maximum pressure.

6: Leave the quarry along the track at the northern end.

7: Return to Rhosgadfan along the quarry road past slate waste tips.

Rhyd-Ddu

3 miles: approximately 2 hours



- Nant Ffrancon siltstone
- Dol-cyn-afon mudstone, siltstone
- Carnedd y Filiast grit, conglomerate
- Marchlyn mudstone, siltstone, sandstone
- Rhyolite
- Microgabbro
- Microgranite

Figure 197: Field excursion.

The objective of this excursion is to examine the upper strata of the Arfon Basin succession, the ***Marchlyn Mudstones*** and the ***Carnedd y Filiast Grit***. These formations belong to a second cycle of basin deepening and shallowing, separated from the underlying Llanberis Slates by an unconformity when emergence and erosion took place within the Arfon Basin. The Marchlyn mudstones again represent deep water muds, but the deposits were not of sufficiently pure clay composition to produce high quality slate.

Start: Park on the main road between Nantlle and Rhyd-Ddu near Tal-y-mignedd [SH537534].

1: Climb the hillside towards Clogwyn y Barcut.

2: Skirt around the crags of Y Garn, crossing beds of the Marchlyn formation.

The rock is a splintery greenish grey slate without a well developed planar cleavage. Siltstones, thin sandstones and occasional conglomerates can be found in the outcrops. This sequence shows characteristics of deposition in a shallow marine basin or shelf sea, with no evidence of turbidity current activity. Large scale cross-bedding could be produced by strong bottom currents redistributing sediment in advancing sand ripples on the sea bed.

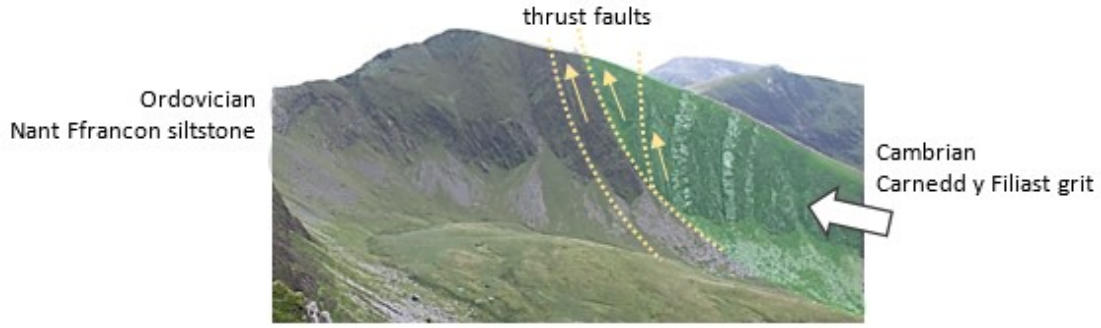


Figure 198:

(right) In the foreground, the lower slopes of Y Garn are composed of Marchlyn mudstone, with a capping of Carnedd y Filiast grit.

(below) Thrust faulting in the face of Craig Trum y Ddysgl.

3: Continue around the walled enclosure at the head of the valley, towards the prominent bands of white quartzite in the far wall of the cwm.

The route crosses Nant Ffrancon siltstone of Ordovician age, though the solid geology is concealed by glacial and periglacial deposits. The ridge of Y Garn above is composed of resistant rhyolite, intruded at shallow depth during the Snowdon Volcanic episode in the late Ordovician.

4: Examine the cliff of Craig Trum y Ddysgl where quartzite bands are exposed.

As we move along the cliff face towards the north-west, we will move down the geological succession from the Ordovician into the Cambrian. The cliff face to the left of the quartzite bands is composed of dark coloured slates of the Nant Ffrancon Formation, cut by a steep angled fault. Beyond the fault, the slate succession continues downwards until the first of the quartzite bands is reached. This contains some conglomeratic layers, and represents a deposit of clean sand and pebbles in a shallow water environment. A return to mudstone deposition is seen before the second quartzite is reached, then this sequence is repeated for the third of the quartzite bands. The rocks belong to the Carnedd y Filiast Grit formation, and represent varying conditions of water depth and sediment supply, probably close to the basin margin.

