

Bulletin

Number 80

January 2007



Talks:

Thursday 11 January: *The beauty and threat of Indonesia's volcanoes*

Speaker Dr Ralf Gertisser (Keele University)

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

Indonesia has the greatest number of active volcanoes in the world. These volcanoes are beneficial to the people living on or near them by providing fertile soil, valuable resources and scenic beauty, but they also pose an enormous threat to the surrounding human populations. Indonesia has suffered the worldwide highest numbers of eruptions producing fatalities and damage to arable land. This talk explores some of Indonesia's most active volcanoes and devastating volcanic eruptions such as the gigantic Toba eruption ~75000 years ago, the great historic eruptions of Tambora and Krakatau, and the recent eruption of Merapi which attracted worldwide media interest.

Thursday 8 February: *The Volcanic Geology and Bronze Age Minoan Archaeology of Santorini, Cyclades, Greece*

Speaker Dr Bob Roach

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

The dormant Quaternary Santorini Volcano lying in the centre of the S. Aegean continental calc-alkaline volcanic arc developed within a N.E.-S.W. fracture zone sited within an extending crust, here about 30 km thick. This arc (convex southwards) extends across the Aegean Microplate, which overrides the north edge of the African Plate, now subducting N.E. along the line of the Hellenic Trench located to the south of Crete. While notable volcanoes lie to the west (Melos) and east (Nisyros), Santorini is the most spectacular because of its sea-filled caldera with walls up to 300m, exposing sections of lavas and pyroclastics varying from basaltic to andesitic and rhyodacitic in composition. These comprise both 1) the products of 12 major explosive eruptions (within two major cycles) and 2) the dissected remains of several ancient lava shields, strato-volcanoes and lava-dome complexes. The present caldera is considered to be a composite structure related to 4 paroxysmal episodes. The latest eruption dated approximately to the middle of the 17th Cent. B.C. produced the composite Thera Tuff, which blankets much of Santorini and was responsible for burying the Minoan settlement of Akrotiri, famous like Pompeii for its preserved frescoes. Both the volcanic evolution of Santorini and the excavation results at Akrotiri will be outlined. [Buffet Form](#)

Thursday 8 March: *AGM and Chairman's Lecture -*

Mike Fereday with *"The life and works of Blaise Pascal"*

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

Blaise Pascal was born in Clermont in the shadow of the Puy de Dôme in June 1623 (a tenuous link to the geology of the Chaîne des Puys). He is known for many works of scientific discovery. Possibly the most notable is his treatise on "La Pesanteur de la Masse d'Air" written in 1653 and published after his death in 1662. In this he proved the relationship between Atmospheric Pressure and Altitude. His final experiment to prove this was carried out by his cousin and involved taking a mercury barometer from the centre of Clermont to the top of the Puy de Dôme by horse and carriage.

He invented and made the first mathematical calculator (addition and subtraction) and made many other mathematical and scientific discoveries. He created the first public transport system in Paris just six months before he died in August 1662 (aged 39). The unit of pressure Pascal is named in his honour.

For further information contact NSGGA Secretary Eileen Fraser 01260 271505

Field programme notice for March, April and May 2007

Thursday 29th March - Ibstock Brick Ltd.

A morning visit; starting at the clay quarry at Knutton to be followed by a tour of the factory at Parkhouse.

Meet for 10.00am at SJ829466; travelling from Newcastle on the Keele Road (A525) take Cemetery Road for Knutton at the roundabout and then down to the crossroads with Silverdale Road, straight over into Church Lane (B5368) and turn first left into Brock Way (Royal Mail depot on the corner). The entrance to the quarry is at the bottom on the right; it is not however signed as Ibstock as at Nov. 2006.

Health and Safety - it is a requirement that visitors have high visibility clothing, hard hats and safety boots. **Numbers** are

limited to 14, to book a place contact Gerald Ford to join the group.

Saturday 28th and Sunday 29th April - Joint meeting with the Essex Group in the *Lake District*.

