



The Black Country Geological Society

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Newsletter No. 206

April 2011

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**Copy date for the next Newsletter is
Wednesday 1st June 2011**

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, mobile: 07973 330706 or email: andrewcfharrison@yahoo.com

Monday 11th April: (Indoor meeting) 'The Geology of Lundy'. Speaker: Dr. Clive Roberts, University of Wolverhampton. This little granitic island in the Bristol channel is in many ways enigmatic. This talk will outline the geology and examine new radiometric dating suggesting that it may be the last volcanic episode of the Tertiary volcanics associated with the opening of the Atlantic Ocean, although it is far from the more familiar Tertiary volcanics of the Scottish north western islands.

Sunday 15th May: (Field Meeting) Visit to Soho House, home of Matthew Boulton. Meet at 12:00 noon at the house, Soho Avenue, off Soho Road, Handsworth, Birmingham, B18 5LB (SP052891). We will be given a guided tour of the house with an opportunity to view Boulton's original display cases and replica fossils from his collection. This trip follows on from the Lapworth Museum last year when we saw Boulton's collection. Tea rooms are available.

Sunday 12th June: (Field Meeting) Visit to Apedale Colliery, Apedale Heritage Centre, Loomer Road, Chesterton, Newcastle-under-Lyme, Staffordshire, ST5 7JS (SJ834488). Meet at 11:00am at the Heritage Centre. We will be given a guided tour of a working mine and a chance to look round the museum. Either bring a packed lunch or there is a cafe on site.

Other Local Events

Friday 17th - Sunday 19th June: Three Counties Show, Malvern Showground. The GA is sponsoring a geology marquee and BCGS has been invited to have a display along with other local Geological societies. The main exhibitors will be the Herefordshire & Worcestershire Earth Heritage Trust (H&W EHT) and Gloucestershire Geology Trust. **2 volunteers are needed each day!** (Expenses will be re-imbursed.) The show runs from 08.30 to 18.00 each day. If you can help for part or all of any of these dates, please contact the Hon. Sec. Bob Bucki (*contact details on p.16*).

Saturday 16th July: Visit to Dudley by the international scientists of the Silurian sub-commission. The Society will have the opportunity to help to host this visit and meet and greet the delegates.

Saturday 24th & Sunday 25th September: Dudley Rock 'n Fossil Festival. Bigger and better than ever, it will feature the usual talks, activities, demonstrations, exhibitors, special exhibitions and traders in everything earth science related for boffins and families, and we need your help:

Volunteers are needed for the BCGS stand

Please contact the Hon. Sec., Bob Bucki (*details on p.16*) if you can help, am and/or pm on either day.

Items are needed for sale on the BCGS Stand

If you have any geological artifacts (ie. rock specimens and fossils), publications, or other geological material to sell for BCGS funds, please contact Mike Williams, tel. 01902 822 505 or email: bungalowmike@blueyonder.co.uk These may be sold on the stand, or made up into 'Goodie Bags'.

The 2011 NAMHO Conference

(National Association of Mining History Organisations, Britain and Ireland)

This conference will be held from **29th July - 1st August** at Preston Montford Field Centre, Montford Bridge, Shrewsbury. (<http://www.field-studies-council.org/prestonmontford/>). Activities will continue around Shropshire through the following week. Full information and booking details are available at: <http://www.namhoconference.org.uk/> Bookings organiser: Andrew Wood, Home Farm, Castle Pulverbatch, Shrewsbury, SY5 8DS. Tel: 01743 718668 Email: andrewgbwood@hotmail.com

Thinktank (Birmingham Science Museum)

Following our recent talk on 'Problematic Plesiosaurs' by Dr. Adam Smith, Natural Science Curator, Thinktank, Birmingham Science Museum, we are pleased to give details of a forthcoming exhibition at Thinktank with a geological theme, suitable for all the family.



Open daily from **29th April - 5th September 2011**, the **DINO JAWS** Exhibition includes fearsome life-size moving models of dinosaurs, fossil evidence, interactive touch-screen displays and a virtual dinosaur dig.

DINO JAWS is free to Thinktank visitors.

Thinktank admission: £12.25 (child & concession £8.40)

A family ticket to Thinktank costs £39.00 (family of 4)

For more information: <http://www.thinktank.ac/dinojaws>

Thinktank, Millennium Point, Curzon Street, Birmingham B4 7XG.

Tel : 0121 202 2222, email: findout@thinktank.ac

The Geologists' Association 2 day Meeting

Saturday & Sunday, 9th & 10th September in Worcester: 'Geoconservation for Science and Society' a one day conference with lectures and debates, and a one day field trip to the Wren's Nest and sites in Worcestershire. Phone: 020 7434 9282, email: geol.assoc@btinternet.com
Registration for conference: GA & QRA members £25.00, non-members £30.00. Cost of field trip not yet known. Booking essential. Further info: <http://www.geologistsassociation.org.uk/conferences.html>

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.

Warwickshire Geological Conservation Group

Saturday 9th April: Mountsorrel, near Loughborough. Meet at 10.30 am at Wood Lane Railway Bridge GR SK 57058 14239 (North of Rothley Plain).

Saturday 14th May: Dudley Wren's Nest and canal trip, led by Graham Worton (Dudley Museum & Art Gallery). Meet at 10.30 am in the Dudley Canal Trust car park.

Wednesday 18th May (evening trip): Edgehill, led by Jon Radley and Ian Fenwick. Meet at 7.00pm, A 422 quarry. To explore fossiliferous ironstone of the Marlstone formation.

If you wish to attend contact Ian Fenwick swift@ianfenwick.f2s.com or 01926-512531. The WGCG mobile phone (0752 7204184) available on the day from 11.00. There is a charge of £2.00 for non-members. For further information visit: <http://www.wgcg.co.uk/>

Please send material for the next Newsletter to:
julieschroder@blueyonder.co.uk
42 Billesley Lane, Moseley, Birmingham, B13 9QS.

