

EXCURSION

Ravenstonedale, Cumbria

8-9 July 2017.

Leader: Tim Colman

A small group of members met in the café of the Lune Springs Garden Centre, outside the village of Newbiggin-on-Lune, in warm sunshine for the first morning of this weekend excursion. The Lower Carboniferous rocks between Kirkby Stephen and Sedbergh are of interest as they lie at the junction between the Alston and Askrigg and Lake District blocks. The Stainmore Trough, lying east-west between the Alston and Askrigg Blocks meets the NNE-SSW Dent Fault that separates the two Pennine units from the Lake District.

Smardale Gill and Ash Fell

The group was joined for the first morning by Silvia Woodhead of the Cumberland Geological Society and Cumbria Geo Conservation, and she had drafted a leaflet describing the geology of the Smardale Gill nature reserve. This is owned by the Cumbrian Wildlife Trust, which had given permission for a small party to enter the quarries that are normally off-limits to protect the flora. The reserve (a biological SSSI) occupies a 7 km length of the disused South Durham to Lancashire Union Railway, built to carry coke from the Durham coalfield to the iron furnaces of Barrow-in-Furness (then part of Lancashire), but closed since 1962. The key section extends from Newbiggin northwards into Smardale Gill, as far as the viaduct over Scandal Beck. This is a beautiful curving structure that was designed by Thomas Bouch (who built the ill-fated cast-iron Tay Bridge 20 years later); it has been restored and is maintained by the Northern Viaduct Trust. The return was along public paths parallel to the railway.

The exposed Carboniferous rocks are all sandstones and limestones of the Arundian Ashfell Sandstone Formation. The first exposure along the trail is a pebbly sandstone that forms the base of the Arundian. Stone used to build the railway structures is mainly Ashfell limestone. Within a cutting through a drumlin, retaining walls of limestone had been built in dry-stone style,



The old railway viaduct built with Ashfell Sandstone, across Scandal Beck within Smardale Gill.



Dipping Ashfell Limestone containing individual corals and beds of nodular chert, exposed in Smardale Gill.

but part had been rebuilt using Ashfell Sandstone and mortar with massive coping stones. It was conjectured that there might be a fault, with or without a spring that had weakened the original wall at this point.

The limestone quarries lie beside the railway where it enters Smardale Gill, and its imposing limekilns are now subject to a preservation order. Some of the quarried stone had been used for construction, but most of it probably went into the production of lime. Corals (probably *Dibunophyllum*) stand in upright growth position, and disrupted layers of white and black chert are exposed in the faces. Towards the viaduct over the river, the dip steepens from about 10° to about 30°, but this may be a local feature against a minor north-south fault.

The railway crosses Scandal Beck on a viaduct that was built with Ashfell Sandstone, and its source quarries lie on the eastern side of the valley, opposite and south of the limestone quarries. This excellent dark red building stone has a silica cement, and various bedding and depositional



Complex channel bedding within the Ashfell Sandstone exposed on the slopes of Ash Fell.

A minor fault within the Ashfell Limestone exposed in the A685 road cutting across Ash Fell.



View from the limestone crags of the Stennerskeugh Clouds across the line of the Dent Fault to the greywacke slopes of the Howgill Fells.



features are well exposed. The top beds of the sandstone are draped with tufa that has accumulated in percolation water from limestone outcrops higher on the hillside. The group then walked over the old packhorse bridge and back to the railway path to the garden centre café.

Ash Fell lies northeast from Ravenstonedale village, and has good exposures above the mobile phone mast [at 733047] beside the A685 road. Terraces of well-exposed limestone extend up the fellside north of the road. A road cutting dating from the 1970s provides an excellent section through the Ash Fell Limestone with a red shale at its base. A minor fault has a throw of about a metre across a zone of densely fractured rock. Southeast of the road, an outcrop of limestone revealed a group of large colonial corals (probably *Syringopora*) in their growth position. The party then traversed along the hillside and descended to the Ash Fell Sandstone, which is exposed in some very small quarries. These showed evidence of a braided river system with channel switching that has created a complex bedding pattern.

The group then drove to the south side of Kirkby Stephen, where the Millennium Bridge crosses the River Eden in Stenkrith Park and overlooks fine exposures of the basal Permian breccias known as Brockram. The bed of the river has large potholes along its small gorge.

Some of the river flow passes underground through joint fissures that have been enlarged by dissolution of the Carboniferous limestone blocks within the red sand matrix of the Brockram.

Great Asby and Garsdale

On Sunday morning, the group assembled at a farm entry on Sayle Lane south of Asby on a misty morning with low cloud. A circular walk was taken over the limestone pavements of the Asby Scar Nature Reserve. Sections within the grikes of the extensive glaciokarst pavement reveal the limestone to be nodular. It is higher in the Carboniferous sequence than that exposed at Ravenstonedale, and the Holkerian/Asbian boundary is not easily reached at its outcrop on a very steep slope.

An abandoned quarry beside the A683 below Stennerskeugh Clouds was the site for lunch. This is within the valley aligned on the Dent Fault, separating Carboniferous Limestone to the east from the Lower Palaeozoic rocks of the Howgill Fells to the west. Time did not allow an additional walk over the dipping limestone pavements of the Clouds to view fold structures and copper-lead mineralization.

The final part of the weekend was spent in Garsdale walking the Sedgwick Geological Trail, starting at the car park by the A684 near Danny Bridge [at 695912]. This trail has 12 numbered marker posts beside the River Clough, crossing the Dent fault (descriptive leaflet is produced by the Yorkshire Dales National Park). Although the trail appears to be seldom used, and is quite difficult underfoot, it is well worth visiting. Over a distance of 600 m along the river bank, the Carboniferous rocks of the Pennine (east) side have been crumpled up against the Silurian rocks of the Lake District (west) side, increasingly so as the Dent Fault is approached. Where the fault is crossed, the narrow limestone valley widens out onto the outcrop of weaker, more easily eroded, Silurian Brathay Flags. A fault breccia, with calcite veins and angular fragments of limestone, is marked by post #9. This is followed (at post #10) by a well-exposed unconformity with Silurian Brathay Flags overlain by the basal Carboniferous conglomerate, which contains rounded pebbles of the flagstone up to 15 cm long, and could well be late Devonian.

Tim Colman and Alan Filmer