Leaders, Professor Chris King (Shap area) and Dr. Peter Floyd (Hard Knott area). Accommodation has been reserved at the Shap Wells Hotel, Shap, Penrith, a Best Western hotel and AA ***.

See [flyer](#) for further details or contact the Field Secretary.

To book places please return the enclosed flyer to Gerald Ford ASAP.

The program for the Lakes weekend is basically as follows:

- Meeting up for dinner on the Friday evening of the 27th to be followed by a brief outline of the weekend's geology.
- Chris King will lead one day in the Shap area; stratigraphic relationships between the Silurian Windermere Group, Borrowdale Volcanic Group and the Carboniferous Limestone with a possible visit to Shap granite quarry.
- Peter Floyd to lead the other day in the Hard Knott area - detailed examination of Birker Fell Formation of the Borrowdale Volcanic Group, together with later acid volcanics and ignimbrites that rest with angular unconformity on the BVG. Possibility of time to visit the Roman fort at Hard Knott or if weather is really bad to go underground in the Honister Slate Mine, Borrowdale.

Saturday 19th May: Ercall Quarries, Wellington, Telford, Shropshire

Leader: Chris Rayner

Starting at 10.00 am at the Forest Glen Car Park (Grid Ref: SJ639093, from junction 7 of the M54 take minor road for about 1 mile heading south between the Ercall and the Wrekin, past the reservoir on your left, at the T junction turn right, car park is 50m or so on the left hand side).

The area is of great scientific importance as it exposes the unconformity between the Cambrian and Precambrian rocks. A variety of rock types and structures are exposed, igneous rocks include rhyolite lavas and ash flows, dolerite dykes and the intrusive boss-like Ercall granophyre. The sedimentary rocks include conglomerates, breccio-conglomerates, quartz sandstones and glauconitic sandstones.

If time permits the intention is to go to the nearby Maddock's Hill Quarry in the afternoon that shows a late Ordovician lamprophyre sill intruded into early Ordovician (Tremadoc Series) Shineton Shales. Walking distance, of order of 2 – 3 miles.

For further information contact:

NSGGA Field Secretary **Gerald Ford**, Tel. 01630-673409 or e-mail: g.ford@ukonline.co.uk

Christmas and New Years greetings from East Kalimantan

I am sorry that I have been unable to attend any meetings of late as I have been working on coal exploration in East Kalimantan. Admittedly this may not be the most environmentally green occupation but mining comes in at third place for forest destruction. Top of the list in SE Asia, and bear this in mind when you switch to "sustainable" biofuels, is clearance to produce palm oil. A similar situation is said to exist in S America.

Anyway, I read the report of your trip to Thurstaston Common and thought you may be interested in some comments derived largely from field surveys conducted with Cheshire RIGS.

The channels on Thor's Stone are not an isolated feature and similar ones can be found next to the Dam in Lymm. Other smooth flat bottomed channels, perhaps no more than 10cm wide/deep are relatively common features on the naturally occurring sandstone bluffs of NW Cheshire and may extend as far as Kinver Edge. I looked at many of these and some can be seen to continue under the soil and vegetation. On Thurstaston Common the rate of soil formation is likely to be exceptionally slow suggesting that the channels must be very old and that they predate the period of current "foot erosion". There is little doubt that some of these channels, such as Thurstaston and Lymm have been modified by people's feet in recent times, but the implied age and widespread occurrence strongly imply a natural origin. Sub-glacial meltwater has been suggested and water laden with sand can be extremely abrasive (ask any drilling contractor).

If you want to see more try Lymm, Nanny Goat Rocks (deepest Birkenhead), Frodsham main road, Helsby Hill (many interesting erosional features) and Bickerton Hill (the "slides", NW side near the stile).

Jonathan O'Dell

Review - National Stone Centre and adjacent area field excursion

Leader: Dr Fred Broadhurst, Sunday, 1 October 2006

Eight intrepid members of the NSGGA assembled under dark rain-filled clouds at the National Stone Centre for a field trip examining features of the Carboniferous Limestone in the vicinity of the High Peak Trail, Wirksworth. Luckily we only got wet once with the afternoon turning out sunny allowing lithological details to be examined at leisure.

