

This handout is an example of an alternative exercise used on the Access Anglesey field course. It was laminated and taken into the field for use by those who were unable to fully visit the outcrops themselves as a relevant parallel experience. For more details see <https://accessanglesey.leeds.ac.uk/>
Note: the students had access to hand specimens that are not shown here.



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Exercise: Lligwy bay

Devonian sediments

Lligwy Bay: Background

- Here at Lligwy bay the aim is to investigate the nature and environment of sedimentation that was going on in the Devonian.
- At this time, much of the UK and Ireland was being affected by a depositional system that was responsible for an array of red sandstones, known nationally as the Old Red Sandstone. Outcrops are found around Edinburgh, Banff, Ireland, Devon and Anglesey.
- The task here is to examine some rocks, attempt to understand them and the relationships between the different sub-types of rock found at Lligwy and to put them into context, through building up a palaeoenvironmental model based on the rock types you find.

Lligwy Bay: Logistics

- Lligwy bay is sadly the most access-unfriendly locality we will be going to. There are no convenient viewpoints, the rocks are too far away for the relay system, and the beach itself contains patches of quicksand, which are distinctly problematic for access.
- What we do have are a variety of materials from Lligwy bay, a selection of field photos for outcrop-scale and hand specimen-scale interpretation, and a selection of hand specimens. Back at base, there is also a thin section.
- We will start with outcrop level examination and work down to hand specimens.
- A further exercise is to consider the Devonian rocks of Lligwy by comparison to other rocks of the same age from across the UK. We have these with us but this may also be done back at base. As there is limited benefit to staying on the beach, this may mean you depart for the hostel early if this seems more appropriate – *a discussion on logistics should be had before leaving for the field.*

Outcrop 1

This is the first outcrop that is encountered as you go along the beach. Consider what the texture of the rock is saying about possible palaeoenvironments.

To help interpret the lighting on the image, the brown regions are ***raised***; the paler linear regions are ***low points*** where beach sand has picked out where material is weathering out.

Lligwy 1

UP



Outcrop 2, part 1

A variety of rock layers make up the unit at this stretch of localities. Have a look at the detailed photographs and work up (if possible) some sketches of key features and consider what they are telling you about sedimentary processes. In addition, we have 4 hand specimens of samples that illustrate these features; which are probably superior to photos.

Lligwy 2



Lligwy 3



Lligwy 4



Lligwy 5



Outcrop 2, part 2

Having considered the different fine-scale features that can be seen in the outcrops, we now have some field photos that can be interpreted to illustrate the different relationships between the lithologies that make up separate layers. In general, coarser layers tend to weather proud, finer layers weather away.

The task here is to make a tracing or an overlay that interprets the different layers so you can see how they stack.

One photo is taken from a funny angle because looking along the beds can be more informative than looking down on them.

(hint – image 1: try to trace the top and bottom of the sand layer just above the compass clino; image 2: try to trace layers across the image)

Lligwy 6



Lligwy 7



Outcrop 2, part 3

Finally, as we progress along the beach a bit further, we encounter the rocks doing something a bit unexpected. Have a look at the attached image and see if you can interpret what you see.

(Hint: look at what is happening just under the vegetation and at the base of the cliff. What happens as you trace that left or right?)

Perhaps consider doing an interpretation either as an overlay or by working in OHP pen on the laminated image. How would you explain this structure?

Lligwy 8



National comparatives

The units at Lligwy represent parts of what is known nationally as the “Old Red Sandstone”, which is Devonian in age.

A question to answer is what features do the samples here have which are typical of the ORS, and which are perhaps more local?

To help answer that we have taken some specimens from the School of Earth & Environment’s collection of Old Red Sandstone from a variety of locations across the UK so that you can make a comparative. In what ways are the Anglesey rock *similar* to, and in which ways are the Anglesey rocks *dissimilar* to, these other specimens?

As these specimens span a wide array of geographic distribution (from Devon to Scotland) can anything be said about the ORS at a national scale? Is there a modern analogue for the environment of formation?

Sample list

- Meadfoot beds, Goodrington beach, Torbay, YE114
- ORS Conglomerate, Portishead, Somerset, YE11
- Upper ORS, Corrie, Arran, YE4
- Quartz Conglomerate ORS, Cefn Bryn, Gower, YE49
- One other (sandy, probably Edinburgh or Banff).