Field Excursion to the Waterfalls Walk, Ingleton, 9th Aug 2023, MGA joint with GeoLancashire.

Eight people, members and guests, participated in this excursion, which was led by Lesley Collins. We started at the car park in fine weather which, despite recent torrential rain, lasted all day. The 4 ½ mile route is well marked but is not for those with restricted mobility, as there are about 1000 steps with a height gain of 150 m.

The purpose of the trip was to examine the oldest rocks exposed in the Yorkshire Dales, the Ingletonian Group, and the Lower Carboniferous rocks which sit unconformably upon them, most obviously at Thornton Force. Also to observe the impact of ice on the landscape and the course of the River Twiss.

In the first part of the trail we passed over the South Craven Fault, for which the evidence in the field is very limited. The North Craven Fault and a trial adit excavated in search of galena are exposed near Manor Bridge (Fig. 1). The Norber Formation contains drag folds close to the fault, but the river level was too high to cross the river dryshod.



Fig. 1: North Craven Fault near Manor Bridge. The black arrow marks the plane of the fault. To the left is the Carboniferous Great Scar Limestone and to the right the Ordovician Norber Formation.

The next main stop was at the Pecca Falls slate quarry (Fig. 2). Across most of the quarry bedding and cleavage are almost parallel, so close examination is required to distinguish between them. A second plane of cleavage is reported. If it is present the cleavage plane spacing is much greater and it is not obvious how one would distinguish it from jointing. Although the rock is mostly mud-sized, occasional thin beds of silt can be found, which show the relationship between bedding and cleavage. We observed a slightly stepped surface along cleavage planes because of the different angles of cleavage in the mud and silt rock types.



Fig 2: Slate Quarry at Pecca Falls.

Just as Thornton Force came into sight we turned up a grassy track to the north towards a small limestone quarry. On the side of the track the Cove Limestone overlies the Ingleton Group uncomfortably (Fig. 3), an age gap of more than 100 My. The basal conglomerate contains 10-20 mm scale clasts, but there are occasional boulders on the erosion surface (Fig. 4). There are boulders under the unconformity at Thornton Force (Fig. 5), but the group decided that access was a bit too wet and slippery. Macrofossils in the quarry are sparse but there is one upturned 'triangular' colonial coral colony about 0.3 m high.



Fig. 3: Unconformity, Cove Limestone over Ingleton Group.



Fig. 4: Boulder on erosion surface (seen in Fig. 3). Traces of basal conglomerate can be seen wrapping round and beneath the boulder.



Fig. 5: Thornton Force. The falls flow over a massive limestone unit and have undercut into the (brown-stained) Ordovician below.

The group ascended the path on the north side of the falls. To the left was the terminal moraine of the Kingsdale glacier (Fig. 6). The moraine damned the dale and when water broke through it cut down through the moraine and underlying bedrock to create the gorge in its current position, offset from the centre of the dale. We then followed the green lane, with a compulsory stop at the ice cream van, towards the Doe valley.



Fig. 6: Kingsdale (Kd), its terminal moraine (M) and the course of the river Twiss (T). The black arrow marks the course of green lane which forms the highest point of the Waterfalls walk and joins the valleys of the rivers Twiss and Doe. This composite of three images distorts the perspective.

About 50 m before the green lane passed through a farm gate, a loose boulder on the south side of the track was examined (Fig.7). This is known as Tiddeman's Breccia, which he had recognised in 1870 as evidence of an unconformity in Chapel-le-Dale.



Fig. 7: Tiddeman's Breccia. The larger quartz pebbles are about 20 mm long. (lefthand image courtesy of Lesley Collins).

At a quarry on the southeast of the River Doe just below Snow Falls, a fallen block contains graptolites, first discovered on a YGS field excursion in 2019 (Fig. 8). They have been provisionally identified as being of Tremadoc Age (Ordovician), dispelling the hypothesis that these rocks were of Precambrian age.

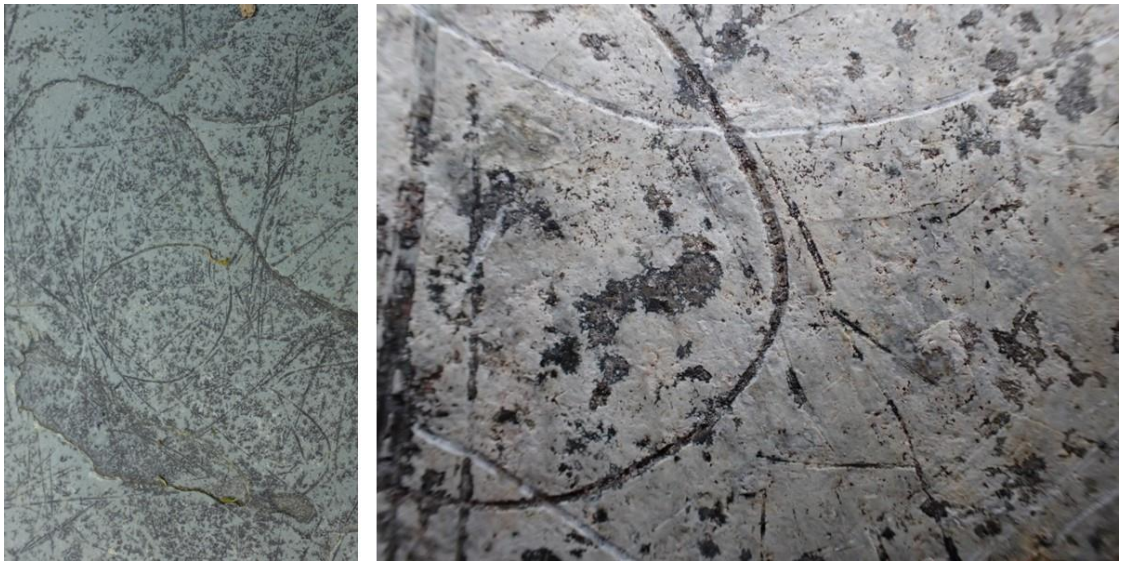


Fig. 8: Graptolites on bedding plane on loose block. (Horizontal field of view very approx. 800 mm in right hand image)

The group returned to the car park and a vote of thanks was given to Lesley for organising and leading a most enjoyable excursion.

Sources include: Lesley Collins' notes and handout, Lower Palaeozoic Rocks of the Craven Inliers (Eric Johnson in Yorkshire Rocks and Landscape, a field guide, ed. Colin Scrutton) and the Settle Memoir (geological sheet 60). Photos, except where indicated otherwise, by PdelS.

Peter del Strother

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