

WEEKEND EXCURSION TO THE LLANGOLLEN AREA

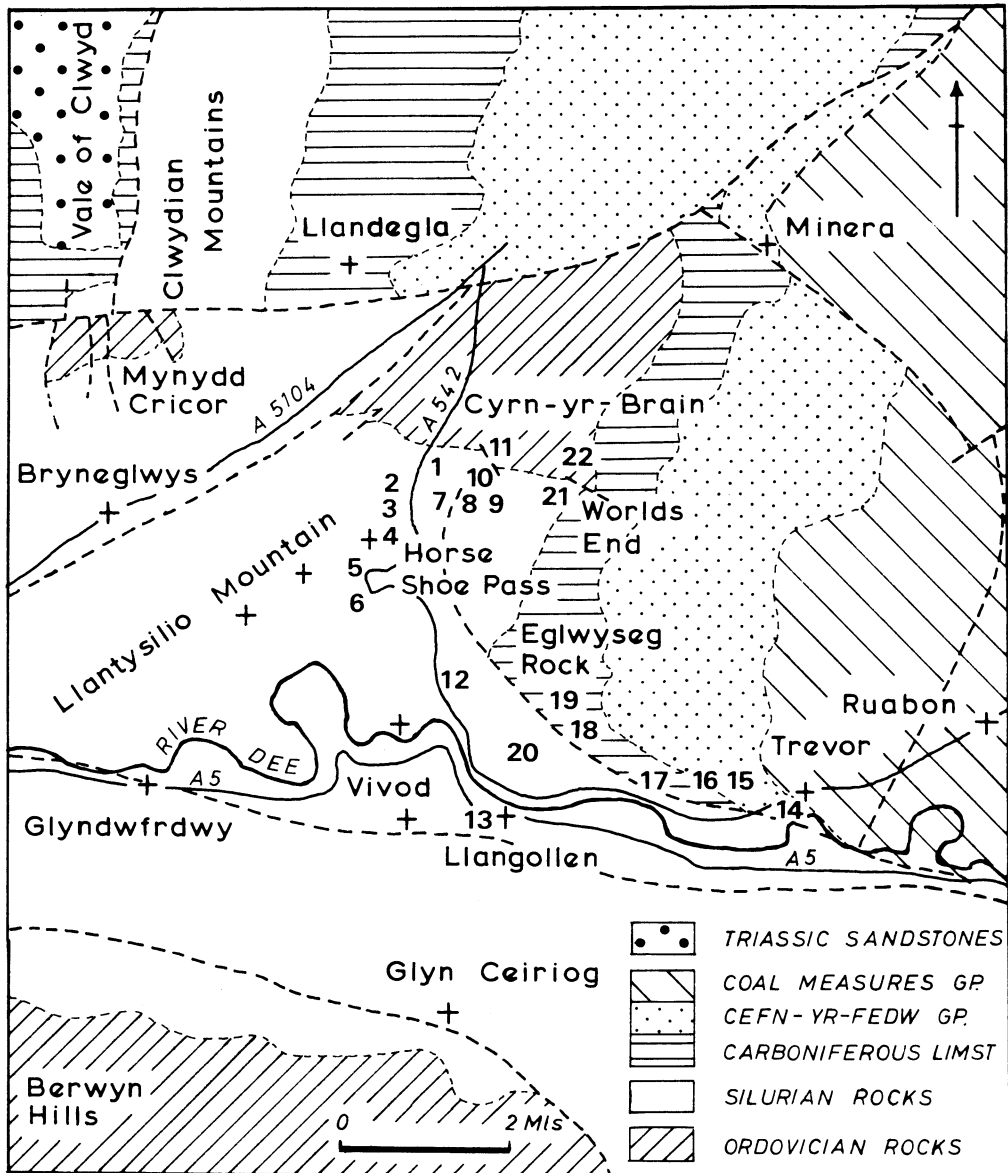
Leader: Dr. F.M. Taylor

11th - 13th May 1973

The party travelled independently to Llangollen, booking in at the Eirianfa Hotel. On the Friday evening, after dinner, the leader gave a brief outline of the geology of the area visited, including, with the aid of maps, the regional geology of the Llangollen area. The town is situated almost in the centre of a Lower Palaeozoic syncline (Wills 1920, 1922) the axis of which trends east - west, approximately along the line of the River Dee. To the east, Carboniferous rocks overlie the older strata with marked unconformity or faulted contacts (Wedd *et al.* 1927). The Saturday excursion was centred on the Horse-shoe Pass examining the northern limb of the syncline, whilst the Sunday excursion was mainly concerned with the Carboniferous rocks but would also complete the study of the Lower Palaeozoic rocks north of Llangollen.

