



The
Black
Country
Geological
Society

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Newsletter No. 219

June 2013

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**Copy date for the next Newsletter is
Thursday 1st August 2013**

The Society provides limited personal accident cover for members attending meetings or field trips. Details can be obtained from the Secretary. Non-members attending society field trips are advised to take out your own personal accident insurance to the level you feel appropriate. Schools and other bodies should arrange their own insurance as a matter of course.

Leaders provide their services on a purely voluntary basis and may not be professionally qualified in this capacity.

The Society does not provide hard hats for use of members or visitors at field meetings. It is your responsibility to provide your own hard hat and other safety equipment (such as safety boots and goggles/glasses) and to use it when you feel it is necessary or when a site owner makes it a condition of entry.

Hammering is seldom necessary. It is the responsibility of the hammerer to ensure that other people are at a safe distance before doing so.

Future Programme

**Lecture meetings are held at Dudley Museum & Art Gallery,
St James's Road, Dudley, DY1 1HU. Tel. 01384 815575.
7.30 for 8 o'clock start unless stated otherwise.**

Those wishing to attend field meetings please contact our Field Secretary, Andy Harrison, telephone: 01384 370 188, mobile: 07973 330 706 or email: fieldsecretary@bcgs.info

Saturday 22nd June (Field meeting): The Geology of Dudley and the Black Country from a Canal Boat, led by Graham Worton (Keeper of Geology, Dudley Museum and Art Gallery). Meet at the Canal Trust car park, NGR SO949917 at 10.00 for 10.30. Pub lunch. There will be a charge for the canal boat trip, payable on the day, gift aid optional. Maximum of 48 people. Please indicate your interest in attending before 8th June 2013, to Andrew Harrison 07973 330 706 or email: fieldsecretary@bcgs.info

Saturday 20th July (Field meeting): The Geology of Worcester, led by Andy Harrison. Meet at 10.30am outside the Guildhall on the High Street (NGR: 385006, 254780). The day will begin with a look at the building stones of Worcester on a circular walk of the City Centre. After lunch we will visit Worcester Cathedral, last resting place of Prince Arthur, eldest son to Henry VII. Please contact the field secretary (details above) to express your interest in attending this event.

Monday 28th October (Indoor Meeting): 'Of fossils and fracking - a palaeontologist's guide to shale gas'. Speaker: Dr Liam Herringshaw

November Indoor Meeting: Date and speaker tbc.

Monday 9th December (Indoor meeting, 7.00 for 7.30 start): BCGS Members' Evening and Christmas Social. This is our annual chance for members to share their geological experiences in a sociable atmosphere with a Christmas buffet provided by the Society. We need a few of you to volunteer to do a short presentation - perhaps your geological experiences on holiday or any topic with geological connections; or perhaps bring along some of your specimens for admiration, discussion and identification. Please don't be shy about volunteering - this is an informal and relaxed occasion: the more contributions we have, the merrier the evening. Please contact our Secretary, Linda Tonkin if you can make a contribution to this event: secretary@bcgs.info

Other Local Events

Dudley Museum & Art Gallery

Rock and fossil identification 11.00 - 1.00 by appointment on the following Wednesdays: 7th, 21st, 28th August and 30th October. Bring along your rock and fossil finds to have them identified by resident experts. Free of charge. Contact details above.

Dudley Rock & Fossil Festival: Saturday 28th September 10.00 - 5.00 and Sunday 29th September 10.00 - 4.00. This is the largest fossil extravaganza in the Midlands and will take place at Dudley Town Hall and Dudley Museum and Art Gallery. Exhibitors will be showcasing everything from fossils, and minerals, to gems and jewellery all of which are for sale. The event will include lectures and talks from geology and palaeontology experts from across the United Kingdom. Family entertainment including: a geological dig, chemistry corner, fossil casting, face painting, glitter tattoo, fossil identification sessions, a Punch and Judy show and craft workshops.

Admission charge: £2.60 adult, £1.60 child, £8 family ticket (2 adults and up to 3 children). **Price includes entrance and activities at both Dudley Museum & Art Gallery and Dudley Town Hall.** For more information see: <http://discover.dudley.gov.uk/events/dudley-rock-fossil-festival-2013/>

Other Societies

BCGS members are normally welcome to attend meetings of other societies, but should always check first with the relevant representative. Summarised information for the **next two months** is given in our Newsletter. Further information can be found on individual Society web sites.

Manchester Geological Association

Sunday 16th June 10.00 - 16.00: Limestones of the southern margin of the Derbyshire Platform. Leader: Dr. Cathy Hollis, University of Manchester. The trip will focus upon the area around Matlock and Wirksworth.

Sunday 7th July: Lymm Dam and Helsby Hill Quarry. Leader: Fred Owen. Looking at some of the structural, stratigraphical and glacial features of the Cheshire Basin.

Further information about outdoor meetings go to: <http://www.mangeolassoc.org.uk/> or please contact Jane Michael by email: outdoors@mangeolassoc.org.uk Visitors are always welcome.

