

Notes from Local Interest Group Begwns Geology Visit 29th July 2021

Present: Maureen Lloyd (ML), Wendy Ozols, Margaret & John Price, Evelyn & John Bally, Joan Lloyd, Roy Lloyd, Lisa Lloyd, Iwan Evans, Elsa Harflett, Richard Harris, David Price, John & Sue Ievers, Tracey Harley, Cherry & Victor Williams, Ann & Howard Dean

Apologies: Dainis Ozols, Bronwen Jenkins, James & Jenny Martin, Jane Nicholls

ML welcomed everyone to the Begwns and introduced Alan Bowring, the Fforest Fawr Geopark Development Officer from the Brecon Beacons National Park. Alan is a geologist by training and regularly gives talks about the rocks and landscape of the western part of the National Park. The Begwns are not on his “patch”, but he had agreed to take us on a geological walk around the Roundabout.

Alan started by giving us a brief outline of the rocks found in this area. Around Hay-on-Wye, to the south of the Begwns, the rocks are mostly Old Red Sandstone (ORS) dating from the Devonian geological period. These can be seen in Hay Bluff and the central Brecon Beacons, for example. Rocks in our area are Silurian, dating from between 430 and 419 million years ago, and so older than those from the Devonian. (The Silurian period was named after a Welsh tribe, the Silures.)

We stopped on our way up to the Roundabout and Alan pointed out some hills that we could see in the distance. To the NE, we could see Brown Clee in Shropshire. This hill is composed of the ORS which extends all the way across the country from the Pembrokeshire coast in the West, through Carmarthenshire, Powys and Monmouthshire, and into Herefordshire, Worcestershire and Gloucestershire to the East, and as far as Brown Clee. We could also see the Malvern Hills in the distance and Alan explained that this line of hills (a lineament) marks a collision zone between two tectonic plates. The rocks there are mainly igneous and metamorphic rocks, and are some of the oldest in England, dating from the late Precambrian, at around 680 million years old.

We examined a couple of rocks on the surface so that Alan could tell us what clues to look for when trying to determine what the rock type is. He told us to look carefully at the texture – could it be fine-grained mudstone or a slightly coarser grained sandstone, both of which are found locally. He also told us to note that rocks are not always found in the place where they originate – “every rock is on a journey”. A rock might have been moved by ice (during an ice age) or even by people, either long ago (eg in the Bronze Age) or more recently (eg by a farmer). One of the rocks had wavy lines on the surface. These represent ripples, just like the ones that you would find on a sandy beach or shallow seabed, which have been “preserved” when the sediment was lithified (turned into rock). This rock was probably formed in the Silurian period (420 mya) from sediments deposited in shallow water. (The ORS, by contrast, was largely laid down by rivers during the Devonian.) The rocks were formed at a time when this part of Wales was much further south than it is at present, being located within the Tropics. This was part of the Welsh Basin, where a considerable thickness of marine sediment was laid down on the sea bed.

Our next stop was at the Roundabout. Alan asked Richard Harris (the sculptor who designed the seat within the walls at the top) where the rocks for his seat and the walls came from. Richard told us that the rock was taken from the Llangorse Quarry at Tredomen. The rock is ORS, specifically from the St Maughans Formation. Alan told us that fossil fish have been found in large numbers within this rock, with a number of new species discovered when they were examined. Although

much of the lower part of the enclosing wall was already in place, when the seat was built in 2000, rocks from the same quarry were used to rebuild the higher parts.

