

Newbury Geology Society

Portishead field trip

19 October, 2025

Nine of us filled the minibus from Newbury and another two met us near the Lakeside Café at Portishead (BS20 7JA), keen to follow up last month's trip to study the East Mendips faults and folds at Vallis Vale.

Neil's notes told us that the Bristol area is 'a fine example' of a Palaeozoic landscape exhumed by tilting and folding generated in the late-Carboniferous Variscan orogeny that pushed up a range of mountains originally extending from the Appalachians to the Urals and fused Wales and northern Britain to southern Britain. Today's itinerary began with the Devonian, carried on through the Carboniferous and took in some Triassic rocks and sands, draped unconformably over the older rocks ('unconformable' is explained below).

We began by walking westwards to Woodhill Bay to study the lower Devonian Old Red Sandstone. A thin band of Woodhill Bay conglomerate is visible above tilted beds of Brownstones Formation sandstone (the Black Nore sandstone) and it apparently contains calcrete pipes, though the party did not find any. The Brownstones sandstone here is massive and dips to the south-east, meaning that as we retraced our steps eastwards it disappeared beneath the conglomerate, which was then covered by Portishead Subgroup sandstones, which in their turn gave way to lower-Carboniferous Avon Group strata.



The group admiring the Devonian sandstones in the Kilkeny Bay cliffs. The weather improved later!

Neil explained that the Portishead Subgroup here is 'unconformable' (late-Devonian, much later than the layers beneath it). This is described in the notes as the 'Acadian unconformity': the Acadian was a late-Devonian stage in the Caledonian orogeny that affected northern England and Scotland but further south presents a gap in the stratigraphy.

Newbury Geology Society

What we saw here was mostly coarse, pebbly sand, suggesting inshore or beach deposits, and we examined areas of cross-bedding representing submarine dunes. Neil also pointed out bands of greenish sandstone, which take their colour from glauconite. This is a potassium iron aluminosilicate mica that forms in shallow water under reducing conditions; this often means fresh water, not salt water, suggesting periods when the sea had retreated. We stopped at one such band where, apparently, the only known British example of *Groenlandaspis*, a Devonian placoderm (armoured fish), had been found. The BGS stratigraphy reports 'fossil fish locally abundant' and their *Guide to the Geology of the Bristol Channel* reports that several different species have been found in this outcrop; but none were found by us.

The Avon Group is represented at Portishead by bands of red limestone separated by greyish siltstones. Applying the acid test to the limestone produced no bubbling, showing that these limestones are 'dolomitic': magnesium has replaced calcium.

Along this whole stretch the top few metres of the cliff is composed of rubbly, often unconsolidated Triassic sands. These are heavily iron-stained and the iron has often run down to stain the grey and/or green layers below. As mentioned above, these Triassic rocks and sands are unconformable: later Carboniferous and Permian rocks that we might have expected to see are not – or no longer – represented at Portishead.

Having reached the minibus we carried on round the bay to a point near the Lido, where major folding in the Avon Group limestones could be seen. The fold here is 'recumbent': folded so far round that both limbs are nearly horizontal. Neil pointed out examples of both 'competent' and 'incompetent' rock in the hinges: competence is a kind of viscosity showing the tendency to retain shape and/or dimensions when metamorphosed, and so crack, and hence incompetent rocks deform rather than fracture. In extreme folds such as these incompetence may appear as powdery or clay-like texture around the axis of the fold.



Recumbent fold in Carboniferous dolomitised limestone.

Newbury Geology Society



subsequently filled and cast in the limestone that was laid down on top of it (see photo).

We did not carry on further round the bay, but at the top of the shore to the east we could see the (Carboniferous) Black Rock limestone that we'd examined at Vallis Vale.

Returning to the minibus, we drove a short distance south-west to where a path down to the shore led us past the no-longer-active Black Nore lighthouse. A short way along the beach Neil showed us an 'angular unconformity': tilted beds of the Black Nore sandstone have been planed level by erosion and a thick layer of Triassic Mercia Mudstone (here, clasts of all sizes and shapes bound in a hard, silty cement) lies

The limestone is massive in form, and crinoid fossils were plentiful (see photo); one large slab displayed a fine example of *Thalassinoides*, traces of burrows into a siltstone layer made by worms, that were



across the erosion surface.

Back in the minibus, we drove back east again to near the Avonmouth dockyard, and followed a path down to a marina. Walking south-west along the shore we were now in the upper Carboniferous: the Black Rock limestone was near, but below, ground level and what we could see were Pennant sandstones that had been tilted near (and in a few yards, past) the vertical by the Variscan orogeny. This is another unconformity: a large part of the Carboniferous is missing from between the Black Rock limestone and the Pennant sandstone. What has been claimed to be a cross-section through a fossilised stalk of *Calamites* (a precursor of the horsetails) was visible in one of these slabs (see photo). Neil assured us that coals could be found in

Newbury Geology Society

these beds; but not by us. We did notice the dip of the sandstone beds change frequently, over short distances.

This was the last visit of a highly enjoyable day; the rain did not miss us, but was not heavy enough to count as proper geological weather. Thank you to Neil for organising and running the visit.



Black Nore Point light.