Fred divided the field trip into a morning session (a descriptive trail around the National Stone Centre) and an afternoon longer walk (covering limestone outcrops along the High Peak Trail to Harboro' Rocks).

1. From the car park we walked towards the café and shop of the National Stone Centre, stopping to examine a large block of limestone in the pathway. This transported block was especially rich in Productid shells with black hydrocarbon residues around the fossil remnants and parallel to bedding.
2. Adjacent to the café was well-bedded Cawdor Limestone (Brigantian stage of the Lower Carboniferous) with numerous shells of brachiopods (largely Productids), corals and crinoids. Most Productid shells were preserved concave-up. This was essentially the normal position of growth where they would have been partly buried in the mud of the sea floor, thus being protected from predators. Crinoid ossicles were abundant with some stems being preserved.
3. Looking across into the adjacent quarry the limestone appeared more chaotic and represented a typical example of a

Carboniferous “reef knoll”. This deposit was not a reef as we know it today, but a dome-shaped build-up of calcareous mud held together with algae, over which normal shelf-sea limestone sedimentation took place. The later bedded limestones could be seen draped over the more chaotic bedding of the interior of the “knoll”.

4. From a viewing platform by Lagoons NE Quarry on the left hand side, we looked at the well-bedded and vertically-jointed limestone. Some thinner horizons looked more broken and may have been the products of storm surges over the shelf sea. Thin bentonite clay partings are also present here and represent intermittent deposits of volcanic ash.
5. The next location was a black covered irregular limestone bedding plane covered with well-preserved crinoid stems (some up to 40 cm long) with many of the longer axes aligned down slope. The dip here is largely depositional as this bed is part of the limestone draped over the adjacent reef knoll. Storm surges over the reef would have detached the crinoids from their hold-fasts and washed them down the sides. The lack of crinoid calyxes relative to stems may be the consequence of the polygonal plates of the “head” being more really detached than the stem ossicles. Behind us was a small fault plane mineralized with calcite, barite, galena and minor fluorite.
6. We walked down the Millennium Wall examining the various styles of building dry-stone walls from different parts of the country. A variety of natural stone typical of the areas were displayed: sandstones, limestone, dolerite, Tertiary basalt, erratic granite boulders from the Southern Uplands, Borrowdale Volcanic Group green “slate” (a volcanic tuff).
7. Back to above the café we passed an old lead mining shaft, one of some 120 in the area at its mining heyday. Apparently mining was important even in Saxon times.
8. At the Steeple Grange light railway (with new rail being restored by volunteers) we walked into the old Steeplehouse Station Quarry. Here the Cawdor Limestone is famous for its abundance of *Petrodus* dermal denticles (the bony external scales of a shark-like fish). Once we got our “eye-in” they were seen to cover the bedding planes in profusion, being small, ribbed, cone-shaped fossils composed of calcium phosphate and thus, weathered out of the more soluble limestone.
9. A short walk along the High Peak Trail took us to Black Rock composed of Ashover Grit (Namurian – “Millstone Grit”) resting on top of the Carboniferous Limestone below. This is a laminated, in places current bedded, medium sandstone largely cemented by secondary silica. Some discussion followed on the derivation of the silica after the deep burial of the sands: (a) derived from the breakdown of associated clays, and/or (b) pressure solution of the quartz grains. Another interesting feature was the presence of numerous holes or hollows in the sandstone face. These present the weathering out of localized patches of calcite cement that formed around plant and wood debris wash down with the sand. Bacterial activity around incorporated plant debris produced an alkaline environment ideal for the deposition of calcite. Thus, this sandstone had 2 phases of cementation: initial, but localized calcium carbonate, followed by more pervasive silica. Moulds of plant stems were seen at the top of the sandstone escarpment, as well as a series of inclined veinlets of barite. An excellent view of the huge working Dene Quarry was also seen.
10. Adjacent to the Ashover Grit outcrop was evidence of past mineralization with waste dumps containing calcite, barite and galena.