The following sequence of Carboniferous, Silurian and Ordovician rocks was seen during the week-end:

Upper Carboniferous	<div style="display: inline-block; vertical-align: middle;">           { Coal Measures  Cefn-y-Fedw Sandstones         </div>	<div style="display: inline-block; vertical-align: middle;">           { Chwarelau Coal and associated rocks Aqueduct Grit Upper Shales Dee Bridge Sandstone Lower Shale Middle Sandstone Cherty Shale Lower Sandstone and Conglomerate         </div>
Lower Carboniferous	<div style="display: inline-block; vertical-align: middle;">           { Carboniferous Limestone         </div>	<div style="display: inline-block; vertical-align: middle;">           { Sandy Limestone Upper Grey Limestones White Limestones Lower Grey and Brown Limestones         </div>
Carboniferous or Devonian		Basement Beds
- Unconformity -		
Silurian	<div style="display: inline-block; vertical-align: middle;">           { Ludlow  Wenlock  Valentian (Llandovery)         </div>	<div style="display: inline-block; vertical-align: middle;">           { Dinas Bran Beds Vivod Beds Nant-y-Bache Beds Glyndyfrwdwy Beds  Moel-y-Faen Slates  Mudstones and siltstones Green-grey and maroon slates         </div>
Ordovician	Bala	<div style="display: inline-block; vertical-align: middle;">           { Plas Uchaf Grit Cyrn-y-Brain Beds         </div>



Text-fig. 1. Outline geology of the Llangollen area. Numbers 1-22, refer to the localities visited.

Text-fig.1 illustrates the outline geology of the area and the localities visited are numbered 1-22. The oldest rocks outcrop on Cryn-y-Brain. From this mountain southwards to Llangollen, successively younger Silurian rocks are encountered all striking approximately east - west. The Carboniferous rocks, striking north - south, overly the Lower Palaeozoic strata unconformably in the east. The Aqueduct Fault forms the junction to the south-east and south.

The geology and outcrop pattern of the northern part of the Llangollen syncline is complicated by intense folding. Regional metamorphism has changed the mudstones and shales to slates but in the sandstones and siltstones, cleavage is much more variably developed, having little effect on the sandstones. There are no igneous rocks exposed in the area visited. Mineral veins occur in many places, with lead, zinc and calcite minerals in the Carboniferous Limestone and a quartz-copper mineralisation in the Silurian rocks.

#### Saturday, 12th May

##### 1. Horse-shoe Pass

From Llangollen, the party travelled from the hotel by car northwards to the summit of the Horse-shoe Pass (SJ 193481) where other Members of the Society joined the excursion. A short walk further north brought Members to the southern slopes of Cryn-y-Brain immediately west of Tai-Newyddion, where in old excavation (SJ 192488) (1) the lowest Silurian rocks were examined. They are poorly cleaved silty mudstones, medium grey in colour and a number of brachiopods were obtained from one of the excavations. From this point, looking generally in a southerly direction the slopes of Moel-y-Faen can be seen with excavations in the slate belt aligned east - west. In front of the quarries (to the north) are the very extensive tips of the inferior slate material.

2. At Hafod-yr-Abbot (SJ 187486) blueish grey and blueish black cleaved mudstones where examined to locate Llandovery graptolites (*Monograptus crenulatus*), at the locality recorded by Wills. On this occasion only small fragments, broken by the cleavage, were recovered.

3. Moel-y-Faen. The party then climbed the northern flank of Moel-y-Faen skirting round the tips and then ascended the steep incline into the quarries (SJ 188477), situated below the summit of the mountain. A number of excavations were visited allowing detailed examination of the lithology and the structure. In the passage-ways leading into the main quarries hard beds of sandstone interbedded with the slate indicated the dip of the beds. The amount varied from almost vertical where the beds were slightly overturned to gentle, where the beds were the correct way-up. Quartz veining, also involved in small intense folds, occurred throughout. The best Moel-y-Faen slates are dark blue in colour and of the local slates, the best quality were obtained from these quarries and mines. The variable quality of the slates is indicated by the size of the tips.