Teme Valley Geological Society

Saturday 8th June: GeoFest Day with guided walks 2.5 and 6 miles. 11.00 - 1.00 and 2.00 - 6.00. Meet at Martley Memorial Hall. Contact Janet on 01886 821061 or John Nicklin 01886 888318 or martleypfo@gmail.com

Saturday 10th August: GeoFest Day with guided walks 2.5 and 6 miles. 11.00 - 1.00 and 2.00 - 6.00. Meet at Martley Memorial Hall. Contact Janet on 01886 821061 or John Nicklin 01886 888318 or martleypfo@gmail.com

Meetings are generally held in Martley Memorial Hall, Martley. £3 non-members or join on day. For more details visit: <http://www.geo-village.eu/> or contact John Nicklin, 01886 888318, 0774 977 4432

Warwickshire Geological Conservation Group

Wednesday 19th June: Moreton Morrell Walk. White Lias scarp & development of the Dene Valley. Leaders: Ian Fenwick & Brian Ellis. Meet at 7pm, Black Horse car park, Moreton Morrell.

Saturday 13th July: Burton Dassett Hills and Cross Hands Quarry. Lower Jurassic especially Marlstone & Jurassic fossils in Chipping Norton Limestone. Leader: John Crossling. (Joint meeting with Leicester Lit. & Phil.) Meet: 10.30, Burton Dassett Country Park, Windmill Hill car park.

For more details visit: <http://www.wgcg.co.uk/> or contact Ian Fenwick swift@ianfenwick.f2s.com or 01926-512531. There is a charge of £2.00 for non-members.

Mid Wales Geology Club

Saturday 6th July: Grinshill Quarries, north of Shrewsbury. Leader: Tony Thorp. This is a joint walk with Shropshire Geological Society and Professor Michael Rosenbaum. **Note:** early start 9.15 for 9.30 at quarry (or optionally by arrangement, later at 11.00 to explore old quarries, local Permian/Triassic geology and a significant Tertiary dyke.) Let Tony know in advance for joining instructions. You will need hard hat, hi-viz vest, good boots and your packed lunch.

Further information: Tony Thorp (Ed. newsletter & Hon. Sec): Tel. 01686 624820 and 622517 jathorp@uku.co.uk Web site: <http://midwalesgeology.org.uk>

Woolhope Naturalists' Field Club - Geology Section

Sunday 16th June: Ercall and the Wrekin, led by Andrew Jenkinson. The morning will be spent looking at old quarries such as Ercall, Maddocks Hill and Limekiln wood. After lunch there will be a walk up the Wrekin to get an all round fix on the geology of the Marches etc. Meet at 10.00am at the Forest Glen car park (Grid ref. SJ 638092). This is on the B5061 between its junction with the M54 (J7) and Little Wenlock. Picnic lunch at the Forest Glen car park (no retail facilities except possibly an ice-cream van!) Numbers needed in advance, if attending please let me know by Tuesday 11th June.

Sunday 21st July: Lickey Hills, led by the Lickey Hills Geo-Champions. The morning will be spent following the Champions Trail (approx 1.5 miles). In the afternoon we will look at other sites of geological interest in the Lickey Hills area. Meet at 10.30am at the Lickey Hills Country Park Visitors Centre, Warren Lane, Rednal, Birmingham, B45 8ER. Warren Lane is off the old Birmingham road (B4096). Lunch at the Visitors Centre, snacks available, packed lunch advisable. Sensible footwear and outdoor clothing appropriate to the weather forecast.

Guests are welcome, but must take day membership of the Club: £2.00. Further information: Sue Hay on 01432 357138, email svh.gabbros@btinternet.com or visit their web site: www.woolhopeclub.org.uk/Geology_Section/default.htm

Herefordshire and Worcestershire Earth Heritage Trust

Through the summer months the H&W EHT and their Geopark partners are running a variety of geology related events, with something for everyone. Below is a selected summary of 'GeoFest' events for June - early August. **For full details of 'GeoFest' events and downloadable programme go to:** <http://www.earthheritagetrust.org/pub/category/news-and-events>

Booking for all events unless otherwise stated: 01905 855184 or eht@worc.ac.uk

Guided Geology and Landscape Walks or Field Trips will take place on:

Sunday 9th June: 'Building Stone and Coal', Highley (afternoon only).

Booking: 01938 820777 or projects@shropshiregeology.org.uk

Wednesday 12th June: 'Exploring the East Malvern Fault'. (morning only)

Booking: redwards@waitrose.com

Saturday 22nd June: 'Stourport to Blackstone Rock' (all day).

Sunday 7th July: 'Wyche and Purlieu' (morning only).

Sunday 14th July: Guided Building Stones & History Walk 'Great Malvern Town'(morning only).

Tuesday 16th July: 'Ledbury In Stone' (evening only).

Saturday 20th July: 'The Southern Malvern Hills' (all day).

Thursday 1st August: 'Malvern Hills Quarries' (all day).

The Three Counties Show: Friday 14th to Sunday 16th June. Family friendly activities, displays and building stone demonstrations in the H&W Earth Heritage Trust and Gloucestershire Geology Trust marquee.

Wednesday Lectures at Malvern Library, WR14 2HU, 6.30 - 7.45pm Cost: £2.00 per lecture.

3rd July: 'The Rocks Beneath Your Feet - the Geology of the Geopark' by Dr Paul Olver.

10th July: 'The Ice Age Geology of the Geopark' by Prof Dick Bryant.

17th July: 'The Geology of the Malvern Hills' by John Payne.

24th July: 'The Building Stones of the Geopark' and 'A Thousand Years of Building with Stone' by Kate Andrew.

