EXCURSION

Ashover, Derbyshire

30 April 2021

Leader: Tim Colman

This afternoon visit, led by Tim Colman, attracted 18 people who met at Ashover Village Hall car park. The purpose of the excursion was to traverse the Ashover Anticline in the Carboniferous limestones, shales and sandstones and associated volcanic rocks. Ashover is a microcosm of the Peak District with outcrops of the Visean Bee Low and Monsal Dale limestones and basaltic tuffs and Namurian shales and sandstones, as well as numerous mineral veins worked for lead and then fluorspar.

We first visited the church which has one the few Norman (c.1150) lead fonts in England. There was also a very fine alabaster tomb with carved figures of Thomas Babington and his wife Edith. Noel Worley, formerly chief geologist of British Gypsum, gave us a fascinating description of the formerly important Chellaston alabaster 'industry' — the rights to alabaster were owned by the Duchy of Lancaster. After walking down through the village past the Old Poet's Corner pub we entered Salter's Lane which leads down to the River Amber in the bottom of the valley. The lane is now much degraded but we found large silica blocks, some banded, in the walls. As we crossed the Amber and looked to the south down the valley, a distinct break in slope was apparent. The trace of the former Ashover Light Railway could be seen. This was built in the early 1920s to connect the Clay Cross ironworks with a source of limestone flux at Butts Quarry, about 500 m to the north. Moving on up the lane, outcrops of relatively soft dark purplish rock were found which were dipping north-west at a shallow angle. Although difficult to determine from a hand specimen in pouring rain this was the Ashover Tuff, erupted from a volcano probably nearby. Just beyond the outcrop the ground rose steeply, implying a change of rock type. At the top of the slope, at the junction with Jetting Street from Fallgate, a small roadside outcrop of fossiliferous limestone was examined. This dipped at a low angle to the north-west and and contained crinoid and brachiopod fragments. Other outcrops in the Ashover area are less fossiliferous and this area is considered by the Geological Survey to have been formed as a possible reef or shell bank. A path from the north was lined on one side by vertical thin slabs of sandstone – an unusual occurrence.

We continued on the gravel road west down the presumed dip slope of the limestone towards the road (Gin Lane) leading to Overton Hall. This was once the home of Sir Joseph Banks, the famous Georgian naturalist, who also owned some of the lead mines in the area. It is now a private house. At the junction with Gin Lane, Tim pointed to some fields to the north-west which were rising gently to the west and appeared greener and damper than the limestone fields beside the track. Beyond them the tree-covered ground again rose steeply to the west, again implying a change in rock type. Due to the heavy rain we did not walk west down Gin Lane to see a small mine spoil heap by the roadside which contains pieces of dark fissile shale, proving this hypothesis.

We moved on up the narrow path to the west, paved with large sandstone slabs. The path rose relatively gently until we reached a small roadside spring, almost dry due to the previous weeks' lack of rain, after which the path steepened through woodland. The spring marks the approximate boundary of the shales with the overlying Millstone Grit. Further on we came out of the woods into an area of mine spoil from the major Gregory lead mine which was very productive and profitable in the late 18th century. It runs roughly east-west for over 1 km from near Milltown in the east to Holestone Moor Farm in the west. Although the mine waste has been well picked over by mineral collectors for many years we did find small specimens of galena, as well as calcite and fluorite. While some members stayed on the waste tips to search for minerals the rest of the party walked uphill on an ill-defined path to Cocking Tor. where a large Millstone Grit outcrop affords a fine view across the Ashover anticline.

We returned to Jetting Lane and turned down Back Lane through Cockerspring Wood past the back of Overton House to Milltown. Although the walls of the path were very overgrown we did find some crinoids, brachiopods and silica. Basalt blocks were searched for but proved elusive. They had been seen on a previous visit by the leader and must have come from a mine as there is no known surface outcrop of basalt. Turning off Gin Lane down the narrow path to Fallgate we crossed footbridges over several narrow vertical worked-out mineral veins which were now open slots up to 2 m wide and perhaps 10 m or more deep. The abandoned Milltown quarry, now filled with slurry from fluorspar washing operations at Fallgate and therefore not accessible, was seen below us to the north. This is the type locality for two very rare minerals – Ashoverite and Sweetite - which are isomorphs of $Zn(OH)_2$ and only occur in millimeter-sized crystals. In the 1950s the Clay Cross Company, who were producing fluorspar from quarries at Milltown and Fallgate, decided to drill a hole through the Ashover Tuff at Milltown to reach the presumed limestone below which could contain fluorspar mineralisation ponded under the impermeable tuff. Unfortunately, after drilling nearly 300 m through a succession of tuff, basalt, basaltic breccia and thin limestones, the company decided it was drilling down the throat of a volcano and abandoned the hole.