The quartzite bands have been rotated into their current position on the south-eastern margin of a local upfold known as the Cwm y Ffynnon Pericline. Pressure from the south-eastern direction has been sufficiently intense to push the quartzite bands beyond the vertical so that they become overturned.

5: Return northwards along the valley, crossing the stream.

In the lower part of the cwm, a sheet intrusion of microgranite is reached. The rock is heavily fractured and igneous features are difficult to identify.

6: Continue past old mine workings, where the waste tip contains samples of copper pyrite and galena.

7: Descend to the Nantlle – Rhyd-Ddu road.

Llyn Padarn

6 miles: approximately 3 hours

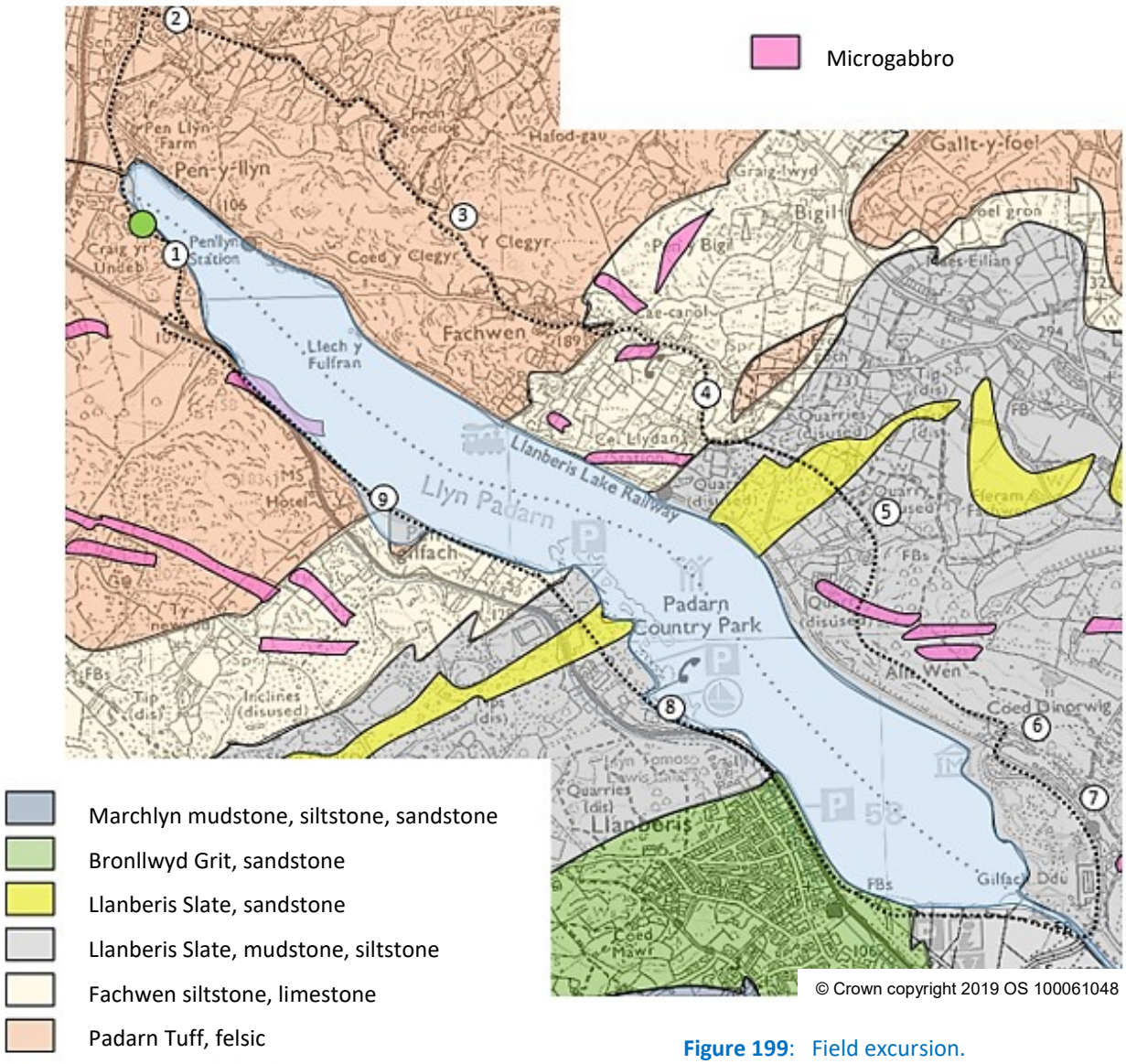


Figure 199: Field excursion.

In this excursion, we return to the lower part of the Arfon Basin succession to examine the Padarn Volcanic formation in greater detail in its type localities around the north-western end of Llyn Padarn. We then make a traverse upwards through the Fachwen Formation into the Llanberis Slates along the northern shore of the lake, returning around the head of the lake and back downwards through the succession on the southern shore.

Start: Turn off from the main Llanberis to Caernarfon road at the north-west end of Llyn Padarn. Park on the old Llanberis road [SH559623].

1: Walk along the old road to Craig yr Undeb.

Climb up into the gap at the centre of Craig yr Undeb to enter a natural amphitheatre cut in the rock outcrop. This is probably the point where the Dinorwig quarrymen met in historic times to plan their union activities. The rock outcrop is composed of rhyolitic ashes which show traces of flattened and welded glass shards, known as **fiamme**, producing a eutaxitic texture. The planar structures produced by the layers of glass shards represent the original bedding of the ashes, and can be seen to dip steeply to the north-west.

Figure 200: Craig yr Undeb, Llyn Padarn. (right) Detail of the ash, showing fiamme structures.

2: Cross the bridge at the end of the lake and enter the village of Brynrefail. Near the end of the village, take a turning to the right and continue eastwards through farmland to Fron Goediog.