Cob House Fisheries Geology Trail, 27th July - 11th August, 9.00am - 5.00pm.

Discover the rocks of the Geopark on a rock quiz trail. Family activities throughout the summer. Cob House Fisheries, Worcester Road, Wichenford, WR6 6YE. www.cobhousefisheries.co.uk

Severn Valley Country Park, 24th July 1.30 - 3.30: Dinosaur Fun Day. Severn Valley Country Park Visitor Centre, Alveley, Bridgnorth, Shropshire WV15 6NG. Tel: 01746 781192.

For further information about the Herefordshire and Worcestershire Earth Heritage Trust's events and other activities visit their web site: www.earthheritagetrust.org/ or phone: 01905 855184.



Open Day: Saturday 8th June 2013

10am - 4pm at the British Geological Survey, Keyworth, Nottingham.

Tours, talks and demonstrations, including a very special guest appearance from TV's Professor Iain Stewart. Experience a unique glimpse of the past, present and future as our scientists talk about real 'Jurassic Parks', tsunamis, space weather, energy and many other areas of exciting science. Explore our newly renovated site and take part in our family friendly hands-on demonstrations in the five themed zones. Tours of

the BGS laboratories, core store and geological walkway will take place regularly throughout the day.

Book online at www.bgs.ac.uk/openday where you can also see the latest details. Follow us on Twitter (@BritGeoSurvey) and Facebook (@BritishGeologicalSurvey) for 'behind-the-scenes' sneak previews.

Geologists' Association Festival of Geology

Saturday 2nd and Sunday 3rd November 2013

Entrance Free !

10.30 am - 4.30 pm, University College London, Gower Street, London WC1E 6BT

Exhibitors: ...from the World of Geology. Fossil and mineral displays, stonecraft, books, maps and geological equipment, jewellery, beads and more...

Discovery Room: Rockwatch with activities for children of all ages with fossils, racing trilobites, Jurassic dioramas and more....

Geological Talks: Prof Iain Stewart - University of Plymouth
Prof Jane Francis - Director of British Antarctic Survey (from Oct 2013)
Dr Susanne Schwezner - Open University
Dr Maria McNamara - University of Bristol

Walks and Field Trips: Saturday 2nd November: Dr Ruth Siddall - Local building stone walks
Sunday 3 November: Field Trip to Riddlesdown Chalk Pit near Croydon - Prof Rory Mortimore
Building Stone Walk in the City - Diana Smith
Walk down the lost river Tyburn - Diana Clements

Amateur Photographic Competition: Any geological topic
1st Prize £100 2nd Prize £50 3rd Prize £25

Further Festival details: www.geologistsassociation.org.uk www.rockwatch.org.uk
020 7434 9298 e: festival@geologistsassociation.org.uk

Editorial

I'm pleased to announce that Peter Twigg has joined the BCGS committee as Vice-Chairman. He has been a member of the Society for many years and the Committee is delighted to welcome him to this post. There is also good news that the Association of Black Country Authorities has approved, unanimously, Graham Worton's recommendation for establishing the Black Country Global Geopark. This is one hurdle in the long application process, and I hope to bring you more on this subject soon.

This edition marks the tenth anniversary of our regular 'Geobabble' feature contributed with unfailing regularity by Bill Groves, and we thank him for the wealth of geological knowledge and geo-curiosities which he has revealed to us in this item. Whether you're a new member, or have missed some Geobabbles over the years, it's well worth trawling back through our Newsletter archive to catch up on Bill's pearls of geo-wisdom, from the very first Geobabble in June 2003, Issue 159, p.7: www.bcgs.info - and don't fail to read this month's Geobabble on p.13 where Bill poses a question...

Ali and Chris have been unable to add their usual 'Dudley Bug' pages to this issue of the Newsletter, but you will see that the 'Dudley Bug', (our very own trilobite, *Calymene blumenbachii*), just won't go away, and appears in this edition as the title of a poem by Ian Henery. Our thanks go to Ian for permitting us to reproduce his poem in this Newsletter.

Finally, please note the two requests from Andy in the box below. As the proposed Himley Cutting geoconservation work requires negotiation with a different authority, he needs to know that there'll be a good workforce willing to take part. So whether you're an old hand, or haven't previously engaged in our very successful geoconservation days but would like to get involved, please put the provisional date of Saturday 5th October in your diaries and contact Andy. ■

Julie Schroder

Proposed Geoconservation work at Himley Railway Cutting

Discussions are currently in progress with the Country Park Manager of South Staffordshire Council concerning the Himley Railway Cutting near Wombourne. The cutting comprises exposures of the Bridgnorth Sandstone with good examples of barchan sand dune cross bedding, which typically has been left somewhat neglected and is now overgrown. We are aiming to undertake some works at this location for the first weekend of October to coincide with the start of the 2013/14 season of geoconservation work. Please contact the field secretary to express your interest in attending this event and keep an eye on the Newsletter for further information.

The 2002 Dudley Earthquake - A request to share your memories

We have been approached by an undergraduate from Staffordshire University, Mark Fleming, who is conducting a study entitled, 'Has the UK become a more seismically active country over the last 20 years?'. Mark wants to use the Dudley earthquake of 2002 as a case study and is seeking public perception and opinion on whether or not the UK has become a more seismic region. He would like to speak to anyone who experienced the earthquake. If you can help please reply to the Field Secretary with your email address and we will put you in contact with Mark.