4. Despite the cold wind and overcast sky, most Members continued to the summit of Moel-y-Faen (SJ 185475) for the view. Once on the top, 1510 ft., it could be seen that the summit is situated at the north-eastern end of a ridge - Llantysilio Mountain - extending south-westwards including the high points of Moel-y-Gamelin (SJ 176463) and Moel Morfydd (SJ 166458), both at about 1,800 ft. Llantysilio Mountain is composed of various parts of the Wenlock and Ludlow sequence. To the north, lies the broad Bryneglwys Valley extending south-eastwards to Corwen. Further north are the rounded hills of the Clwydian Range and the Ordovician inlier of Mynydd Cricor. Visibility did not allow a view of the North Wales coast or, in a westerly direction, the Snowdon Range of mountains. To the north-east, across the Ruthin road, the position of Ordovician rocks is marked by the television mast on Cryn-y-Brain. Eastwards the Carboniferous Limestone escarpment of Eglwyseg Mountain formed of grey rocks with scree deposits, could be clearly seen and a little to the south the isolated hill of Dinas Bran indicates the position of the highest Ludlow rocks. Still looking south, the present course and the abandoned incised meanders of the River Dee were pointed out. Further south, the sky-line is made up of rocks representing the southern limb of the Llangollen syncline extending to the west and the Berwyn Hills.

5. Oernant Slate Quarries. The summit party, then descended rapidly to the disused slate quarries on the south side of Moel-y-Faen, at Oernant (SJ 183470) to examine the Pentre Dwr Slates. They are grey in colour and as this slate band was more variable in lithology and of poorer quality than that of Moel-y-Faen there was less exploitation and the excavations are smaller. The trend of the quarries is parallel to those of Moel-y-Faen indicating that the fold axes are parallel with the strike of the beds. The presence of small scale folding can be seen in the more westerly of the Oernant Quarries where shallow southerly dips are followed by steep dips to the north.

6. Clogau Quarry. Continuing further south along an old tramway and up a steep incline, the old slab quarry on Clogau was next visited (SJ 185464). The rocks at this locality are a sequence of rapidly alternating thinly bedded siltstones and mudstones. The siltstones have generally resisted cleavage which has changed the mudstones to slates. The dip of the beds and the cleavage in the main quarry are steep and almost parallel. In the passage leading into the quarry variation in dip can be detected by coarser beds indicating the presence of small folds. Rock creep has affected the top section of the north quarry face. In the main quarry, some of the exposed bedding surfaces are covered with *Orthoceras*, somewhat distorted by the cleavage; other surfaces are covered with small concretions. The quarry used to specialise in the production of large slabs of slate used for billiard table tops, stone cisterns, boundary and walling stones.

7-9 South side of Cryn-y-Brain. The party returned briefly to the car park at the top of the Horse-Shoe Pass and then took the footpath to Bryn-yr-Odin (SJ 201481) (7). On either side of this footpath exposures of pale grey, green-grey, and purple slates were examined. The slates seem to be cut by two cleavage planes set at an angle to produce blocky fragments. Small orthid brachiopods were found in the green-grey bands. Attempts were made to trace some of the purple bands for short distance up the steep slopes, for with the absence of coarser beds in this part of the sequence, the colour changes were the only clue to the bedding. Maps produced by L.J. Wills show that the distribution of the purple slates illustrates folds in the strata and that they fit into the general structural pattern determined elsewhere on more reliable evidence. The track towards Caer Hafod (8) allowed the party to examine the varied lithologies that occur between the purple slates and the blue slates at Pant Glas Quarry (SJ 214476) (9), the lateral equivalent of the Moel-y-Faen Slates. The quartz veining seen previously was again noted and as at the Moel-y-Faen quarries, the veins were folded.

10-11 Cryn-y-Brain. A route was next projected that would eventually reach the summit of Cryn-y-Brain, the northerly traverse descending the sequence. A number of steep valleys were crossed, in one of which, a band of purple slates within the green-grey slates could clearly be seen at outcrop and in scree debris. After crossing a flat marshy area, outcrops of siltstones situated above the Plas Uchaf Grit were examined in the rising ground towards the television mast. Finally close to the mast blocks of the typical white coarse sandstone, the Plas Uchaf Grit, were discovered at about the right outcrop point but none were thought to be in place.

