

Bulletin

Number 75

October 2005



Programme

Talks:

Thursday 13 October

The Archaeology of Lead and Copper Mining in the Peak District

Dr. John Barnatt

7.30pm start, School of Earth Sciences and Geography, Keele University

Abstract - This talk will be a presentation in two parts:

- A lecture that will briefly first introduce the history of metal mining in the Peak District and the varied archaeological, geological and ecological resource that survives today, together with initiatives for its conservation. Following this several archaeological projects will be summarised, including surface archaeological excavations at How Grove on Dirlow Rake and at High Rake near Great Hucklow; underground assessment at the Ecton Mines and at the caves/mines in Northern Dale near Wensley; and the ongoing research project into pre-gunpowder mining using firesetting, using coal as fuel, at metal mines across the orefield.
- A 25 minute video on the ongoing High Rake Mine excavation and conservation project by the Peak District Mines Historical Society conservation team. This started in 2000 and was filmed by David Webb last year - it is anticipated that work will continue into 2006 before this ambitious project is complete. The video includes a tour of the surface excavations and dramatic footage of the exploration of the 220m deep engine shaft.

Thursday 10 November

The Earth - An intimate History

The Big Earth Science Picture, a life story of our planet

Prof Richard Fortey FRS (Natural History Museum)

A Geologists' Association Regional and the Fifth Wolverton Cope Memorial Lecture

Admission by Ticket only meeting.

- The meeting will be preceded by a **buffet** in William Smith Building, School of Earth Sciences and Geography, Keele University at 6.30pm. This will be **free** to Geologists' Association and Affiliated Group members; non-members £3.00.
- The Lecture will be in the Huxley Building, Keele University and starts at 7.30pm.
It is free to all but entry only by ticket booked in advance.

If you would like tickets and a campus map they can be obtained from Carol Fereday 01782-713227

or fill in and send back this [booking form](#)

or e-mail carol@burnett40.freerve.co.uk before 25 October 2005

Thursday 8 December

NSGGA Christmas Social with buffet and talk -

Some geological highlights from Western Canada

Dr Pat Cossey (Staffs University)

The meal will start at 7.00pm in the Earth Sciences Department and will cost **£8.50** including wine - see [booking form](#) to attend.

2006

Thursday 12 January

The K/T Boundary Event

Dr Peter Floyd:

7.30pm start, School of Earth Sciences and Geography, Keele University

Thursday 9 February

Geology and Wine in Southern France

Dr Roger Suthren:

7.30pm start, School of Earth Sciences and Geography, Keele University

Including wine tasting and buffet beforehand

Thursday 9 March

AGM and Chairman's Address -

The Geology of the Chaîne des Puys, France

Mike Fereday:

7.30pm start, School of Earth Sciences and Geography, Keele University

Field trip to Castleton, Derbyshire – 12 June 2005

The group of 15 (or so) met beneath Mam Tor where the A625 peters out into the Mam Tor landslip above the Blue John mine. The main part of the day took the form of a circular walk; at the start, though mid June, some were regretting not being kitted out for mid winter. As leader for the day, Chris Arkwright gave a graphic outline of the geological history of the area and a comprehensive set of field notes from which this report is largely taken.

As background, Castleton sits on the edge of a Lower Carboniferous platform, which extends across most of Derbyshire to the south, modern erosion levels revealing the Asbian paleogeography of some 330 Ma. A major feature of these Asbian limestones is the facies change from massif (lagoonal) to basin sediments with various reef types in between. Lavas and ash layers are also found within the limestone beds and are evidence of the quiet, mainly undersea, volcanism on the fringe of the Caledonian Orogeny.

In Upper Carboniferous times, sediments from an immense delta to the north filled the basin, on-lapping the carbonate reef complex and eventually covering the Derbyshire Dome to some considerable depth. Various stages of uplift and erosion since then have stripped back these deltaic layers, with glaciation completing the process, to reveal the edge of the limestone platform as we see it today. The remnant deltaic sediments in the Castleton area comprise distal muds of the Edale Shales overlain by the proximal sandstones of the Mam Tor Beds. The instability of sandstones on shales, followed by periglacial weakening being the cause of many landslips in the South Pennines.

Regional uplift and faulting, during and since the Carboniferous, created fissures which were later mineralised, lead mining being important since Roman times and more recently mining of the famous Blue John fluorspar.