**Please contact the Field Secretary, Andy Harrison with your responses to these requests
(contact details at the top of p.2)**



This innovative new Geology Centre is situated close to the Wyche Cutting in the Malvern Hills. It was opened by Chris Darmon on Saturday 1st June, along with the launch of the 2013 'GeoFest'. It has geology displays, merchandise, and ingeniously mounted touch screen tablets where you can access a wealth of geological information relating to the Malvern Hills. It is open every day except Wednesday, and offers a warm welcome, spectacular views, and an excellent cafe! For more information: www.geocentre.co.uk tel: 01684 252414.

Field Meeting Reports

Saturday 6th April 2013: BCGS Fieldtrip to Warwick. Led by Ian Fenwick and Hugh Jones, Warwickshire Geological Conservation Group.

It was a lovely, sunny day when we met, around 10:30am, in the car park of the Warwickshire Golf Club, Leek Wootton just off the A46. After a brief introduction to the day, from leaders Hugh Jones and Ian Fenwick, we headed off along a dusty track edging the golf course to our first location, North Woodloes Quarry.

North Woodloes Quarry

This is a small quarry and at the time of our visit was being worked to supply stone for repair works to Warwick Court House, in Warwick town centre. The quarried stone is yellow-brown Triassic Bromsgrove Sandstone, which has been extracted and worked as a local building stone for some time. The Bromsgrove Sandstone sits at the top of the Sherwood Sandstone Group and appears to have been deposited under shallow deltaic conditions. Down through the Sherwood Sandstone Group sequence, in Warwickshire, the Bromsgrove Sandstone gives way to the Permian Ashow Formation, which forms the top of the Enville Group. Other members of the Enville Group include the Kenilworth Sandstone Formation, the Tile Hill Mudstone Formation and finally the Coventry Sandstone Formation. Overlying the Bromsgrove Sandstone is the Mercia Mudstone Group.



North Woodloes Quarry

The 4m high exposure of Bromsgrove Sandstone, in North Woodloes Quarry, exhibits extensive trough cross-bedding within its lower 1.5m - 2.0m. Here the sandstone is blocky in nature and of good quality. Within the top 2 - 3m of the exposure the sandstone is of poorer quality, and 3m wide channel structures appear to indicate a WNW – ESE flow direction. Together with fossils found at other sites these structures are indicative of deposition under meandering fluvial/estuarine conditions. The exposed face is 'pock marked' with fist sized holes that have been previously interpreted as preferentially weathered out mudstone clasts. However, Hugh is of the belief that they are in fact bullet holes left behind from military target practice.

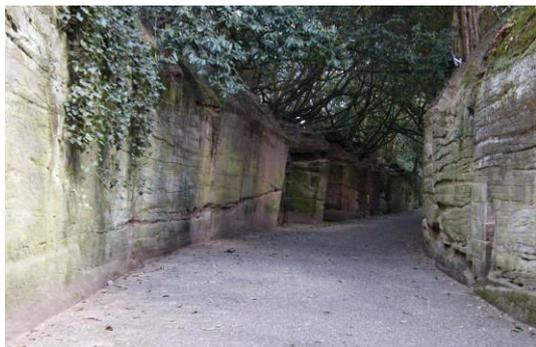
To the west of the quarry is the Warwick fault, an extension of the Western Boundary Fault, where the Bromsgrove Sandstone is faulted up against younger Triassic Mercia Mudstone strata. To the north is the Nuneaton Ridge, which forms the western edge of the Warwick Coalfield. The regional dip of strata through Warwickshire is a shallow 5° towards the west/southwest. Above the Mercia Mudstone Group, sits Lower Jurassic Lias strata, which can be seen in south Warwickshire.

Warwick Museum

From North Woodloes Quarry we headed back to our cars and drove into the centre of Warwick. The remainder of the day comprised a visit to the Warwick Museum, which we last visited in February 2007, and a guided tour of Warwick town centre, led by Hugh. At the Museum, curator Jon Radley, gave us a brief talk about the geology of Warwickshire. Housed within the Museum is a great display of Warwickshire geology, which demonstrates how the geology changes from Cambrian and Carboniferous strata in the north to Jurassic in the south. Overlying the solid geology of the county is a mix of glacial and interglacial deposits representing the Anglian and the Devensian Ice Ages.

Warwick Building Stones

After the Museum, we stopped for lunch prior to Hugh taking us to view the building stones of Warwick town centre. Most buildings in Warwick are constructed of Bromsgrove Sandstone. From the Museum we walked past part of the old city wall and on to the 14th Century west gate of the town, which sits on a shallow outcrop of Bromsgrove Sandstone. Continuing up Castle Street, we passed the Court ►



Warwick Castle entranceway

House, being restored with stone from North Woodloes Quarry, to Warwick Castle. The entranceway to the castle is cut through Bromsgrove Sandstone and within the exposures can be seen excellent examples of current cross bedding. In places the yellow brown colour of the Bromsgrove Sandstone gives way to red brown staining, the result of iron oxide leaching from the overlying Mercia Mudstone strata. Unfortunately, the easy-to-work Bromsgrove Sandstone is susceptible to the destructive activity of masonry bees that like nothing better than to burrow into the sandstone to build their nests. The evidence of their damage was quite apparent within some of the sandstone blocks within the castle

walls and in many structures and buildings across Warwick.