From the view point (10), the terrain described previously from Moel-y-Faen was again observed.

The return journey to the cars was made along the track from the T.V. relay station to the Horse-Shoe Pass. In an old cutting (SJ 200483) (11) adjacent to the track a few feet of black graptolitic slates were exposed interbedded with dark grey silty slates. The horizon has yielded *Monograptus crenulatus* but the blocky slate fragments rarely produce good specimens. On this occasion fossil collecting was made difficult by the gale force freezing wind blowing through the cutting.

12. Valle Crucis Abbey. From the car park, the party returned to the Eirianfa Hotel noting on the way the coarser sandstones and siltstones of the younger Ludlow rocks, particularly at the old quarry near Valle Crucis Abbey (SJ 202445). The Abbey is situated in an old abandoned incised meander of the River Dee.

Sunday, 13th May 1973

13. Llangollen. A visit was made to the rocks exposed in the bed of the River Dee at Llangollen, 200 yds. west of the town bridge (SJ 214421). The coarse greywackes are thickly bedded and are more or less horizontal forming the upper part of the Vivod Beds in the centre of the Llangollen Syncline.

14. Trevor. From Llangollen, the cars were driven along the Ruabon road to Trevor for the commencement of the study of the Carboniferous rocks. At the works of Roberts and MacGinnis (SJ 265426), part of the Millstone Grit and Lower Coal Measures strata are exposed. The Aqueduct Grit was first examined on the western side of the site. About 40 feet of coarse felspathic sandstone, with occasional pebbly layers were exposed in the quarry. Members of the excursion felt quite at home in dealing with this rock and comparing it with Millstone Grit exposures of Derbyshire.

Moving round to the east side of the site some of the higher beds of the Aqueduct Grit could be seen and the lowest members of the Coal Measures. The entrance to the Ganister Mine (Wills 1922, now closed) was seen and the rocks exposed here and in the adjacent face were examined. The following sequence was established:

Sandstone  
Clays and siltstones  
Coal, 18 inches ? Chwarelau Coal  
Ganister - the original material for the works  
Sandstone

Plant fossils were obtained from most of the horizons including the upper sandstone.

In a stock pile behind the works, the present stocks of ganister, eventually to be crushed and used as the raw material for the manufacture of refractory bricks, had been obtained from quarries well to the north of the works.

Garth. From the Brick Works, the cars followed the minor road to Garth and then an even narrower road in a westerly direction towards the 'Panorama Walk'. On the way, exposures and escarpments formed by the Middle Sandstones could be seen. The sandstones are similar in lithology to the Aqueduct Grit. One of them is the source of the stone for the famous Pont Cysyllte Aqueduct.

15-17 Panorama Walk. Rocks below the Middle Sandstones were next examined in old quarries (SK 248429) (15) about 800 yards west of Garth. The quarries are mainly in cherty mudstones but exposures of the overlying and underlying sandstones were seen. The cherty rocks are a rather unique type of lithology, resembling a very fine-grained, well bedded ganister. The party moved westwards to the main escarpment (16) formed by the Lower Sandstones and Conglomerates, above the Carboniferous Limestone. The sandstones are very coarse with large white quartzite pebbles. The effect of the Aqueduct Fault cutting across successive escarpments of limestones and sandstones was demonstrated.

Continuing westwards along the Panorama Walk, the top beds of the Sandy Limestone were next examined (SJ 241429) (17). The structure exhibited by one of the rock faces immediately drew attention. At first glance, the structure was an apparent unconformity with horizontal beds cutting across others dipping at 45°. As there was no satisfactory explanation for this phenomena on the regional scale, an explanation was sought in conjunction with the Aqueduct Fault, indicating movement along the fault during deposition of the Sandy Limestone. Finally the previous explanation (Wedd *et al.* 1927) was put to the party that these were giant

cross-bedded units. The exposed part of the cross-bedded unit is almost 6 feet in height a scale outside the experience of those present. The explanation was eventually reluctantly accepted. Lunch was then taken during a heavy rain period.