The farm track turns into a narrow footpath between dry stone walls leading to the remains of several old cottages built into the wooded hillside.

Near the cottages, an outcrop of quartz granule conglomerate is seen. This sediment occurs within and near the top of the Padarn Volcanic Formation, indicating an interruption in volcanic eruptions and reworking of volcanic debris by water currents within the shallow marine Arfon Basin.

Figure 201: Quartzite sandstones overlying quartz granule conglomerate, Fron Goediog.

3: Continue up the footpath through woodland to the col near the hill of Y Clegyr. Before the path begins to descend towards Llyn Padarn, leave the path and head up the hillside to the left to reach the rocky summit of Y Clegyr.

Figure 202: Rhyolitic agglomerate within the Padarn Volcanic Formation, Y Clegyr.

The upper beds of the Padarn Volcanic Formation are well exposed in the glacially eroded pavements of the summit ridge. Rock types vary from fine ashes showing recrystallization of silica, to coarser volcanic agglomerates composed of coarser pyroclastic fragments.

Evidence from the area around Y Clegyr suggests that the major ignimbrite eruptions seen lower in the Padarn Volcanic Formation were dying out, and were being replaced by intermittent explosive vent eruptions producing air fall ashes. Volcanic episodes were separated by periods of marine

deposition, during which ash was redistributed by water currents to produce beds of sandstone and conglomerate.

Return to the footpath and descend through the woods to Fachwen. Join the minor road and continue uphill through the village.

If time permits, it is interesting to leave the road at the end of the village and ascend through the fields towards the summit of Pen y Bigil where a transmitter tower is located.

Examples of conglomerates of the Fachwen formation are exposed in many small outcrops. These rocks are similar in character to those seen during the field excursions to Mynydd Cilgwyn and Moel Tryfan earlier in this chapter.