Mam Tor (back scarp) Here the Edale Shales are revealed, overlain by the more competent Mam Tor beds; the extensive scree slope is evidence of continual erosion, care required! Loose blocks of coarse-grained sandstone show flute marks whilst some finer-grained sandstones contain much mica. Both are typical of interbedded proximal sediments from the Namurian delta to the north. Distal deltaic sediments are represented by the pyretic, organic-rich, marine mudstones interbedding the sandstones and comprising most of the Edale Shales.

Windy Knoll In the small quarry (no hammering allowed), we saw the exposed back reef with coarse-grained limestones containing scattered fossil corals, crinoids and brachiopods. The joint faces are mineralised with calcite, galena and fluorite. Ancient fissures in the cliff face are filled with angular boulders of dark muddy limestone. Once thought to be neptunian dykes i.e.

filled in under water, they are now regarded as fossil grykes of a Pre-Namurian palaeokarst. Near the top of the face were some semi-solid hydrocarbons that could be mistaken for sheep droppings!

Winnats Pass (south side) Initially a shallow channel cutting the reef complex, whereby fossil debris was washed down the slope to form beach beds near Speedwell Cavern. In the Pleistocene, melt water waters removed the soft Namurian shales which had been deposited in this fossil valley and later periglacial action trimmed it to its present-day form revealing a section through the lower and upper reef complexes of the carbonate platform edge. The different reef types exhibiting various fossils, much to the excitement of our two enthusiastic fossil-hounds.

Treak Cliff Cavern The break for lunch was taken at Treak Cliff Cavern where there are interesting displays of minerals and archaeological finds from the area; also retail opportunities from soup to Blue John and other minerals. Blue John is unique to Castleton and has bands of deep blue/purple crystals against a colourless/yellow background, 14 different type patterns are recognised. The blue colour is due to organic hydrocarbons in the crystal lattice.

Odin Mine Late Carboniferous hydrothermal fluids picked up Pb, Ba and F from anoxic basin clays and deposited minerals up-dip into fissures all along the edge of the carbonate platform. The vein has been worked for galena, barite and fluorite, the mine closing in 1869; below the road are the remains of a horse driven crushing circle. Slickensides and traces of galena, azurite, malachite, fluorite and allophane can be seen in the walls of the gorge.

Mam Tor Landslide A number of stops were made as we walked from the toe upwards across the landslip back to the road. The landslide is classified as a Slump-Earthflow type; the initial slump has been dated to 3600 +/- 400 yrs BP. The main road between Manchester and Sheffield was built over the ancient debris flow in 1810 and subsequent movement necessitated many road repairs until the through route was closed in 1977. Sections of the landslide move at different rates; it is the subject of a study by Chris with network points established in 1996 that are monitored annually to obtain the rate and direction of movement of the different areas. Recent movement patterns result in a major slide of ~ 1 m every 4 years when the combination of a high water table and winter storms increase pore pressure sufficiently to reactivate the main slip planes.

Upon returning to the cars before we 'lost' anyone, a vote of thanks and small presentation was made to Chris Arkwright for organising such a thoroughly interesting and varied day.

Dirtlow Rake/Orebody For the last site we travelled to the other side of Castleton by car. Mineralisation in the Peak District is an example of the low temperature, Mississippi type, formed when highly saline hydrothermal fluids (>150⁰ C) rose from basins into surrounding highs, usually precipitating into carbonates. The rake is an E-W trending vein system containing mainly barite and calcite. The adjacent Dirtlow Orebody, exploited by Laportes until 1999, is comprised of fluorite and calcite. From the waste heaps some good specimens were collected; including, rather surprisingly, examples of polished granite to the delight of last years chairman.

The rain having managed to restrict itself to the occasional shower the group finally dispersed in the late afternoon sunshine to fine views across the southern Peak.

Gerald Ford

Field trip to Hawkstone Park – 16 July 2005 **Not More Steps**

The weather was quite promising when a group of just over 20 met our guides for the day Chris Rayner and David Pannett from Shropshire G.A outside the Visitor Centre. Included in our group was David Thompson who is an expert on sedimentary rocks.

Hawkstone Park & Follies were created in the 18th century by the Hill family and became one of the greatest historic parklands in Europe. Centred on the Red Castle and the awe inspiring grotto hill carved out of white sandstone cliffs leaving huge supporting pillars. Before setting off along the intricate pathways, ravines, arches and bridges David Pannett gave us a brief resume of the history of the park and Chris outlined the geological setting.