18-19 Trevor Rocks. The afternoon commenced still 'in the wet' but with the promise that the rain would show up the corals in the Carboniferous Limestone to perfection. Sure enough, at the old quarries towards the top of an old incline, (SJ 234433) (18), the coral beds were quickly located. Various species of *Lithostrotion*, *Lonsdaleia*, and *Palaeosmia* were seen with occasional specimens of *Dibunophyllum*. Gigantoproductids, other productids and spirifers were amongst the brachiopods noted. Extensive collections of corals and brachiopods were possible not only in this quarry but in the succeeding continuous exposures towards the Eglwseg Rocks. A route was taken, mainly along an old tramway which allowed a gradually descending sequence to be looked at, through the White Limestones to the Lower Grey and Brown Limestones. At one point (SJ 228434) (19) close to the base of the White Limestone, possibly in the Grey Limestones a bed of red, yellow, and brown shales dipping at 45° at the outer edge of the tramway evoked a certain amount of discussion. Limestone could be seen below the exposure of the shales in the lower part of the escarpment and a bed of shale could be seen higher in the cliff face. It was eventually concluded that a slip had taken place, either along a joint or possibly a fault parallel with the Aqueduct Fault which is quite close to the escarpment at this point. The idea, that the steep dip was the result of drag against the fault plane of the Aqueduct Fault, was made and on the evidence available at the time, could not be disproved. The party continued along the tramway until a point was reached opposite Castel Dinas Bran.

20. Castel Dinas Bran. Some encouragement was then necessary to attempt the precipitous descent to the base of the escarpment, the crossing of the fault hollow eroded along the Aqueduct Fault and the equally precipitous ascent to the summit of Castel Dinas Bran (SJ 222431). The point about the erosion along the fault hollow having been made, the highest Ludlow Beds in the Llangollen area were then examined. *Saetograptus* (*Monograptus*) *lientwardinensis* has been recorded from these beds along with other fossils (Wills 1927) but little was obtained on this occasion. From the top, there were excellent views, the rain having cleared away, across the Vale of Llangollen and the old river valleys of the Dee, abandoned as a result of ice blockage during the Pleistocene and water finding a new outlet and eventually eroding a valley to a lower level than previously. Northwards, the ground walked over on the previous day could be seen and the magnificent escarpment of the Carboniferous Limestone continuing northwards in great arcs towards Worlds End.

Returning to the cars, red soils and blocks of red sandstones and breccias were pointed out at the foot of the limestone escarpment (SJ 226432) and the brown limestones, occurring above the red beds were available for study at a number of places.

21-22 Worlds End. (SJ 233478) Along the very narrow road to Plas Uchaf and Worlds End, there are continuous views of the Carboniferous Limestone escarpment. Just off the road, beyond Plas Uchaf, in the stream below the limestone, grey-green mudstones (Llandoverly) are exposed. The Carboniferous Limestone outcrops a few feet above in the hillside. At Worlds End, a footpath leads up through a small valley eroded along a fault, which can be seen in a number of places as a result of small mining excavations and intense calcite veining.

Further along the narrow road to Minera, a few forestry road, on the left has been cut across the Nant Craig-y-moch and westwards towards Fron Lŵyd. This road cuts through the highest part of the Cynr-y-Brain Beds, below the Plas Uchaf Grit. The beds are calcareous and fossiliferous with corals, trilobites and brachiopods. The rocks were examined by the party in the same stream section but above the forestry limit (SJ 230485) (22) in somewhat older strata but similar fossils were obtained indicating the Upper Ordovician age of the group. The excursion was declared closed when the third cephalon of *Platycalymene* was disclosed.

After a vote of thanks to the leader, the party dispersed some to explore the old mine tips at Minera and others returning to Llangollen.

#### References

- WEDD C.B., SMITH B., and  
WILLS, L.J. 1927. The Geology of the country around Wrexham, pts. I and II. *Mem. Geol. Surv. G.B.*
- WILLS, L.J. 1920. The Geology of the Llangollen District. *Proc. Geol. Ass.* vol. 31, pp. 1-25.
- WILLS, L.J. 1922. The Lower Paleozoic rocks of the Llangollen District. *Q. Jl. geol. Soc. Lond.* vol. 78, pp. 176-226.

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