Figure 203: Fachwen conglomerate, Pen y Bigil.

There is no evidence of a long time break and unconformity between the top of the Padarn Volcanics and the Fachwen Formation. The change in lithology may represent a gradual decline and termination of volcanic activity associated with the collision of the Arvonian microcontinent with Gondwana in late Precambrian times. Sedimentation continued in the small Arfon Basin, initially in a shallow coastal environment.

4: After following the minor road into Fachwen, continue to the end of the village where a track turns right through the woods towards Llyn Padarn.

At the end of the vehicle track, a footpath continues past several large open pit slate quarries now almost lost and overgrown in the woodlands.

These are developed in the Llanberis Slate Formation.

Figure 204: Llanberis Slate, Fron-gôch woods. The orientation of the bedding is indicated.

As sedimentation in the Arfon Basin continued from Precambrian into Cambrian times, subsidence along the Menai fracture zone may have produced deeper water into which muds were deposited. A long period of continued subsidence allowed the accumulation of the great thickness of the Llanberis Slate formation.

5: Continue along the path through the woods until the Dinorwig quarry hospital museum is reached. The museum is well worth a visit.

6: Descend the steps to the lake, and take the path alongside the narrow gauge railway track to reach the railway station at Gilfach Ddu.

7: At the back of the railway station, walk through a short tunnel to reach the Vivian quarry. The flooded pit is now often used for training of scuba divers.

The dominant structure in the slate is the near-vertical cleavage. Traces can be seen of bedding, often picked out by colour variations between the purple-grey slate and paler green bands. A tight anticlinal fold, passing upwards into a fault, can be seen at the base of the main quarry face.

A prominent feature in the quarry is a thick microgabbro dyke which has been left in place during quarrying operations. The dyke exhibits fine grained margins, with a coarser central core.

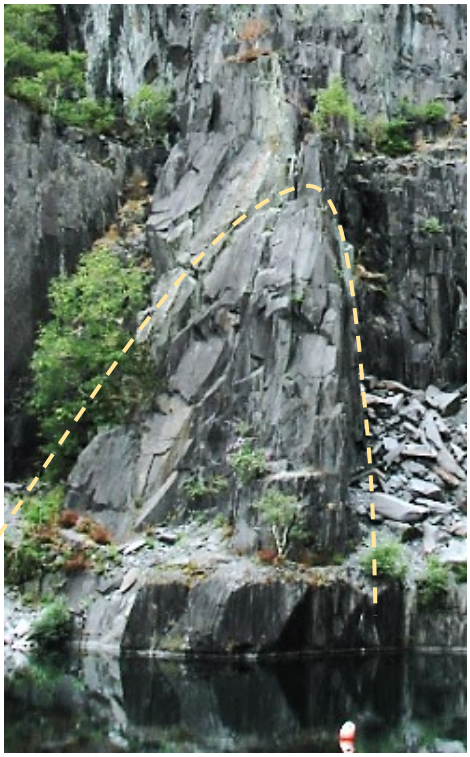


Figure 205:
(above left) Vivian quarry.

(above right) Detail of a faulted anticline.