Herefordshire & Worcestershire Earth Heritage Trust (H&W EHT)

For more information on the Geology Course, the Rock & Fossil roadshows, the GeoFest and other H&W EHT activities visit: <http://79.170.44.138/earthheritagetrust.org/pub/category/news/>

Geology Course: Volcanoes in Action – past and present

To explore the origins of catastrophic eruptions, their effects, and steps being taken to monitor these features of our natural world. Practical identification of volcanic rocks will be supported by the use of 35mm slides and handouts.

Course dates: Wednesday evenings 7.30pm - 9.30pm, 22nd & 29th June, 6th & 13th July. Plus two day-long field trips on Sunday 26th June and Saturday 23rd July.

Venue: Martley Memorial Hall, Worcestershire.

Cost: £50.00.

Course Tutor: Dr. Paul Olver

Enquires and booking for the 'Volcanoes in Action' course, contact: Natalie Watkins on 01905 542014 or email: n.watkins@worc.ac.uk

Rock & Fossil Roadshows 2011

Learn about rocks, fossils, minerals and Earth Science. Fun activities, specimens to examine.

Tuesday 19th April, 11.00am - 3.00pm.

Hereford Museum Resource and Learning Centre,
58 Friar Street, Hereford. HR4 0AS
(More roadshow dates in the June Newsletter. Ed.)

Malvern Walking Festival: Walks led by H&W EHT

All walks **must** be booked in advance (see below).

Individual walks: £5.00 pp per day.

Geopark Way walks: £15.00 pp per day (includes transport).

Wednesday 1st June: Southern Malverns Geology Walk (Walk No. MWF53). Led by John Payne. Meet: Hollybush free car park (SO 759 369) 2.00 pm. Est. finish: 5 pm. Distance: 3 miles Circular.

Thursday 2nd June: Volcanoes, Rocky Shores & Glaciers of Malverns (Walk No. MWF63). Led by Moira Jenkins. Meet: Swinyard car park (SO 766 382) 2.00 pm. Est. finish: 5.00 pm. 3 miles Circular.

Friday 3rd - Sunday 5th June: Ledbury to Gloucester section of the Geopark Way. Three all day walks. See web site below or MWF leaflet for details.

For bookings and full programme details visit www.malvern-hills.info or phone Malvern Tourist Information Centre on 01684 892289.

1st June to 31st August 2011

What's On!



GeoFest 2011

Activities and events highlighting and celebrating the Abberley and Malvern Hills Geopark

Hosted and promoted by the Abberley and Malvern Hills Geopark Partnership



For further details visit
www.Geopark.org.uk
or pick up a GeoFest 2011 leaflet

Have a look at our website at: www.bcgs.info

Shropshire Geological Society

Saturday 16th April: Wroxeter/Uriconium building stones, led by David Pannett (morning Rockhop meeting, commencing 10.00am). Walking (one mile); some rough ground; bring your own refreshment if required (booking to reserve a place and obtain joining instructions from David Pannett by email: jessicapannett@hotmail.co.uk; telephone: 01743 850 773)

Saturday 30th April: Llanymynech Part 2, led by Gordon Hillier (all day, commencing at 10.00 am). Walking (one mile); some rough ground; bring your own refreshment if required (booking for this field trip must be made **by 14th April**. Reserve a place and obtain joining instructions from Keith Hotchkiss by email: kah22@btinternet.com; telephone: 01694 723 130).

Saturday 7th May: Haughmond Hill, led by Mary Steer (morning or afternoon Rockhop meeting, commencing at 10.00am or 2.00pm - state your choice when booking). Walking (two miles); rough ground; end at a public house for refreshment (booking to reserve a place and obtain joining instructions from Keith Hotchkiss by email: kah22@btinternet.com; telephone: 01694 723 130).

Saturday 14th May: The Hollies and the Eastern Stiperstones, led by David C Smith. Walking (three miles), rough ground; bring own refreshments if required (booking to reserve a place and obtain joining instructions from Keith Hotchkiss by email: kah22@btinternet.com; telephone: 01694 723 130)

Anyone wishing to attend a field meeting should telephone a meeting co-ordinator at least 48 hours in advance. A nominal charge is levied for non-members. Generally held at Shire Hall, Shrewsbury, commencing at 7.15pm for 7.30pm. The Rockhops are primarily intended for beginners. Arrive 15 mins before the start of field trips for admin. Further info at: www.shropshiregeology.org.uk/

Manchester Geological Association

Sunday 8th May: Cutacre Surface Coal Mine, Little Hulton. Led by Alan Davies, 10.00 am. This is a visit to a working mine which may be closed and landscaped/infilled in the near future. Fossil collection is permitted. Further information awaited from UK Coal: hi-viz jackets, helmets and boots required. Contact: Jane Michael: 07917 434598, email: outdoors@mangeolassoc.org.uk

Meetings are held in the Williamson Building, Oxford Road, opposite The Manchester Museum. There is no charge for visitors from other societies at lectures or field visits. Further information about indoor meetings at <http://www.mangeolassoc.org.uk/> email: lectures@mangeolassoc.org.uk

Editorial

Boulder Bonanza in Birmingham and the Black Country!