We continued down along the castle entranceway to the Castle gate, with its paving of Blue Lias cobbles and arches of Oolitic Limestone, both of Jurassic age. Our walking tour then continued along Mill Street to the River Avon and Banbury Road Bridge before heading back up Castle Hill and Jury Street, past St. Mary's Church on Church Street to finish at Old Square, where the Museum is located.

Other building stones seen along the way include the Hornton Stone from Edge Hill, an orange red Jurassic ironstone which exhibits an abundance of brachiopod nests, burrows and belemnites. This stone can be seen in the base of the walls to the old gaol and as a dressing stone on the old post office and the council offices. The base of the tower of St. Mary's Church is built of Shrewley Sandstone, a greyish, well-bedded sandstone, which, stronger than the Bromsgrove Sandstone, was used to support the weight of the tower.

I would like to thank Hugh, Ian and Jon for their time for what was a very interesting visit with ideal weather.

Sunday 28th April 2013: Geoconservation Day at Rubery Cutting, Birmingham

It was a cold, cloudy and breezy morning when we met around 10.30am beneath the A38, Bristol Road South fly-over, opposite the Rubery Cutting. We were met by Steve Hinton (Senior Ranger, Lickey Hills Country Park). After a few words on health and safety, hard hats and high visibility vests were handed out before Steve told us about the work to be carried out.

The Rubery Cutting (also known as Leach Green Quarry) is situated on the corner of Bristol Road South (the A38) and Leach Green Lane, Rubery, Birmingham. Declared a Local Nature Reserve (LNR) in 1991, it was for many years used as an educational site for first year geology undergraduates. However, in recent years it has become somewhat neglected, overgrown and used for dumping rubbish.



Clearance at the Rubery Cutting

The Birmingham & Black Country Nature Improvement Area (B&BC NIA) have begun supporting work to enhance the educational value of the site as one of Birmingham's most important geological exposures. They are a partnership of 50 organisations that have come together to deliver significant improvements to the natural environment of Birmingham and the Black Country. A lead partner in the B&BC NIA is the Birmingham & Black Country Wildlife Trust.

In 2006 the site was established as representing a unique aid for the interpretation and understanding of early Silurian palaeontology and associated palaeo-environments. The site's exposures comprise Silurian Rubery Sandstone (from the Upper Llandoverly) unconformably overlying Lickey Quartzite. Previously thought to be of Cambrian age, the Lickey Quartzite has now been re-classified as Lower Ordovician. The Rubery Sandstone is also supposed to be very fossiliferous, however none were encountered during our visit. ►

Some of the more heavy duty clearance work, involving the removal of trees, treating stumps with herbicide and scrub removal from the access path had already been undertaken. Joining volunteers from the Lickey Hills Geo-Champions group, BCGS members assisted in clearing rubbish, scrub and soil from selected rock faces. Going forward, the plan is for both groups to work with the Birmingham City Council Ranger Service to undertake ongoing maintenance, to ensure that the exposures remain visible and free of vegetation.

More information about the site can be found on the following websites. NB: Most of these sites assign the Lickey Quartzite Formation to the Cambrian. The BGS Lexicon confirms the more recent Ordovician classification: www.bgs.ac.uk/lexicon/lexicon.cfm?pub=LQ

BCGS: www.bcgs.info/4ruberycutting.html

EHT Champions: ehtchampions.org.uk/ch/?p=685

Birmingham City Council: www.birmingham.gov.uk/

Birmingham and Black Country Wildlife Trust www.bbcwildlife.org.uk/nia/projects/rubery-cutting

Saturday 11th May 2013: Visit to the BCGS/ Wildlife Trust Conservation Sites.

Led by Andrew Harrison (BCGS)

Barrow Hill

It was a cool and windy start with broken cloud, sunshine and showers throughout the day for our visits to Barrow Hill, Barr Beacon Quarry, Rowley Regis (Blue Rock Quarry) and Springvale Park. Between October 2012 and March 2013 members of the BCGS have been undertaking vegetation clearance work at these sites, in association with the Birmingham and Black Country Wildlife Trust.

We met on Vicarage Road, at Barrow Hill at 10.30am and walked to East Quarry. Further clearance work had been undertaken since our visit in October 2012 and apart from some new growth of bramble, nettle and scrub, little vegetation had returned. The exposures of dolerite intruding the host Etruria Marl and the associated calcite mineral veining from later hydrothermal episodes could still be clearly seen. After some discussion and interpretation of these features we headed back to Vicarage Road and, piling into one car, drove to Barr Beacon Quarry with Mike Allen acting as our chauffeur.

Barr Beacon Quarry

The clearance work of December 2012 and March 2013 has really opened up the exposures at Barr Beacon Quarry. Little vegetation has grown back, but much still needs to be done. The gloom of the day provided an ideal light for picking out some of the finer features in the exposures before us.

Looking from a distance at the Bridgnorth sandstone, distinctive yellow-brown and red-brown banding can be seen. Mike interpreted this as secondary weathering controlled by the grain size of the sandstone, probably from the leaching of iron. Upon closer inspection the sandstone revealed barely visible cross bedding and layers with slightly coarser grain sizes than others, possibly supporting Mike's idea. The exposure also exhibits thin bands of rounded pebbles and clasts, indicative of flash flood deposits. Towards the top of the exposure can be seen thin bands of mudstone and channel-like features suggesting a shift to wetter environmental conditions than those seen lower down the exposure. After a brief look at the overlying Kidderminster Conglomerate, which comprises sand, gravels and cobbles of various sizes, it was time to head back to the car where we made use of a break in the cloud to have a bite of lunch.