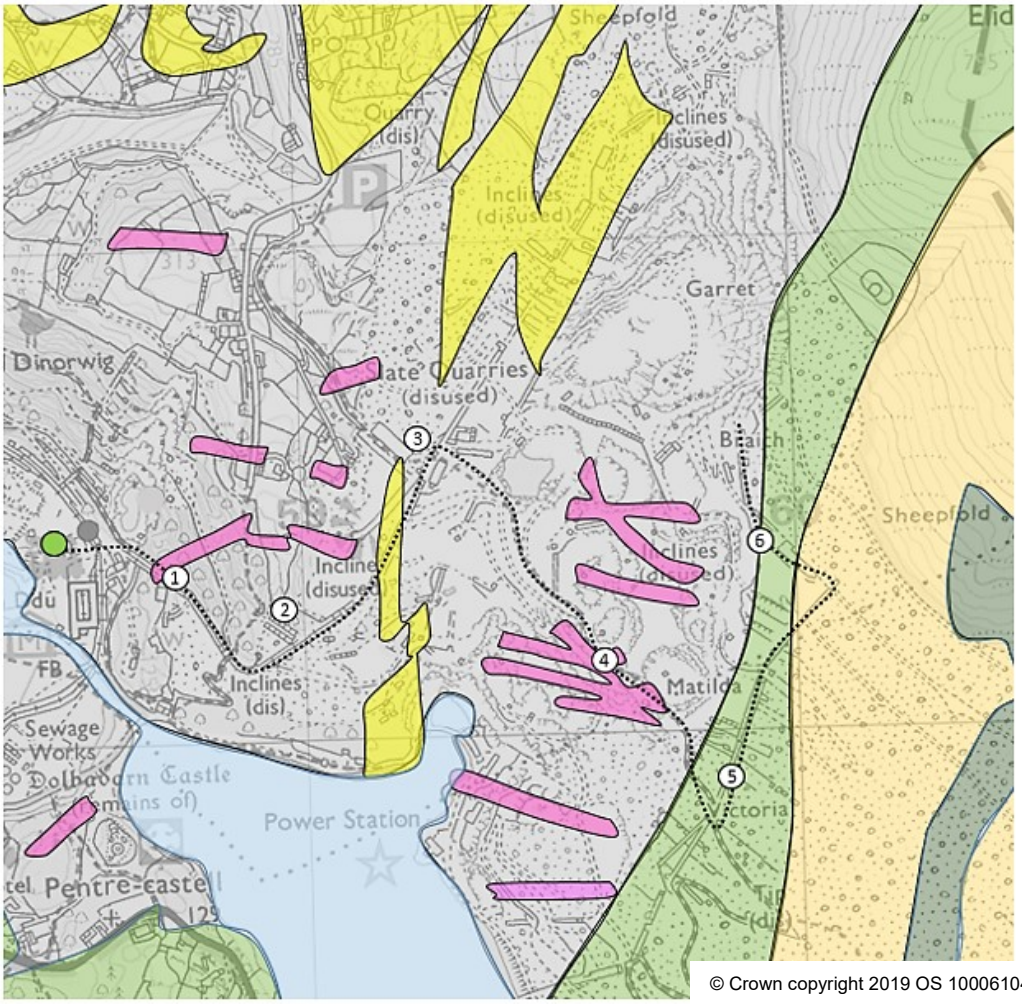
(below right) Microgabbro dyke.

Whilst at Gilfach Ddu, a visit to the Welsh National slate museum is highly recommended. Situated in the former Dinorwig quarry workshop complex, the museum provides extensive displays related to the history and operation of the quarries, including aspects of geology.

8: The return to Craig yr Undeb can be made along the western shore of Llyn Padarn. The route begins on a footpath around the head of the lake, then continues through a park alongside the lake, before joining the track bed of the former railway branch line from Caernarfon to Llanberis. The railway trail passes through a short tunnel cut in the Padarn Volcanic Formation as Craig yr Undeb is approached.

Dinorwig quarry

2 miles: approximately 2 hours



Carnedd y Filiast Grit, sandstone, conglomerate

Marchlyn mudstone, siltstone, sandstone

Bronllwyd Grit, sandstone

Llanberis Slate, sandstone

Llanberis Slate, mudstone, siltstone

Microgabbro

Figure 206: Field excursion.

In this excursion we visit Dinorwig quarry near Llanberis, perhaps the most extensive and well preserved of the north Wales slate quarries. The route takes us from the slate museum at Gilfach Ddu, up the 'A' series of inclines (1,2) to the site of slate mills (3). We then follow a track across the hillside past enormous quarry workings (4), to reach the 'C' series of inclines (5). We then ascend to the high 'Australia' level where remains of a variety of quarry workings, buildings and machinery can be seen (6).