At Fallgate we turned up Jetting Street for a short distance before taking the footpath alongside the River Amber. After crossing the Amber the path was formed of large sandstone flagstones with square holes for bolting down machinery. These were apparently not local but had been sourced from mills in the northwest. We followed the path back up to Hockley Lane near Ashover and turned right down the road until we came to an opening on the east side of the road which gave access to a cutting in the Ashover Tuff with two limekilns. Up to 4 m of well-bedded dark purple, medium to fine grained tuff were visible dipping at around 10° north-east into the hillside. As we returned to Ashover the well-defined breaks in slope of the flat alluvial plain of the Amber, the gentle rise of the Ashover Tuff and the steeper slope of the limestone were well displayed.

Tim Colman

EXCURSION

Clitheroe, Lancashire

Weekend 27–28 June 2023

Leader: Peter del Strother

A disappointingly small group of three members joined the leader, Peter del Strother and Brian Jeffrey for a two-day visit to this famous area. The first afternoon was spent examining the Chadian Waulsortian 'reef' or mud mound in the Clitheroe Limestone Formation which is well exposed at the former Salthill quarry, now a National Nature Reserve. We then walked to the former Hanson (now Heidelberg) Lanehead quarry to view some spectacular examples of folding and faulting.

***Figure 1**: Drumlins, Horton-in-Ribblesdale.*

The next day we parked at Horton-in-Ribblesdale having left one car at the other end of the walk in Austwick. We then crossed the railway line and walked north-east, crossing several drumlins (Fig. 1) and reaching exposed platform carbonates displaying clints and grikes in the Great Scar Limestone (Fig. 2). The grikes all had an alignment of 30^0 west of north. We turned south at a fingerpost signed 'Austwick' and crossed a limestone pavement with occasional glacial erratics. Turning west down a valley we crossed a

***Figure 2**: Clints and grikes in Great Scar Limestone.*

stream where we searched for samples of the Ordovician Moughton Whetstone – formerly used for sharpening steel blades. This blue-grey mudstone also shows Liesegang rings caused by migrating iron oxides. The Carboniferous limestone cliffs overlooking the valley showed strong vertical jointing corresponding with the grike alignment seen previously. This direction is sub-parallel to the North Craven Fault to the south. The jointing stops at a grass-covered mudstone (Fig. 3). We were asked to consider whether this jointing was exaggerated by glacio-eustatic rebound.

***Figure 3**: Vertical jointing in Carboniferous Limestone.*

The path was bounded by a drystone wall that marked the boundary between lands owned by Furness and Fountains Abbeys and dates back to around 1155 AD. The wallstones contained siliclastic lithoclasts in a carbonate matrix which we were to see in situ at the next locality. We continued southwards for a kilometer to reach Austwick Beck Head. This is a famous locality where the beck emerges from a flooded cave at the junction of the Carboniferous limestone with the underlying Ordovician Ashgill mudstone. Both formations are roughly horizontal. The limestones above the unconformity contained the same lithoclasts seen in the wall rocks earlier.

Further down the valley we passed over Silurian Wenlock Austwick Formation mudstones and turbidites. Outcrops of a sandstone showed numerous elliptical cavities up to 30 cm long (Fig. 4) parallel to the bedding. These have been interpreted as former rip-up mud clasts associated with rapid deposition. Peter pointed out examples of cleavage/bedding refraction.

Figure 4*: Cavities in Austwick Formation sandstone (Silurian, Wenlock) formerly occupied by rip-up mud clasts.*

Figure 5*: Norber sandstone glacial erratics.*

The walk ended with a visit to the large (up to 4 or 5 meters high and broad) glacial Norber sandstone erratics which have been transported by ice from the Silurian exposures in the Crummack Dale valley to the north (Fig. 5).

We then descended to pick up our transport in Austwick before returning to Horton-in-Ribblesdale

Tim Colman

EXCURSION

Clowne railway cutting

23 September 2023

Leaders: Robert Brown and Mike Allen

Around 15 members attended an afternoon visit to Clowne abandoned railway cutting near Bolsover in Derbyshire. The excursion was led by Robert Brown and Mike Allen, to examine the Permian Cadeby Formation (Lower Magnesian Limestone), Lower Permian Marl and Basal Permian Sandstone together with an outcrop of the Clowne coal seam (Westphalian B). The site is ideal for wheelchair access with ample nearby car parking, pedestrian crossings over the main road and gentle step-free access into the cutting by the old railway station.