At the top of the hill, Alan told us a little of the glacial history of the area. The smooth profile of the landscape indicates that much of the area was covered in ice. Between 100 000 and 80 000 years ago, the climate started to deteriorate and get much colder. By about 28 000 years ago, ice had started to build up in the high parts of Wales like Snowdonia and the higher parts of the Brecon Beacons. Around 22 000 years ago, the Ice Age was at its peak in Wales with much of the land covered, but the ice had all but disappeared from southern parts by 18,000 years ago. Then, from about 12 900 to 11 500 years ago, there was an advance of the ice once again, but only the high NE-oriented cirques of the Brecon Beacons had an ice covering at this time; there was no ice in the Black Mountains. In general, the east of the area always had less ice than the west because (as today) it was drier here and so less snow fell/accumulated. The Black Mountains never generated their own ice in the last Ice Age (although they may have done so in the earlier Anglian Ice Age) – it came from ice moving into the area from the Wye and Usk glaciers.

Just beyond the Roundabout we stopped so that Alan could explain the shape of the land. The subtle features in the landscape are the result of a series of rocks. The rock type here is Raglan Mudstone and this consists of mudstone with sandstone bands. (Alan showed us the local geological map to illustrate these variations in the rock type.) The sandstones are more resistant and so stand out as ridges; the less resistant mudstone results in flatter areas between the ridges. The result is a quite obviously stepped look to the landscape. We examined a small quarry in the more resistant sandstone, where the rock appeared “laminated”. The horizontal layers in the rock are bedding planes. In this quarry some of the layers are tilted; others are slightly curved and this indicates cross bedding which occurs when sediments are laid down in a current, in this case underwater. Cross-bedding can indicate the direction of the current and Alan showed us the most likely direction of flow here. These sediments were laid down in what was then the Welsh Basin. When examining a rock, certain types of evidence can help in dating the rock and in determining the type of environment in which it was formed. Looking for fossil evidence can be most helpful, especially in terms of dating the rock. For example, brachiopods have slightly different versions over time. Also, a careful examination of the fossils can help determine the kind of environment in which the rocks were formed as different plants or animals live in different environments, eg terrestrial, fluvial or marine. It is also useful to compare what you can see in the rock with present day creatures/plants.

On one of the flatter areas, we found an exposure of the mudstone in the path. This rock is very easily weathered and eroded and Alan illustrated this by using his boot to loosen bits. It is crumbly and very susceptible to freeze-thaw weathering, which helps to break it up. Because it does not form prominent features in the landscape, it is often overlooked. It is certainly a poor building stone and so is not quarried.

Further on, by one of the seasonal ponds below the Roundabout, we looked at another couple of large rocks on the surface. These were halfway between a sandstone and a mudstone and consisted of many layers. Again, this would not be good building material. Alan explained that, in the Welsh Basin, sand and mud would have been carried down to the sea by rivers from the hills beyond, some of which might have been very high. Layers of sand and mud would have built up as they were deposited – the further material is carried, the smaller the particles become (and the more rounded). He went on to explain that this represents the constant recycling of rocks: the rock forming the hills/mountains is weathered and eroded; rivers carry the loosened material down to the sea; material is deposited and slowly builds up; it is compressed and/or cemented into new sedimentary rock; eventually it is uplifted forming new hills and the cycle starts again.

The last stop of the evening was at a small exposed rock face. Here Alan encouraged us to look for fossils in the rock, specifically brachiopods, and some of us did find small samples. Alan passed around a rock specimen from Ysgwydd Hwch, a RIGS (regionally important geological site) in the Brycheiniog Forest, where very similar rock and fossils can be found so we could see what we were looking for. Most of the fossils in this rock are brachiopods, but it is also possible to find serpulites and orthocones (which can vary quite considerably in size).

To conclude, Alan referred us to the British Geological Survey (BGS) website, www.bgs.ac.uk. Here you can find geological maps for the whole of GB, together with large amounts of information about different rock types and landscapes.

We returned to the cars in fading light having had a most interesting and educational walk. ML thanked Alan for giving so generously of his time to lead the walk, having put a great deal of work into researching and preparing such a fascinating insight into our local rocks and landscape. She also thanked Lisa Lloyd for suggesting and organising the event for us.

Many thanks also go to Avryl and Roy Lloyd for providing extremely welcome refreshments at the end, helping to round off a perfect evening.