In this edition we continue to follow up the recent renewal of interest in glacial erratics with a further contribution from Mike Williams (p.13) and my own initial attempts to track down some of these elusive ice age relics in Birmingham (p.14). There will be more on this subject in a later edition, and it would be interesting to hear from any readers who know the whereabouts of any erratics not covered so far, or have more information about those already described, in this and previous Newsletters. ■

Julie Schroder

Annual General Meeting

This was held on Monday 21st March, and was followed by a fascinating talk on Plesiosaurs and the closely related Pliosaurus by Dr. Adam Smith (Natural Science Curator, Birmingham Thinktank). His erudition was matched by his enormous enthusiasm for this subject, and his presentation was rivetting from beginning to end. Have a look at Adam's excellent web resource 'The Plesiosaur Directory', where you can discover more about these extraordinary creatures: <http://www.plesiosauria.com/> ►

Summary of Chairman's Report for 2010-2011

The Chairman, Gordon Hensman, commenced by honouring the officers of the Society who have worked unstintingly over the last year.

Honorary Secretary. The Chairman expressed regret at the departure of our Honorary Secretary Barbara Russell, who is stepping down due to personal circumstances. Barbara has always been keen, willing and capable in performing numerous tasks, including the provision of refreshments at our meetings. On behalf of the committee and members of the BCGS the Chairman thanked Barbara warmly for all she has done for the Society, adding that, thankfully, she will carry on with the essential service of refreshments. Long may she brew and percolate for us!

The Chairman announced that committee member Bob Bucki had agreed to stand for election to the vacant post of Honorary Secretary, and expressed admiration for his achievements over the last 5 years. Leaving his job with the Fire Service, he engaged in a full-time course of study at Birmingham University, and gained a Masters degree in Geology. (*Bob was duly elected as Honorary Secretary.*)

Treasurer. Mike Williams was thanked for his professional expertise and for keeping the Society on an even keel in these challenging times. He was also thanked for his guidance in committee meetings.

Field Meetings Secretary. Andy Harrison was thanked for an interesting programme of seven field trips over the last year. The Chairman expressed regret that some were poorly attended and urged members to make every effort to attend. To ease the burden of travel costs many future meetings will concentrate on the local sites in the West Midlands - especially those in the Black Country. The Chairman also thanked Andy for his Field Reports in the Newsletter, describing them as 'masterpieces of detailed observation, put together in a coherent narrative'. He urged us not to miss these 'veritable cornucopia of geological minutiae'!

Meetings Secretary. Graham Worton was praised for arranging six interesting indoor meetings, ranging from plesiosaurs, glaciers and Wenlock Edge to controversial views on climate change, and all this in addition to his extensive duties as Keeper of Geology at Dudley Museum and Art Gallery.

Newsletter Editor. The Chairman thanked Julie Schroder and her 'computer whizz' husband John for producing excellent Newsletters of very high standard, and praised them for their efforts.

Praise and congratulations were also expressed to Chris Broughton and Alison Roberts, our two young graduate members who contribute the informative and amusing 'Dudley Bug' pages in the Newsletter. Bill Groves was also complimented for his regular 'Geobabble' items in the Newsletter. The Chairman then put in a plea for more items from other members of the Society.

Auditor. Once again, we thank Martin Normanton for his work in auditing our accounts.

Other Activities

The BCGS was represented at two events: In June, at the public library in Perton we had a stand and two pull-up displays courtesy of Alan Cutler. Barbara Russell, and former chairman Alf Cole and his wife were thanked for their assistance. In October, at the Black Country Day at Birmingham University we made a small amount of money from the sale of leaflets, pamphlets etc, thanks to the efforts of our Treasurer, Mike Williams.

Finally, the Chairman thanked Alan Cutler for his work in geoconservation, and for producing the series of illustrated leaflets of geological sites in the Black Country. These have enabled us and outsiders to appreciate more fully the importance of the geology of this unique region. ■

Gordon Hensman, Julie Schroder

Treasurer's Report

Financial results for 2010 show that BCGS made a small loss of £132.87 for the period. Cash reserves remain healthy and detailed analysis of our Balance Sheet shows that in most respects costs remain well under control. Looking at the income side of the Balance Sheet, interest earned on our reserve is now negligible and membership subscriptions remain our main source of income. Thanks to initiatives agreed by the Committee to expand the profile of the Society through sponsorship of the Art Exhibition and use of the Society's stand at Science Fairs and events, new membership recruitment has been encouraging. However renewals by existing members remain disappointing and the Committee is proposing to send out a final renewals reminder for this year with the next Newsletter. It is also proposed that a system of payment of subscription by direct debit now be introduced as soon as possible. ■

Mike Williams

Field Meeting Reports

Sunday 20th February 2011: Moorcroft Wood Conservation: Visit 2

The morning was grey and cold when we met Julia Morris at the Local Nature Reserve Wildlife Trust visitor centre off Hawkswood Drive for 10:00am. Once again we were joined by members of the Wildlife Trust's Living Landscapes Project (LLP) who, since November, have continued to clear the blast furnace slag area that BCGS members helped with on our last visit (Sunday 24th October 2010).

We spent the morning helping to clear more of this area of undergrowth and brambles. According to Julia the importance of this site is being recognised as possibly having the largest amount of blast furnace slag in the region. In most other places furnace slag has been removed for various reasons and uses.



What is blast furnace slag? Generally it is the partially vitreous waste left over from smelting metal ores, and in the case of Moorcroft Wood, iron ore. In its raw state iron ore is a mixture of iron and other metal oxides, silicon dioxide (quartz), and it may also contain sulphur and phosphorus. The high temperatures reached in the blast furnace cause the iron to separate from the other elements, which are removed as waste. During the smelting process oxides may be introduced to help remove impurities from the ore and also to help protect the furnace lining. When left to cool, the resultant blast furnace slag resembles solidified lava and may also contain lumps of waste metal and waste lining bricks.

Where properly utilised, blast furnace slag has been found to be an excellent source of construction materials, with uses as roadstone, concrete aggregate, biological filter media, glass making and cements. Members may recall last year seeing a wall built of blast furnace slag on the Holloway, near Tettenhall, Wolverhampton. However, fill containing slag has to be treated cautiously. When it is fresh, blast furnace slag is volumetrically stable, but it may contain pockets of unstable compounds that when they weather, could result in volumetric expansion. This has particular implications for building foundations on fill with slag content. These have been known to crack with resultant structural damage to buildings. Basic steel slag, produced from steel manufacture, is worse since it commonly contains compounds likely to suffer volumetric expansion at unpredictable future dates.