Dinorwig, in common with the other quarries of north Snowdonia, worked the Llanberis Slate Formation. These rocks originated as thick mud deposits within the subsiding Arfon Basin during lower Cambrian times. Occasional turbidite grits are also found, suggesting that rare discharges of turbidite sands took place onto the muddy basin floor.

A probable unconformity above the Llanberis Slates indicates uplift and erosion in the middle Cambrian. Deposition recommenced with sandstones of the Bronllwyd Formation, followed by finer muds and silts of the Marchlyn Formation as the basin deepened again. The Bronllwyd grits exhibit graded bedding with coarse quartz grains at the base, suggesting turbidite deposition in a proximal environment near the edge of the Arfon basin.

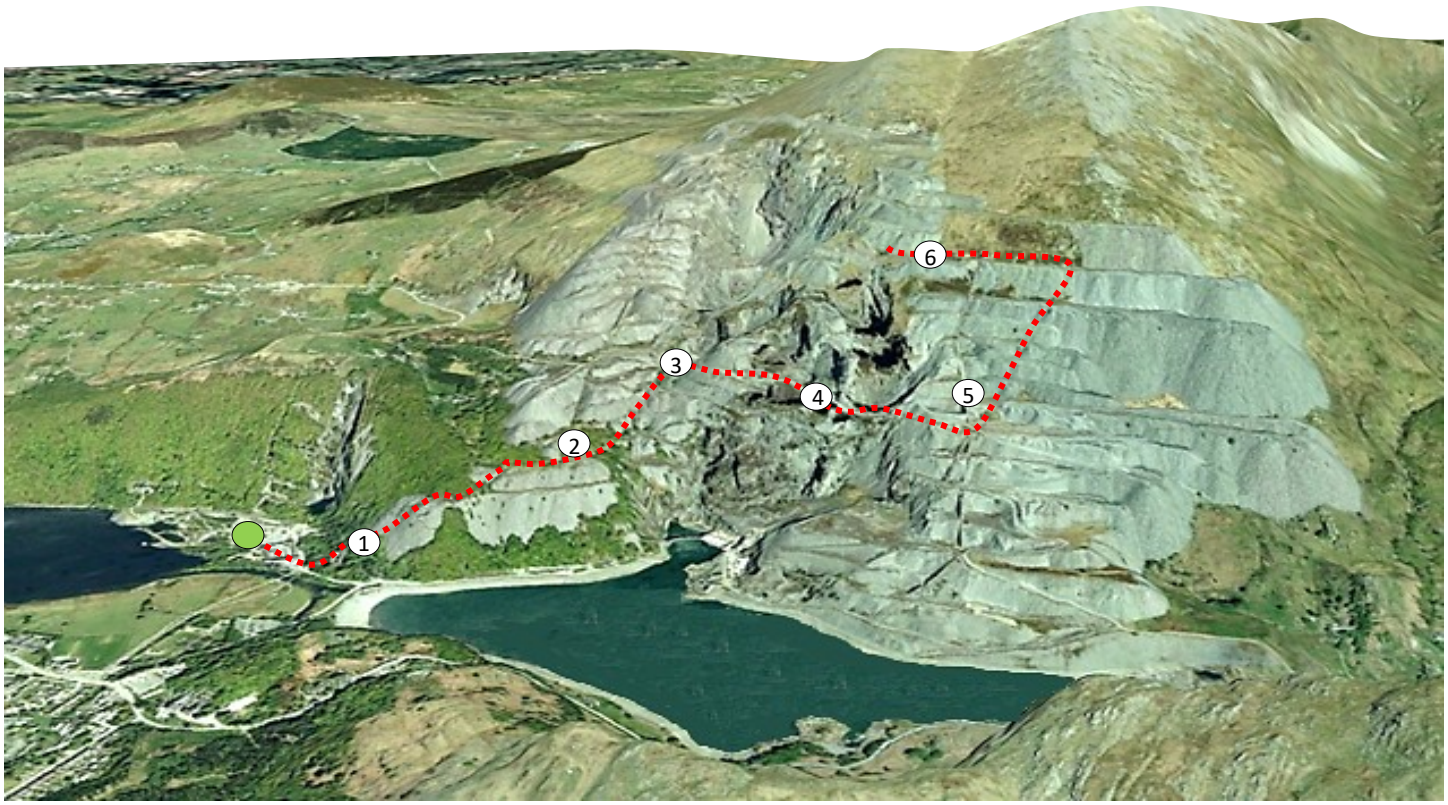


Figure 207: Dinorwig quarry route.

During the Ordovician period, extensive volcanic activity occurred across the Welsh Basin. At Llanberis, this activity gave rise to thick microgabbro dyke intrusions which are seen at a number of points in the quarries. The dykes were of no economic value, so were often left in place by the quarrymen and now appear as thick vertical slabs standing out above the slate workings.

Earth movements during the Acadian orogeny in the Devonian period led to folding of the mudstone and sandstone sequence along north-east to south-west axes, accompanied by thrust faulting as the sedimentary sequence was compressed towards Anglesey. Low grade regional metamorphism in the thickened sedimentary succession led to recrystallization of clay minerals and the development of slaty cleavage. The purity of the clay deposits of the Llanberis Slate Formation produced high quality slate with a finely spaced and regular cleavage, ideal for the manufacture of roofing slates. The overlying mudstones of the Marchlyn formation were also converted to slate, but silt impurities produced brittle and irregular cleavage of little economic value.

Start: A car park is available at the Gilfach Ddu slate museum [SH585604].

Walk past the entrance to the Vivian Quarry behind the railway station to reach the lowest section of the 'A' incline.

1: Ascend the quarry incline. This was a gravity worked system, with heavy full trucks descending and pulling lighter empty trucks back up. The rails are still in place, and the drum house and cable brake can be examined at the top of the incline.