The Park lies on fault-bound scarps formed by the outcropping Triassic sedimentary rocks, mainly sandstones. The Wilmslow Sandstone and the Helsby (Grinshill) Formations are seen within the park. The Tarporley Siltstones are present and indeed are exposed in a small valley just outside the official public area. Beyond the park Hawkstone Hall sits on the low ground on the Bollin Formation of the Mercia Mudstone Group.

Our first point of interest after leaving the Visitor Centre was the view from the Urn. Standing at the safety rail near the Urn we were able to view the opposite cliffs of Wilmslow Sandstone which form the Terrace. The red and white sandstones looked blocky in places and were fragmented by joints. The red colouration was due the weathering of iron oxides present in the sandy sediments. The pale sandstones have resulted from reducing fluids circulating through the sediments and subsequent chemical alteration causing "bleaching". The nature of these fluids is subject to debate and mineralisation was discussed at length during the day.

En route to the White Tower there were vertical and curved markings indicating pick marks of stone masons in the quarries showing how easily the rock could be shaped and indeed how easily it was eroded.

The white top of the Monument, made of best quality Grinshill stone, contrasted with the red stone of the rest. It had been necessary to replace the red corner stones over the years. Most of the party climbed the 152 steps up the monument and were rewarded with wonderful views. It is said that 13 counties are visible on a clear day - we were not so fortunate but nevertheless it was worth the climb. The collection of conifers surrounding the Monument included "Monkey Puzzles" (*Araucaria*) from Chile, one of the oldest conifer families dating back to the Triassic Period.

Crossing Swiss Bridge enabled us to appreciate the steep drop of the impressive gorge below as well as a striking view of the Grotto Hill. The gorge was probably eroded along a line of weakness know as a fault. Whether this was completely natural or whether it had been artificially widened during the construction of the features of the park is not known. A debate ensued as to whether it was a fault plane or a joint.

We then continued across Weston Bridge on the way to Gingerbread Hall up the Cleft to the Grotto. It was difficult to examine the rocks in the Grotto even with a torch. As we wandered through the network of chambers, pillars and passageways we found evidence of the minerals that had been mined there. Green staining on the surfaces was evidence of malachite and copper carbonate. We saw an exposure of barytes-rich sandstone at the back of the main cave.

After a welcome break for lunch we followed the signs for the Hermitage and Retreat. As we were walking along the path Chris pointed out excellent joint or fault planes parallel to each other showing once again the copper staining and producing most attractive green and orange coloured rock features.

Fox's Knob is a pinnacle of Grinshill Sandstone with a flat slab on top and is a remnant left after the erosion of a much larger rock formation. As we emerged on the far side we could see thin striped curving beds sweeping across the rock face made more distinctive by the black iron oxide present in alternate layers. This is cross bedding which is a sedimentary structure produced by shifting sands moved by current action on shallow river beds or migrating dunes wind-blown by winds in deserts and resulting in inclined beds at varying angles.

The path along Reynard's Walk at the foot of the Terrace Cliffs displayed one of the most impressive sandstone faces in the park. Turning one corner a high vertical cliff of red then white rock with thinner slabs at the top exhibited an excellent section through the Wilmslow and Grinshill Formation and further along magnificent sweeping high angle dune bedding came into view. Closer examination revealed 'flows' of barytes up to a metre long looking like miniature waterfalls.

Chris's notes suggested that we at this stage should take an imaginary trip 230 million years back in time to feel the dry heat, wipe the grit from our eyes and gaze upon the sand dunes and dried river beds of the seeming endless desert landscape. I think most of the party could easily have done this as by then it was very hot. We had climbed what seemed endless mostly eroded steps and were looking forward to welcome refreshment as the end of a very interesting field trip.

Chris and David were thanked for a most enjoyable day.

Marj Allen - an enthusiastic (sometimes confused) novice at Geology

NSGGA - Next Committee Meeting

- **Thursday 17 November 2005 at 7.00pm**
in the School of Earth Sciences and Geography, Keele University

Staffordshire RIGS Group

For details about the Group and meetings, contact:

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Janet Osborn; John Reynolds; John Winchester
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Roger Clowes, Janet Fairclough, Vanessa Pilley (Keele Geol. Soc)

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