Julia mentioned that St. Modwen Properties Plc have offered to fund a couple of interpretation boards for the Moorcroft Wood site, which will provide some information on the site's history. Readily available historical information and pictures of the site are scarce, but Julia is hopeful that funding from the Heritage Lottery will help finance searches of local authority archives and other information sources.

More work days are planned for Moorcroft Wood, of which BCGS members will be kept posted. In the mean time I would like to thank Julia for her time. ►

Sunday 27th February 2011: Barrow Hill Nature Reserve – Dudley's own Volcano. Led by Alan Cutler, BCGS and Julia Morris, Birmingham and Black Country Wildlife Trust, LLP.

A small group gathered at St Mark's Church, behind Russells Hall Hospital at 10:00am. The aim of the day was to loosely follow the trail described in the Barrow Hill 'Dudley Volcano' leaflet, published by Dudley MBC, BCGS and English Nature. We started at the summit of Barrow Hill, before going on to East Quarry, Tansey Green Clay pit, via the Barrow Hill incline, West Quarry and returning via St. Mark's Church.

There is some disagreement as to how Barrow Hill gets its name. According to the published leaflets it is because of two Bronze Age burial chambers previously discovered on the northern slopes of the hill. However, Alan believes that the name comes from the shape of Barrow hill and cites Robert Plot's book 'The History of Staffordshire', in which he described Barrow Hill as hard rock and not like other 'soft' barrows.



Geologically Barrow Hill is an example of a Late Carboniferous, self-contained dolerite intrusion, 150m high, associated with the Dudley volcano. It is one of several intrusions across the Black Country, the largest being Rowley Hill to the east. Although the gloom obscured our view from the summit, on a clear day good views can be had of the Worcestershire and Shropshire hills to the south and west and over the Black Country to the north and east.

The Barrow Hill intrusion was emplaced into the surrounding Carboniferous Coal Measures approximately 300Ma. The intruded strata belong to the Middle and Upper Coal Measures, part of the Pennsylvanian Stage (formerly Westphalian B and C respectively). The Middle Coal Measures comprise sandstone, mudstone, siltstone and coal layers interbedded with seatearth and ironstone beds. Overlying is the Etruria Marl that marks the beginning of the Upper Coal Measures and comprises a sequence of red clays, sandstone and conglomerate.

These strata indicate a changing environment in the area between 315 and 300 million years ago. Here the Middle Coal Measures strata represent the southern margin of a vast tropical river and deltaic swamp system that stretched as far north as southern Scotland. This system formed part of the Pennine Basin, which itself was part of a larger complex that extended as far as France and Germany. The area would have resembled the modern Mississippi delta, but on a larger scale, with lush vegetation that included conifers. The later Etruria Marl represents a periodically drained alluvial plain that later gave way to a well drained flood plain.

During this part of the Carboniferous, Britain was located at equatorial latitudes. Tectonic activity, associated with the closure of the Rheic Ocean led to the collision of Gondwanaland in the south, with parts of North America, Greenland and Western Europe to the north. This collision produced the super continent Pangaea and caused uplift that changed both the local geography and drainage. Another consequence of this collision was crustal thinning, faulting and associated emplacement of alkali rich dolerite intrusions.

The Middle Coal Measures, are known as the Productive Coal Measures because of their economic importance as a source of coal, clay and iron, in modern times. The Upper Coal Measures are known as the Unproductive Coal Measures and the Etruria marl, named after Etruria near Stoke, was used for brick making. Two main quarries are situated at Barrow Hill known as East and West Quarry, which in the 1800s belonged to the Earl of Dudley's estate, and their dolerite was used as roadstone on local turnpike roads. An increase in demand for roadstone in the 1900s saw a second brief period of working, but they have long ►



since ceased to operate. Features like the foundation blocks of aerial ropeways used to transport dolerite from the quarries, and the Barrow Hill incline route of the former Pensnett Railway are testament to the industrial legacy of Barrow Hill.

On the north face of East Quarry are exposures of unaltered dolerite, weathered into columnar joints, and formed near the top of the intrusion. The south face comprises an exposure of agglomerate formed from a loose assemblage of dolerite, Etruria marl, hydrothermal deposits like calcite reflecting the processes going on at the edge of the intrusion. Here the molten dolerite has come into contact with and scoured up the Etruria Marl, which was probably still wet during intrusion. In a trench on the east side of the quarry it was possible to get a closer look at the hydrothermal deposits, calcite veins, baked marl and features that may have been gas bubbles or former xenoliths.

Exposures of agglomerate can also be seen in the West Quarry, including coal xenoliths and Etruria marl. Workings in this quarry go deeper than those of the East Quarry and the dolerite here is different in nature suggesting either another part of the magma chamber or a separate intrusion.



Extraction of Etruria marl for brick-making produced the Tansey Green Claypit. Today it comprises an open area of green meadows and pools with old grey/black colliery spoil heaps along its western side. Excavations and surveying by the British Geological Survey in the mid 1990's revealed deposits of volcanic ash beneath the marl. In these deposits were preserved intact silicified conifers, believed to be the oldest in the world. These conifers are thought to have grown on the flanks of the Dudley Volcano and became entombed in layers of ash.