Peter Floyd

From here we returned to the National Stone Centre for lunch and a rock and fossil retail opportunity. Afterwards we reconvened at the nearby visitor centre at the Middleton Top Incline; the engine house complete with beam engine in working order was used for the working of trains on the incline of the Cromford and High Peak Railway.

11. Proceeding westwards along the High Peak Trail we progressed down the geological sequence. In the cutting leading to Hopton Tunnel chert was seen in the Matlock Limestone (older than the Cawdor Limestone but still of Brigantian age). Discussion on the similarity of chert to flint under the electron microscope and its potential use for microliths in northern England. A number of origins for the silica were suggested, especially derivation from associated volcanics and degradation of clay within the limestone. An origin from original siliceous organism (as for flint) was ruled out due to the lack of such fossils in the limestones.
12. In the cutting after the tunnel, the limestone was darker in colour where it has been dolomitised, as has the underlying Hoptonwood Limestone (of Asbian age). What was the source of the magnesium needed to bring about dolomitisation? Field evidence indicates that dolomitisation predated mineralisation (lead/zinc etc.) in this region. The mineralisation is generally accepted as of late Carboniferous age, in which case dolomitisation has to be the result of magnesium-rich fluids reaching this area during the Carboniferous, from adjacent Carboniferous basins.
13. At the top of the Hopton Incline we paused beside a sculptured piece of oolitic limestone (presumably Jurassic) and the formation of ooliths was described. The sculpture was raised on a plinth of pink sandstone, unusual in gritstone, indicating Permian -Triassic weathering. As for the sculpture itself, the general consensus was that highly stylised shells were represented!
14. Leaving the High Peak Trail we took the path to Harboro’ Rocks. The dolomitised Hoptonwood Limestone here is distinctive on account of its brownish colour and the presence of holes and cavities. Some due to the change from the original calcite to dolomite that involves a reduction in volume. However, in some cases the holes are seen to be the moulds of fossils. Here the original calcite of the fossils apparently resisted dolomitisation and was eventually removed by solution during the course of weathering. Dolomite normally not having fossils as they are totally replaced by Magnesium. One brachiopod was subjected to the acid test and fizzed satisfactorily indicating it still contained fossiliferous material.

From Harboro rocks we returned to Middleton Top along the High Peak trail, reaching the visitor centre just in time for refreshments. Peter Floyd gave a heartfelt vote of thanks to Fred for leading a most interesting and enjoyable outing as well as extending our knowledge of the Carboniferous period.

Gerald Ford

Review - Glacial Features of the River Severn Field Trip

Sunday 6th July with David Pannett

A dozen members met at the Fisherman's car park, Atcham, east of Shrewsbury (SJ538085) on what was to be another very hot day. It was the first of a series of sites to study the effect of glaciations on the landscape, a journey that would take us westerly and end at the Welsh border.