Rowley Regis (Blue Rock Quarry)

After lunch we headed to St. Brades Road, in Rowley Regis, where we were luckier with the weather. Our visit was to the former Blue Rock Quarry, where we had undertaken clearance work in February 2013. Although the exposures were clear of vegetation, a thick carpet of nettles, brambles and undergrowth was already beginning to appear. The yellow gorse, home to the Green Hairstreak Butterfly, was also in full flower. ►



Blue Rock Quarry, Rowley

We discussed the dolerite intrusions seen here and the thin layer that separates the two. Examples of spherical weathering are apparent in the dolerite, which is quite different from the more columnar dolerite seen within the Barrow Hill East Quarry. Like Barrow Hill, calcite veining from later hydrothermal events is also evident in Blue Rock Quarry.

Springvale Park

From Rowley we headed along the A4123 to our final stop, Springvale Park, between Wolverhampton and Sedgely, where once again we were lucky with the weather. Little in the way of vegetation has grown back since our clearance day in November 2012 and the main face remained well exposed.

The exposure comprises grey sandstone and weak grey micaceous, thinly laminated, siltstone/shales belonging to the Carboniferous Coal Measures. The siltstone/shale part of the exposure also contains discrete layers and cobbles of ironstone. During our visit we were fortunate to find some fossil plant remains that included a leaf and a fragment of plant stem.

The importance of these four sites to wildlife means that further clearance work is currently on hold until the beginning of October. No doubt the summer will encourage an invasion of plant growth that needs to be managed if these sites are to remain visible. From the first weekend of October, the next season will continue on the first Saturday of the month through to March 2014.



Fossil plant stem, Springvale Park

I would like to thank those who attended and Mike for acting as our driver for the day. Please remember if you would like to come and help, then check the newsletter and contact the field trip secretary for details. Please remember to wear stout boots and bring a packed lunch. Some tools are provided, but many volunteers like bring their own. ■

Andy Harrison

Cryopedology, Frost Soils, Patterned Ground.

In the April Newsletter (No. 218), Alison and Chris wrote an informative article in their 'Dudley Bug' about Periglacial Environments, and as I had a special interest in the phenomena associated with these distinctive forms of land surface, I thought it would be of some interest to members to read extracts from a special study I completed some 50 years ago! This combines nicely with my interest in climatology.



North Iceland, July 1963, Gordon Hensman

Periglacial Climates and Environments.

These develop along the margins of ice sheets where total annual precipitation - almost entirely snow - is generally light to moderate, allowing the deep penetration of frost, sometimes to depths of hundreds of feet. The annual mean temperature must be no higher than -2°C (28°F), - lower if there is normally deep snow, and there must be many freeze/thaw cycles. In the coldest areas permafrost/tjaele may be present.

During the maximum extension of the Pleistocene ice sheets, the open steppes and semi-deserts (as in north-east central Iceland now), and the newly deposited fluvial-glacial gravels, favoured the action of wind. Extensive deposits of wind-blown dust (0.1 - 0.01mm in size), called **loess**, are a feature of many parts of Europe, North America and Asia - particularly central China. The brick-earths of Sussex are likely to be loess deposits. ►

The brief cool summer (warmest month $<10^{\circ}\text{C}$, 50°F), allows melting of the surface layers to a varying depth, 1 - 2m at most. Frost soils can be divided into: a) those due to frost action, and b) mass-movement, generally known as 'solifluction', a term introduced by J.G.Anderson in 1906 in his paper on solifluction in the Falkland Islands. It is with the former that this study is chiefly concerned.

Frost Soils caused by Frost Action

Soils due to frost action are known as **polygon soils**, characterised by displacement of material due to freeze/thaw action. This often results in ring-like structures appearing on the surface of the ground. Polygons, circles, stripes and steps may develop in cold regions. The uplands in the British Isles are cold enough and experience a sufficient number of freeze/thaw cycles annually to develop these features. However, many may be, at least in part, relict features from former periglacial climates. There are relict stripes on the Stiperstones.

The precise details of the processes at work are not entirely clear, and according to Sharp³ no less than 21 theories have been proposed. One thing is clear: these soils owe their existence to the peculiar properties of water. Water is unusual among liquids in being at its densest at 4°C . Above or below this, expansion occurs. When changing to ice it expands by about 10%. If it didn't, ponds, lakes, rivers and seas would not freeze on the surface.

These features, together with the varying ability of soil particles to conduct heat are the basis for the formation of frost soils.

Where movements of the ground occur in regions with frequent frost, it is often wrongly attributed to expansion of water on freezing. The correct explanation was available as long ago as 1765, and in 1862 James Thompson (brother of Lord Kelvin), explained this to the British Association.

Water's expansion on freezing is 10% by volume. The linear expansion is only 3%. A frost heave of 1 inch would correspond to a frost penetration of some 30 inches were it due to expansion. Consider your garage door which has stuck in frosty weather. In the UK frost never penetrates more than 6 inches at the most, so something else other than expansion must be responsible for your annoyance at not being able to get the car out on a frosty morning!