Both East and West quarries are heavily overgrown with trees and undergrowth. There are no plans to open up the West Quarry because of various legal issues and health and safety. However, East Quarry which was last cleared in 2005, requires much vegetation clearance and interpretation to improve the view of the exposures. The wardens and the Wildlife Trust have yet to decide what to do. According to Julia it is proposed to bring in contractors to clear the worst of the vegetation and the BCGS will be asked to help with the more detailed clearance and interpretation work. Also with the rapid rate of vegetation growth in the quarry a regular programme of vegetation management is intended. There are currently no plans to carry out any work at the Tansey Green Claypit. The deposits containing the conifers have been buried to protect them, but examples can be seen in the Dudley Museum and Art Gallery.

Whilst we walked along the trail Julia pointed out numerous points of ecological interest. Barrow Hill itself is a recognised nature reserve and to the north and west are several traditional grassland meadows that lead to the privately owned Coopers Bank and Tansey Green Claypit. Locals pay a small sum to the Council to graze horses on the meadows, which in recent times have suffered from the use of chemicals. The soils of Barrow Hill itself are relatively neutral and because of the overgrowth and scrub the species of wild flowers there are unknown. The soils of the meadows are more acid and as we crossed Hay Meadow, en-route to Tansey Green Claypit, Julia pointed out several traditional grass and wild flower species.

Coopers Bank has examples of 100 year old hedges, and Barrow Hill nature reserve and the surrounding meadows support a variety of tree species: birch, oak, beech, ash, hazel and willow. There is abundant habitat for birds: green woodpeckers, finches and warblers and amphibians: great crested newts, frogs and toads and other species. Alan remembered that as a lad he had seen the West Quarry full of water and great crested newts. Today West Quarry is dry and Alan believes that this is due to drainage and landscaping works undertaken at Tansey Green Claypit.

I would like to thank Alan and Julia for an interesting and enlightening visit round Barrow Hill. If all goes to plan it is hoped to undertake some clearance work within the East Quarry this summer. **Would those members interested in helping please let me know. ■**

Andy Harrison

The Dudley Bug

Welcome

Well summer is finally on its way at long last! As many of you will know we have joined the committee so we hope to bring some fresh ideas into the mix. We hope you enjoyed the last Dudley Bug and the small quiz (answers below). This time we are going to introduce the subject of glaciations. Don't forget to visit <http://www.geologymatters.org.uk/> to search for local collections. The website was recently launched with a day out at various localities across the Black Country. A good day had by all those who had attended!

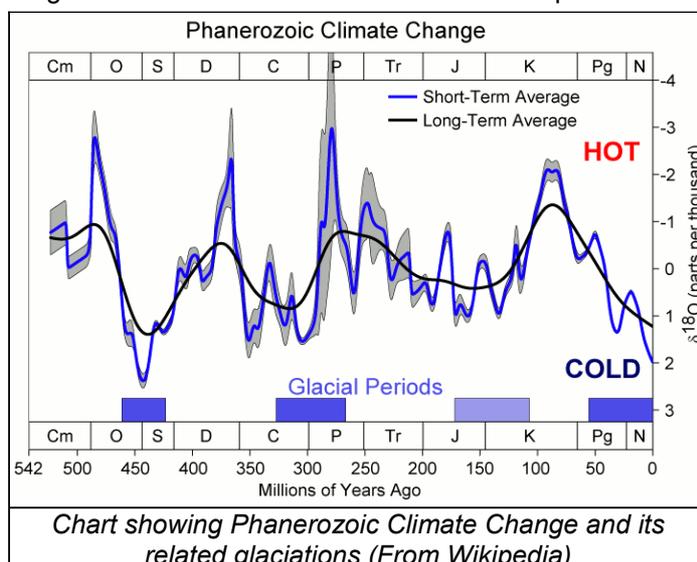
Alison and Chris

Glaciation: A brief 'very' introduction

The past 2.6 million years has been dominated by at least eight glacial "ice house" climates, punctuated with warmer "green house" periods, some warmer than today! From the past evidence it is clear that climate change can be very abrupt and extremely severe, causing exceptional risk to life on earth, including humans. A complete glacial cycle lasts around 100,000 years, in which 90,000 years are cold and 10,000 years are a warmer interglacial. During the last interglacial period, known as the Ipswichian, around 120,000 thousand years ago the climate was much warmer than at present. The arid climate was indicated by the fossil remains of hippopotamus, lions and elephants found in Trafalgar Square, London.

Causes of climate change.

Studies suggest that the most influential factor causing climate change is astronomical patterns. These are known as the Milankovitch cycles, first suggested by Scotsman James Croll (1875) and developed by Serbian Milutin Milankovitch (1941). The hypothesis is "based on the premiss that variations in the geometry of the Earth's orbit with respect to the Sun, Moon and other planets will govern the seasonal radiation cycle and thereby give rise to long-term fluctuations in climate." (Lowe & Walker, 1997).



Changes in Earth's orbit as a result of gravitational influences lead to eccentricity of the orbital path. The orbit alters from circular to elliptical over a period of around 100 ka. Perihelion refers to the time of year where the Earth is nearest to the sun, and aphelion to the period furthest away. There is a variation of insolation by up to 30% during the most eccentric orbit. Over the smaller period of 41ka the obliquity of the Earth's axis fluctuates between 21°C and 24°C. The concentration of insolation reaching the surface is affected throughout the year (Lowe & Walker, 1997).

Finally, the third variation is caused by gravitational attractions between the sun and the moon, making the planet wobble around its axis, known as precession. The "wobble" cycle occurs about every 21ka, alternating which season each hemisphere is closest to the sun. For example, currently the northern hemisphere is closest to the sun during the winter and during the summer it is at the furthest point in the orbit. This will switch over in 10,500 years.

The variation in insolation can be measured using the Asian monsoon during the Holocene, which is linked to the North Atlantic region. Stalagmites in Dongge Cave, China provide ²³⁰Th dating for wet and dry seasons through the Holocene with a margin of error ± 50 years. The weaker monsoon events appear to match ice rafting events in the North Atlantic where oceanic circulation weakened. The stronger monsoon events occur when oceanic temperatures and insolation rates are higher. The results can also be matched with the Greenland Ice Core Project (GRIP) and orbital cycles ►

controlling the insolation rates. Transitions of insolation rates took place over decades, therefore were extremely rapid (Wang *et al*, 2005).