2: Pass through the drum house and follow the railway track to the base of the second incline. After ascending the incline for a short distance, a row of buildings will be seen on the left. This is the Anglesey Barracks (Barics Môn) where quarry workers from Anglesey lived during the working week. Continue to the top of the incline.

3: Examine the site of the former slate splitting mills.

4: Take the track which runs eastwards around the hillside to the main quarrying area of Dinorwig. A series of large pit quarries have been worked to the left of the path.

A series of large microgabbro dykes cross the workings at this point. These have been largely left in place, but a cutting was made for railway access to the workings beyond. This route which is now followed by the footpath.

Figure 208: Microgabbro intrusions, Dinorwig quarry.

5: Continue to the 'C' series of inclines. Ascend the two incline stages to reach the C5 drum house on the Australia level.

Bedded siltstones and fine sandstones of the Marchlyn Formation are exposed in the cutting at the rear of the drum house.

Walk along the Australia level to the old mill building, where a large amount of machinery is still present. Circular saw tables, powered by an overhead line shaft, were used to cut slate slabs into suitably sized blocks for splitting into roofing slates.

Figure 209: Outcrop of Bronllwyd turbidite grit in the hillside behind the slate mill. Australia level, Dinorwig.

In the bank behind the slate mill, outcrops of the Bronllwyd turbidite grit can be examined (fig.209). Bouma A-unit graded grits with a basal quartz granule conglomerate can be identified. Parallel laminated B-unit sandstones are also present.

6: Continue along the Australia level, past further workshops, an engine shed and compressor building, to reach the Braich area of the quarry. From this point, multiple working levels can be seen in the quarry faces.

From this view point, a tight anticline-syncline fold pair can be picked out in the outcrops of Bronllwyd grit on the opposite side of the valley above Llyn Peris.

Figure 210:
View across Llyn Peris from Dinorwig quarry. Folding is visible in outcrops of Bronllwyd Grit.