Svalbard permafrost stone rings, Wikimedia, photo by Hannes Grobe

Ice Lenses

Frost heaving is caused by the growth of large ice crystals, or lenses, below the surface. This is the direct consequence of the thermodynamic principle that systems tend to exist in those states having the lowest 'free energy'. It can be attributed to each unit area of surface possessing an excess surface free-energy which is due to the extra energy possessed by atoms in the surface over and above that possessed by atoms within the crystal. The higher the proportion of surface atoms to internal atoms (that is the smaller the crystal) the higher will be its free energy. Simply put, large crystals grow at the expense of the smaller crystals by attracting water from them. Space does not allow further expansion on this fascinating aspect of water.

Mud Polygons

These features develop on fine-grained soils and clays in Arctic regions. Sometimes extensive fields of polygons occur, each one separated by cracks or strips of vegetation. They tend to bulge up in the centre a small amount - this time probably largely due to the 3% expansion phenomenon. In summer they often dry out with the result that a network of cracks extends across the polygon having little or no relationship to the peripheries of the polygons. These cracks have nothing to do with ice wedge cracks.

Trail and Expansion Trail

This type of frost-soil is only known from geological sections, because it lacks conspicuous surface features. It consists of contortions and folding of bedding planes which are frequently drawn out towards the surface. ►

Brodel Soils

Stone rings, stripes and polygons are the best known of brodel soils. They develop in regions where repeated freezing and thawing takes place every year. A mixed soil of coarse and fine debris is essential to their formation. They appear as rings from one to several feet in diameter, containing fine earth in the centre and stones around the periphery. This difference extends to some depth. As a general rule, single structures form rings and where crowded they make up a regular polygonal network. If they are on a slope they form stone stripes partially as a result of solifluction. In very cold areas permafrost is necessary for their formation, but in more temperate regions this is replaced by impermeable rock beneath. Relict or fossil stone circles and stripes have been noted in the former periglacial areas of Great Britain.

Convection Current Theory

This is likely to be one of the basic mechanisms in the formation of patterned ground - although there are another twenty theories at least! The soil needs to be a mixture of various sized constituents. The very finest clays and the soils with particle sizes above about 2mm do not develop patterned ground.

The typical stone ring/garland has a slightly raised interior consisting of fine silt and clay, with assorted stones around the edge.

Frost heave, whereby needle ice/pipkrake grows underneath stones and raises them above the general level at right angles to the ground, will lead to stones being pushed to the surface, as during the melt, finer material flows into the void left by the stone. The growth of ice crystal and lenses within the finer material raises the surface.

On slopes, the growth of pipkrake at right angles to the ground, but at an angle to the vertical, results in stripes developing as the ice deposits the stones slightly down stream on melting.

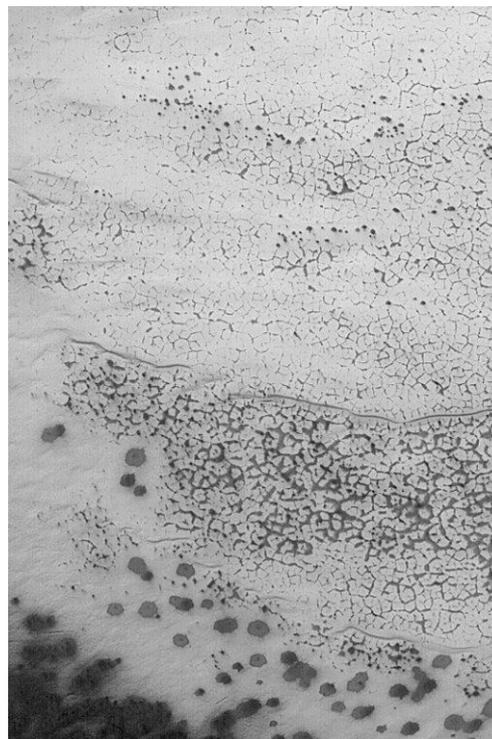
Frost Wedges.

These are found in regions of permafrost, and can only develop with prolonged cold below -10°C , (14°F). Severe prolonged cold causes the ground to contract to form a crack. During the summer thaw, water penetrates the crack where it freezes at the level of the permafrost. This joins the ice already there which accumulated as snow and hoar frost during winter. In the following winter, water near the top of the crack freezes and exerts pressure to widen it. The ice is likely to act as a centre of freezing and thus attract water from the saturated layer between the permafrost and the surface. During spells of extreme cold the crack may open still further, the space left being filled with more hoar frost and snow. This process is repeated every year resulting in an ever widening ice-filled crack. Frost wedges can occur in irregular polygons several metres in diameter. When milder conditions set in, the ice melts and the void will be filled in by surrounding fine materials. In this way it is preserved ready to be found by an observant geomorphologist – or even a geologist! Numerous frost wedges, in a relict state, have been found in this country. ■

Gordon Hensman

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Polygonal pattern in seasonal carbon dioxide frost in the Martian southern hemisphere. Photo covers an area 3 km (1.9 mi) across. NASA/JPL/Malin

The Dudley Bug

by Ian Henery

"Miss, a question - how old, really, are you?
What is the oldest thing that you can think
And when you were born, did people wear shoes?
Was Red Bull invented for kids to drink?"

"Let me see - well, there was Top of the Pops,
Music was served on vinyl in inches;
Starsky and Hutch were our cuddly cops
And seen in weekly romantic clinches."