There is much controversy surrounding Milankovitch cycles and their ability to initiate a glaciation on their own. For example, the induced temperature change is a maximum of 0.5°C, when at least 5°C is required to alter the climate. Therefore another intrinsic factor must act as a catalyst for climate change such as greenhouse gases or oceanic circulation.

Sub-Milankovitch cycles observed in the North Atlantic affect climate. These are temperature fluctuations that correlate well with reducing Arctic ice sheet size over the last 6 thousand years. They operate on a smaller 100 – 1000 year cycle. The cycles comprise of Dansgaard – Oeschger events, which occur about every 1500 years and produce a saw-tooth pattern of rapid heating followed by slower cooling. These cycles are believed to be controlled by the direction of the North Atlantic Drift current which has a “swinging gate” cycle, varying with climate. The second cycle is known as the Heinrich cycle, recognised in 1988. These events are related to ice rafting events in the North Atlantic, which form numerous layers of dropstones. The iceberg provenances are traced using the geochemistry of the dropstones, dominantly sourced from Canada, also from Greenland and Norway. A proposed theory for these events was by Denton, suggesting ice sheet expansion caused ice shelf growth before breaking up. An alternative theory by MacAyeal (1993) suggests that this may be due to the insulating effects of the thick ice sheets causing geothermal energy to build up at the base. Eventually inducing basal thawing, this increases the ice flow on a wet base. The thinning and expansion releases icebergs into the North Atlantic. Both of the aforementioned cycles are packaged as Bond cycles.

Breakdown of thermohaline oceanic circulation currents may be another cause of climate oscillations. For example, the North Atlantic Drift which transfers heat from the tropics to the higher latitudes prevents ice sheet expansion in the Northern Atlantic region. The salinity driven current may be significantly weakened by high volumes of fresh melt water released from the Arctic lowering the salinity, therefore reducing denser downwelling flows. Heat transfer from the tropics would halt, leading to rapid cooling of the North Atlantic and a possible re-advance of the Arctic ice sheet. An increase in albedo effect as a consequence could provide a positive feedback loop. CO₂ and CH₄ can induce interglacial phases, and possibly glaciations in extreme cases, such as when greenhouse effect increases melt water at a higher rate than the Gulf Stream salinity driven system can cope with.

Calculating climate.

In order to reconstruct Quaternary environments, a number of dating techniques are used to associate the environment with the correct period in time. Radiometric techniques use exponentially decaying naturally occurring stable isotopes such as ¹⁴C, ²¹⁰Pb and ⁴⁰Ar isotopes, by calculating the current amount of radioactive decay compared to the isotopes half-life (Atkinson *et al*, 1987). Radiocarbon dating can provide absolute dating until about 80,000 years BP, possibly over 100,000 years BP in some cases. Pollen itself cannot provide dependable chronological restraints, therefore the stratigraphic horizon must be correlated with other proxies. Dendrochronology can provide absolute dating to about 1000 years BP by counting tree rings. Further back in time, ¹⁴C dating of pollen grains can be used to assist with locating a date window around a target time. Radiocarbon dating of pollen gives a date which then needs to be calibrated to calendar years, known as calibrated radiocarbon time-scale. Pollen has yielded temperatures 1.5 - 3°C above present in Aosta Valley, Italy during 8300 – 6000 years BP. **To be continued... ■**

Geo-fact Quiz Answers (From Newsletter 205)

Here are the answers to last issue's quiz. We hope you managed to answer them!

- Chromite belongs to the spinel mineral group.
- Rock crystal is also known as quartz.
- Mammals first appeared during the Triassic period.
- False. A nappe is a body of rock which has moved a short distance from its original location.
- True an illite is a group of mica-like clay minerals with a three sheeted structure
- The date range of the Neogene is 2.588-23.03Ma
- The Atacama Desert in South America is the driest place on Earth.
- The Glenuig earthquake on 23/1/2011 in the Highlands of Scotland measured 3.5M_L.

Geobabble

In all things geological, scale is very important, whether it is time or space. Most of us can handle the vast time scales when referring to planet Earth; four and a half billion years we can handle. We can also appreciate the great distances and depths involved when looking at major Earth structures and tectonics, as well as the minutiae of images from the electron microscope. Where there can be a problem is when we leave the safe confines of the Earth, or even the solar system and delve into space. I have been following the splendid television programmes of Prof. Brian Cox and I am still trying to appreciate the time and sizes involved, from galaxies to atoms, and I appreciate the effort he takes to explain, using all sorts of visual aids, images and metaphors. The pictures are wonderful in their own right.

We have all seen impressive features in our geological investigations and have wanted to photograph them for a record, but have we remembered the scale? We must put something familiar in the picture so that the viewer can appreciate size. I have known some geologists who carry something special for this purpose such as a very old coin. The pictures with this article show various items that have been used in some photographs. A lens cap is very common as you have to put it somewhere after you have removed it, but many modern cameras do not have a detachable lens cap. A hammer is also common, but so many sites do not require a hammer; lens, pens, keys, indeed anything can be used. The photograph using the cigarette packet is very old and is probably not politically correct today, but if you investigated the design, it may give you an age range of when the picture was taken. One geologist I knew always liked to open a bottle of Newcastle Brown at important exposures, he would tip a little on bedding planes to indicate true dip, drink the beer, and then use the bottle as scale. However, the best indication is a scale bar or tape, clinometers and more commonly a mobile phone or iPhone. For bigger features you try to get people in the picture. This not only gives you a scale but reminds you of old friends who shared your fieldwork. Many pictures do not need a scale as it is provided by something like a tree or bush.