1. To the background 'thump' of an irrigation pump we walked down to the river where the braided river channel was evident. Upon examination of a section of the stable river terrace gravels, imbrication was identified. The detail of the river relating to its Pleistocene inheritance; a fluvio-glacial deposit containing a variety of materials, including erratics from the Lake District. A further short walk downstream took us to where the river was deeper and had a wide spread braided channel. It was explained that with climatic change and the loss of the glacial feed, one channel takes over and then cuts down leaving terraces. The cycle of river cutting, infilling and the formation of terraces were discussed.
2. At Shepherds Lane the 'battleground' between the various advances and retreats of the Northern ice and the Welsh ice was described. The outcome being drift up to 30 metres deep and the development of branched sub glacial channels giving a depth of drift that enabled blocks of ice to remain as the ice retreated to form kettle holes (an Ellesmere in miniature).
3. The next stop was at David's home at Bicton for refreshments in the garden where a geological exhibit of the area was on display.
4. Moving onto Preston Montford (SJ433143) behind the Field Study Centre the section down the river cliff was examined and the various features compared. Namely, the material from the ice forming a moraine, development of a lake (exhibited by fine laminated clays) and then the subsequent drainage of the lake by development of a river through the moraine. Formation of river terraces and alluvium as the river cuts meanders and then shrinks in size. One part of the section was the result of an ice contact delta filling lake with varves and drop stones. Returning to the top of the river cliff and looking westward over the Severn floodplain the ratios of width (x10) to the average meander (here 1:30) and the evolution of the river from proglacial meltwater to the present was discussed; was the river then three times wider as it does not now fit the normal geometry?
5. Pausing at an overbridge on the 'new' Shrewsbury bypass the section exposed during construction was described. One bridge abutment was on solid rock with a subglacial channel lying across the route of the road leaving the other abutment situated on sand. The deposition of gravels and sands under the floodplain from the sandur was explained.
6. At Shrawardine Castle (SJ401153), a Millennium Green site, from the remains of the castle, the zonation of an ice cap was explained and the levels of the different glaciations interpreted from the landscape. The formation of a lake and the cutting of the Ironbridge Gorge, initially suggested by Lapworth, is now thought to be a more complex story with a series of smaller lakes being created instead. The problem of differentiating between the effects of different glaciations was raised. Lunch was taken in the shade around the pool where dragonflies could be observed.
7. At The Royal House pub (SJ352174) there was the opportunity for cool refreshments, we did not however join the locals swimming in the river! At the riverbank, lake clay was exposed but no river gravels, the angular stone being a dolerite roadstone that had been transported by river from the Breidden when a wharf was operational. Across the field the scars of a rotational slump were visible.
8. Stopping next at Melverley Church (SJ333165), a picturesque 'black and white' church situated right on the bank of the river Vyrnwy. Here the river runs over clay and does not meander but cuts narrow deep channels, better for navigation, compared with a gravel substrate where wider shallow channels are formed.
9. The last stop took place on a former railway bailey bridge, now taking a road over the Severn just below its confluence with the Vyrnwy where the extensive system of argoes (floodbanks) was noted. Finally, Chairman Mike gave David a vote of thanks for taking us on a fascinating exploration of the geology and landscape of this underrated part of Shropshire.

Gerald Ford

Publications

The Founding of the Geology Department at Keele University:

Memories of the First Five Intakes 1950-1958

compiled and edited by David B. Thompson and Colin S. Exley

Based on the recollections of former staff and students, this enlightening and detailed account of the founding years of geological study at Keele is available via the Keele University web site.

To access the publication go to:

<http://www.esci.keele.ac.uk/about/history.html>

and click on the "Founding of the Geology Dept...." title

Articles

Korn, D. & Tilsley, J.W. 2006

Ammonoid assemblages from the Asbian B2b (Early Carboniferous: Mississippian) buildups of the Peak District, England
Proceedings of the Yorkshire Geological Society **56** part 2, pp.111-150

Diary Date

As part of the Bi-Centenary celebrations of the Geological Society of London, NSGGA are having a joint meeting with the West Midlands Regional Society of the Geological Society on **24th April 2007**. The speaker will be Hazel Rymer of the Open University

on "Volcanoes" at Wolverhampton University meeting at 7 30pm for 8 00pm start. Further details in the next bulletin.

Hamps & Manifold Geotrail Launch

Members of NSGGA are cordially invited to the launch of a new geological trail guide for the Hamps and Manifold valleys.

At **11.00am on Sunday 25th February 2007**, the trail will be officially opened in a ribbon cutting ceremony at Hulme End Visitor Centre. Professor Cynthia Burek from the University of Chester and an executive committee member of UKRIGS has agreed to perform the opening, followed by a walk along part of the trail.

Free copies of the trail will be available, as will the authors - Dr. Patrick Cossey, John Reynolds and Dr. Richard Waller - to accept the plaudits and explain the trail.

NSGGA Membership Form 2007

Subscriptions for 2007 are now due - please complete the membership renewal form and return to Mike Brown, Membership Secretary. Prompt payment would be much appreciated.

NSGGA - Next Committee Meeting

- **Thursday 18th January 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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Executive Committee (co-opted):

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