"Miss, your language is strange, foreign to us;
Music is downloaded, pizza in inches!
No wonder your dad used to make a fuss
And go in the shed to feed his finches."

"No Sky TV, snooker in black and white;
No twitter, Skype, mobile phones or facebook,
We sat by coal fires and read at night
And mom grew her own vegetables to cook."

"Miss, did you have the number to Childline?
No texts sent to your posse of cool mates
And your dad's job - under the earth to mine?
Horrible history, life was not great!"

"How far back can I go? Let's try Dudley:
Dinosaurs ruled the earth, fossils in rocks;
All this area was covered by sea
And secrets, geologists can unlock!"

"Miss, is this the Wrens Nest Nature Reserve?
Fossilised bugs in rocks - insects! Scary!
Want to go up there but don't have the nerve,
You could say I'm a bit of a fairy."

"It's not a bug, dear but a trilobite,
Nicknamed Dudley Bug or Dudley Locust
By limestone quarrymen working the site,
Now an ancient monument held on trust."

"Miss, my book says it was a coral reef
And fossilised millions of years ago;
Trilobites. Dudley Bugs, did not have teeth-
Gosh, Miss! There is so much that I didn't know!"

"Ripple marks remain of sea on the sand
Four hundred million years in the past;
An ancient sea in the palm of your hand;
Geology matters, secrets to last."

"Miss, I hear you - life photographed in lime,
7 hundred types of fossils, Wrens Nest;
Massive coral beds, like ripples through time,
86 are unique, we are the best!"

"Thank you, now let's move on from time travel,
Leave the beach by a tropical lagoon;
Answers are given, the past unravels,
The spirit reaches for the stars and moon."

Ian Henery (Walsall's Poet Laureate), 10th May 2013

Geobabble

This is the tenth anniversary edition of **Geobabble**; the first article of this name appeared in Newsletter 159, June 2003. The Society had a familiar look about it; Graham Worton was Chairman, Alan Cutler Vice Chair, Mike Williams Treasurer, Gordon Hensman was Meetings Secretary and Sarah Worton was Secretary. We had no official Newsletter Editor at that time but Graham would knock it together. I remember the inception of Geobabble as I was working with him in his then office, upstairs in the Museum and Art Gallery. He showed me his proposal for a new feature called Geobabble. The idea was that the Society could put together its own glossary of geology techno-speak. He kicked off the new column with the word **taphonomy** meaning the processes operating from the death of an animal until it became a fossil. He asked me if I would like to make a contribution and so I went away and came up with four ideas related to terminology. I had hoped that Graham would spread them over the next four Newsletters, but they all appeared in the August 2003 edition, and so Geobabble began.

You can read these early editions by going to our excellent website: www.bcgs.info and follow the links to the Newsletter and then Geobabble. In the August 2003 edition the word **penecontemporaneously** was defined, and its use when playing hangman. Then the revision of fossil names in the 70s and 80s was looked at, so that my favourite Wenlock coral Omphyma had become the weak sounding Ketophyllum. The most ridiculous use of language I could find was an American earth scientist calling the ground, "the free air interface". But most anomalies seem to come in the area of the classification of sedimentary rocks and the naming of minerals. Have you heard of a silirudite? Is it Baryte, Barite or Barytes? ►

One interesting feature of the development of terminology is that in palaeontology once the name has been changed, the old name quickly retreats into the background, whereas with minerals it lingers as an alternative. In my mineral book it is: Baryte (*Barytes*, *Barite*); Fluorite (*Fluorspar*); Halite (*Rock Salt*) etc, etc. The alternatives are in common usage, but less so when dealing with fossils.

Sixty Geobabbles have been written since its inception and inevitably I have had to drift away from its original aim of geology techno-speak for most contributions. It has, I hope, reflected geology in unlikely or unusual settings such as needlework, poetry, feature films, stamps as well as talking about some of the geologists who have done great things in history. I often trawl the internet and follow up ideas: my latest - you may be able to help - are there any professional sportsmen or women with degrees in geology, or even a deep interest in geology? ■

Bill Groves

Members' Forum

The Vanished World Centre - a geological treasure trove down-under!



Oligocene baleen whale

Oligocene baleen whale, partially excavated and protected in situ, giving a rare opportunity to relate a large fossil creature to its environment.



Oligocene shark-toothed dolphin

At the museum we were treated to an impromptu tour of the exhibits presented by the curator, a charming and enthusiastic expat from Yorkshire. The museum's main focus is a display of local rocks, minerals and fossils, but it contains much more besides. We spent a very happy few hours there, and would highly recommend adding the trail and museum to your itinerary if you are considering a visit a visit to New Zealand's South Island. See: www.vanishedworld.co.nz/ ■

Julie Schroder

During our recent holiday in New Zealand, John and I were in Oamaru on the east coast of South Island, about 100 miles SW of Christchurch. We'd been to see the famous blue penguin colony, and by chance picked up a leaflet about the 'Vanished World Trail' which led along minor roads from Oamaru to the 'Vanished World Centre' in Duntroon, about 20 miles inland to the NE. Intrigued, we set off, and found ourselves immersed in a world of Oligocene geology, crowned by a fascinating museum at the end of the trail. The highlight of the trail was an



Site of Oligocene baleen whale



Vanished World Centre

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