These photographs are of interesting features listed below, and I am sure that you will be able to match the caption to the picture, as a sort of quiz. ■

Crevasse/moulin in the Morteratsch glacier, Switzerland

Dalmanites with hypostome, Dudley Museum and Art Gallery collection

Aberystwyth Grit, near Clarach, Ceredigion

Phenocryst in Shap Granite.

Ripples and ironstone nodules in Coal measures, Broadhaven, Pembrokeshire.

Channel in Coal Measures, Broadhaven, Pembrokeshire.



Bill Groves

The Mystery of the Glacial Erratics in a Nursery Playground



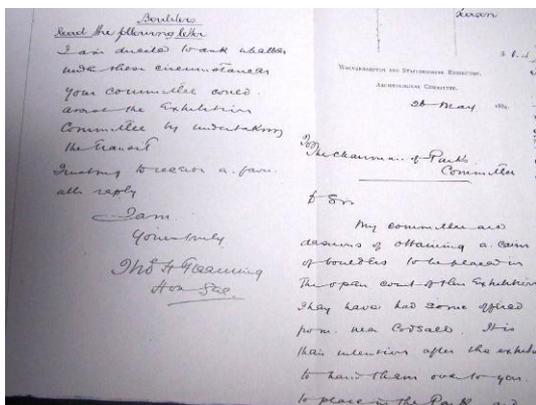
If you know New Hampton Road West in Wolverhampton then you may know the location of Newhampton Art Centre, but did you know that immediately across the road in the garden of the Whitmore Reans Children's Centre nine glacial erratic boulders can clearly be seen?

The question is, how did these erratics come to be concentrated at this location? The answer may be more to do with the Victorian's fascination for all things to do with natural science rather than the great ice sheets which once covered this area.

West Park which adjoins this site was officially opened on 6th June 1881 and the Council immediately planned a new exhibition of local trades, art and antiquities to be held in 1884. The park area was not chosen as the site of this exhibition, which was instead located in and around the new Art Gallery in Lichfield Street. The Natural Science section included a whole gallery given over to geological specimens and expositions including a representation of the 10 yard coal from the Hamstead Colliery and a heap of glacial boulders from Palmers Cross Farm near Codsall.



Artist's impression of 1902 Exhibition, Wolverhampton City Archives



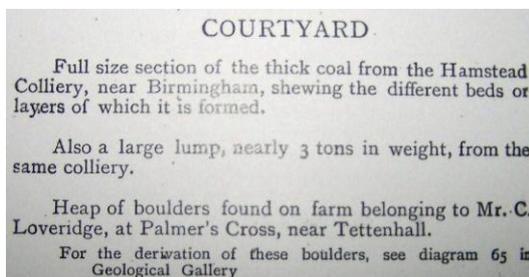
Transcript of handwritten correspondence obtained from the Parks Baths & Cemeteries Committee Archive:

26th May 1884 To: Chairman of Parks Committee
Dear Sir

My Committee are desirous of obtaining a cairn of boulders to be placed in the open court of the Exhibition. They have had some offered from near Codsall. It is their intention after the Exhibition to hand them over to you to place in the Park and I am directed to ask whether under these circumstances your Committee could assist the Exhibition Committee by undertaking the transit.

Trusting to receive a favourable reply I am yours truly
Tho H Fl??ming Hon. Sec.

In the 1880's horse drawn transport would have been the only way to move the boulders to this site and although these erratics were only accepted into the exhibition on the basis that they be returned to Codsall this may never have happened. They may have found their way down to the new exhibition area of West Park which today is occupied by Whitmore Reans Children's Centre. We know that in 1902 a further exhibition was held on this site which included the creation of a fairy grotto which may have included these boulders. However, further research into the records of the Parks Cemeteries & Baths Committee Minutes archive is required to confirm this interpretation of events. ■



1884 Exhibition catalogue

Mike Williams

Birmingham's Glacial Erratic Boulders

In 2006 (Newsletter 175) Alan Cutler instigated a Black Country 'Boulderdash' requesting information from members on the whereabouts of any significant glacial erratic boulders which might be suitable to feature in the 'Scorching Deserts and Icy Wastes' series of leaflets. Completion of this series was announced in the last Newsletter (No. 205, p.6) with the publication of the Stourbridge and Wolverhampton leaflets, and it is evident that the greatest existing Black Country concentration of these boulders lies in the Wolverhampton area.

Interest in this extraordinary and very visible ice-age legacy was fuelled for many of us by our field trip to Compton, Wolverhampton last March (report in No. 201. p.7), and kept alive by subsequent research from Mike Williams with photos of erratics in Bushbury, Old Warstone Lane, and Bognop (No. 202, p.14), Blakenhall (No. 204 p.15), and a Children's Centre in New Hampton Road West featured in this edition (p.13).



But what of my own home town of Birmingham? I'd long known of the glacial boulder beside the main lake in Cannon Hill Park, (*left*) but knew nothing about its history. Intrigued, I started to delve into Birmingham's glacial legacy, and found that erratics were very definitely present in the landscape of the past, some even weaving their way into the fabric of local history and folklore, but what of their provenance? The sketchy picture gleaned so far suggests North Wales as the main source of Birmingham's boulders, with some specific mention of the Arenig mountains, but I've found conflicting accounts of the likely time of their arrival.