The first part of the cutting is in Cadeby Formation dolomitic limestone with prominent jointing. A brief discussion followed on the effect that this jointing had on surface buildings during mining subsidence. In addition, the use of powdered limestone as an explosion retardant in coal mines was mentioned due to its very low (<1%) quartz content.

Cadeby Formation dolomitic limestone

Further west along the cutting the Lower Permian Marl outcropped and the variation upwards through the sequence was described with increasing amounts of limestone present until at 50% it passed into the lower part of the Cadeby Formation.

An outcrop of the Basal Permian Sandstone was examined and its variation across the area from predominantly wind-blown sand dunes to more water born sediments towards Mansfield was discussed. The thickness variations of the sandstone, due to sand dune formation, were remarked upon as was its effect on the variable thickness of the overlying Lower Permian Marl.

Basal Permian Sandstone showing dune bedding.

A few hundred metres west of the end of the cutting is a partial outcrop on the Clowne Seam, which has been worked at several collieries in North Derbyshire. There followed a discussion, with small scale maps as a reference, on mapping of coal quality, reserves assessment techniques, extent of underground workings and the effects of faulting, including the Park Hall half graben, on mining hazards including water ingress.

Clowne Seam coal with overlying mudstone.

Robert E Brown

EXCURSION

Wressle Oilfield, Humberside

28 September 2023

A dozen members of the East Midlands Geological Society visited the Wressle Oilfield in North Lincolnshire, courtesy of the operator, Egdon Resources. The party was met on arrival by the managing director/founder of the company, Mark Abbott, Martin Durham and several colleagues. A presentation on the history of exploration and production was followed by a visit to a viewpoint, from where the current operation, pulling tubing on the workover rig to change the completion, could be viewed.

The oilfield was discovered by BP from shows in the Broughton B1 well in 1985, and although tested was not developed at that time. Subsequently, the Wressle 1 well, drilled in 2014, by Egdon and their partners Union Jack (40%) and Europa Oil & Gas (30%), revealed that the discovery-well lay in a western compartment of a larger field. It lies on a structural trend with the Crosby Warren oilfield just to the NW, currently operated by Europa. The oil produced is a light (39°API), low viscosity and high-quality crude, typical of the East Midlands fields, although Wressle lies on the Humber Platform, beyond the 'classic' hydrocarbon province of the Gainsborough Trough. The oil is produced from a reservoir temperature of ~62°C. A further compartment of the near field area will be explored with the forthcoming Broughton North exploration well.

The Wressle 1 well encountered shows in three different reservoirs:

Penistone Flags (Westphalian Langsettian) –oil and gas column.

Wingfield Flags (Westphalian Langsettian) – thin oil and gas column.

Ashover Grit (Namurian) – oil, flowed 80 barrels of oil per day (BOPD).

The well terminated at 2240 m drilled depth in Dinantian age strata.

The structure is a simple 4-way dip closure in the Carboniferous strata associated with inversion along a NW–SE trending fault. This structure is entirely concealed by Permian, Triassic and Jurassic strata (at ground surface). The reservoir was charged from the SE with spill into the Broughton and Crosby Warren structures to the NW. Following flow testing in 2015 it was discovered that 'formation damage' had occurred in response to completion brine causing clays to swell in the Ashover Grit reservoir. After careful planning, a '*proppant squeeze*' operation (small scale hydraulic fracture) was safely and successfully carried out in 2021, resulting in a significantly improved rate of production from the Ashover Grit, to around 780 BOPD. Seismic monitoring was carried out by University of

Bristol. Some 500,000 BO have been produced to date. Total reserves are estimated in the range 1 to 3 M BO equivalent. Minor production of oil and gas from the Wingfield Flags is also occurring, with some of the gas being used for electrical generation on site and the remainder flared. A 3D seismic survey was acquired in 2012 and has been reprocessed subsequently. The plan is to also produce from the Penistone Flags reservoir using a well from the same pad, and export the gas to the local grid, in the near future.

The participants express grateful thanks to Egdon Resources for hosting the visit, Mark Abbott and his colleagues for their informative presentations and Tim Colman, for arranging and coordinating the visit.

Tim Pharaoh