It is known that the most recent glaciation, the Devensian, reached its maximum extent around 18,000 years ago, and in the Midlands it reached no further south than Wolverhampton. It carried material from Scotland, the Lake District, and from North Wales via the Irish Sea ice. This may explain the wealth of glacial erratics found immediately behind this glacial limit, and would date their deposition between 120,000 and 10,000 years ago.¹ With Birmingham lying beyond this limit, it is clear that the deposition of boulders in this area must belong to an earlier glacial advance.² The Anglian glaciation (300,000 to 250,000 years ago) was the most extensive known to have covered the British Isles, reaching as far south as the Thames valley. This was followed by the somewhat disputed Wolstonian advance (200,000 to 130,000 years ago), which may also have reached beyond the Birmingham area.³

It seems that either of these glaciations could be responsible for Birmingham's boulders, and I'm hoping that, through these pages, our readers may help to shed more light on this rather shady area. My research so far begs more questions than it answers.

The Great Stone, Northfield

This large erratic boulder lay on the corner of Church Hill and Church Road in front of the pub named in its honour until it was moved to the neighbouring 17th century village pound on 30th September 1954. Newspaper cuttings displayed inside the pub reveal that there was some opposition to the shifting of this iconic landmark, but road safety finally prevailed, the stone was moved and the pavement widened to accommodate prams etc. No-one knew how deeply it was buried, but local legends suggested 14 feet. A heavy duty crane was employed, but in fact it lay only 8 inches below the surface. Now it stands forlornly imprisoned in the pound. As for ►



The Great Stone was moved from this corner in 1954

its origins, one account states that it stood 'for ten thousand years after the last Ice Age at the corner of Church Hill and Church Road',⁴ and the Newspaper cutting in the pub, that it was 'deposited by the moving ice of the Great Ice Age millions of years ago'. I've yet to find the true story! With a pub and a road named after it, it is astonishing that it bears nothing to proclaim its history on either a geological or human time scale.

Cannon Hill Park Boulder (photo above)

This was unearthed during the excavation of the lake when the park was created in 1873. A history leaflet for the Park² states its provenance as the Arenig mountains in Wales, and a Google earth flag dates its arrival at 18,000 years. (Surely this can't be right?) Now it stands by the main lake, worn smooth by long use as a seat and climbing frame, with nothing to hail its illustrious history.

The Gilbertstone

This glacial erratic stone has a chequered history. For some time it apparently marked the boundary between the parishes of Bickenhill, Sheldon and Yardley.⁵ It was then moved to the Coventry Road, then to the grounds of Lyndon Green Junior School, and finally, in 1965 to Blakesley Hall, Yardley. The stone is most likely named after the Gilbert family who lived in the area in the Middle ages, and legend has it that a powerful member of this family lifted and moved the stone to re-define a land boundary to his own advantage. Another legend says that it was brought by a giant named Gilbert. Now it rests by a tree in the grounds of Blakesley Hall, unmarked, and probably unnoticed by most visitors as it bears no information panel to celebrate its historical, social and geological significance. This is astonishing when you consider that there was a mansion called Gilbertstone House until it was demolished in 1937, a whole district named after it, a 'Gilbertstone' school and recreation ground, and at least two roads bearing its name. I wonder if its current shape with smoothed, almost symmetrical sides may be as much due to the hand of man as to the erosional powers of the glacier which carried it here?



The War Stone



As far as I know, this is the only one of Birmingham's glacial boulders which bears, in situ, some reference to its origins. Like the Gilbertstone it is steeped in local historical significance but at least this magnificent boulder has been honoured with a plinth in the cemetery which bears its name. It is in Warstone Lane Cemetery, Hockley, in Birmingham's Jewellery Quarter. The caption explains that it is felsite, of glacial origin, and that it was originally called the 'Hoar Stone'. A 'hoarstone' is a boundary stone, and it seems that this stone was originally at the boundary between the manors of Birmingham, Aston and Handsworth.⁶ It would be interesting to know, as with the Gilbertstone's use as a boundary stone, whether the boundaries were created around the stone or whether the stones were moved to mark the boundaries. 'War Stone' is a corruption of 'Hoar Stone'. I wonder whether 'Old Warstone Lane' mentioned in Mike's account of glacial erratics (see above) derived its name in the same way? ►



Calcot Hill, Clent Hills

Although this is beyond the scope of my current quest specifically for Birmingham erratics, I feel I must conclude with a mention of this boulder which I have passed by on several occasions over the years whilst wandering over the Clent Hills. It lies at the junction of a footpath and a lane at grid ref. SO 944784, beside Calcot Hill Farm. It is incorporated into a boundary wall and is particularly noteworthy because it bears a plaque illuminating its history, as an erratic from the Arenig mountains. This is on the kissing-gate post and reads: *'Boulder from Arenig Mountain in N. Wales brought here by the Welsh ice-sheet in the glacial period'*.

I look forward to further contributions from our readers on this subject. So far I feel I've only revealed the tip of the iceberg, so to speak! ■

Julie Schroder

References

1. Toghil, P. 'Geology of Britain', p.173.
2. Birmingham City Council web site.
3. Toghil *op. cit.* p.176 & Woodcock/Strachan 'Geological History of Britain and Ireland', pp401-103.
4. Bill Dargue, 'A History of Birmingham Places and Placenames' web site: <http://billdargue.jimdo.com/>
5. Bill Dargue *ibid.* and Wikipedia.
6. Bill Dargue *ibid.*

Members' Forum

BGS iGeology

Some of you may have used the British Geological Survey's free on-line geology maps, but did you know that they have also produced a free App called iGeology for the iPhone and Android? Have a look at their OpenGeoscience page where you can find the links under *Maps*:

<http://www.bgs.ac.uk/opengeoscience/home.html> ■

John Schroder

Information for members

From time to time, the Society is emailed copies of other geological societies' newsletters. If you would like to be emailed a copy when they are available please email the Newsletter Editor at the address below. You may, of course, ask to be removed from the list of recipients at any time.

Stop Press: Woolhope Naturalists' Field Club - Geology Section

Sunday 15th May: A stroll around Little Doward hill led by Dr Sue Hay

Further information from Sue Hay, 01432 357138 or email svh.gabbros@btinternet.com

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