



Newsletter No. 204

December 2010

The Black Country Geological Society

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Copy date for the next Newsletter is

Tuesday 1st February 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: andrew_harrison@urscorp.com

Monday 17th January (Indoor Meeting) The new acquisition of the Wenlock Edge quarries. **Speaker: Peter Carty**, National Trust Countryside Property Manager, Carding Mill Valley. Peter will talk about their plans, and the joint working proposals for Wren's Nest and Wenlock Edge.

Friday 21st January (Geoconservation field work) Please note the changed date!
Wren's Nest: Hedge laying. Details are to be confirmed once it's known how many are interested. Please contact Andy if you would like to help (*contact details above*).

Sunday 20th February (tbc) (Geoconservation field work) Helping with clearance work at Moorcroft Wood (details to follow).

Monday 21st February (Indoor meeting) 'An introduction to Glaciers, Ice Ages and the British Landscape.' **Speaker: Dr. Richard Waller, Keele University.** This will be a modern review of glacial science and our current understanding of Ice Ages, illustrated with some classic British Landforms.

Sunday 27th February (Field meeting) morning trip, meeting at 10.00am to **Barrow Hill/Saltwells, led by Alan Cutler and Julia Morris.** Start point tbc.

Monday 21st March (Indoor meeting, 7.00 for 7.30 start) AGM followed by '**Problematic plesiosaurs - a unique group of extinct marine reptiles**'. **Speaker: Dr. Adam Smith**, Natural Science Curator, Thinktank, Birmingham Science Museum. This talk will bring us cutting edge findings about these majestic creatures of the Jurassic Seas.

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 so far from the more familiar Tertiary volcanics of the Scottish north western islands.

Other Local Events

Saturday 16th July: Visit to Dudley by the international scientists of the Silurian sub-commission.

Sat/Sun 24/25th September: Dudley Rock 'n Fossil Festival. Bigger and better than ever.

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.

Lapworth Lectures

There is no information available about the Lapworth Lectures for Semester 2 in 2011 at the time of going to press. Please refer to the website for further information at:
<http://www.lapworth.bham.ac.uk/events/lectures.shtml>

Woolhope Naturalists' Field Club - Geology Section

Friday 21st January : A geological tour of North East Greenland given by David Rex.

Indoor meetings are usually held in the Woolhope Club Room of the Main Library, Broad Street, Hereford, HR4 9AU, starting at 6.00 pm. Guests are welcome, but must take day membership of the Club: £1.00. 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

North Staffordshire Group of the Geologists' Association

Thursday 13th January: Bio-geochemical cycles. Dr. Rebecca Bartlett (Birmingham Uni.)

Thursday 10th February: Coal bed methane. Professor Peter Styles (Keele University).

All lectures are held at 7.30 in the School of Earth Sciences and Geography, William Smith Building at Keele University unless otherwise stated. Further information at: www.esci.keele.ac.uk/nsgga/

Shropshire Geological Society

Wednesday 12 January: Shropshire Unconformities. Speaker: Dr Peter Toghill.

Wednesday 9 February: Longmyndian fossils. Speaker: Alex Liu, Palaeobiology Group within the Department of Earth Sciences at the University of Oxford.

Anyone wishing to attend should telephone the meeting co-ordinator at least 48 hours in advance. A nominal charge is levied for non-members. 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/

Warwickshire Geological Conservation Group

Wednesday 19th January: More interesting fossils. Hugh Jones resumes his talk.

Meeting in the Senior Citizens Club, Southbank Road, Kenilworth. 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/>

Herdman Society Symposium

Saturday 19th February 9.00 – 5.00. 'Geoscience Frontiers 2' A day of lectures at the Sherrington Lecture Theatre, Department of Earth and Ocean Sciences, University of Liverpool. ~£8.00 for non-students, which includes lunch and tea/coffee.

Patterns in the history of life. Richard Fortey FRS (Natural History Museum).

The geological history of young continents, old continents and the oceans: why are they so different? Prof. James Jackson (Cambridge University).

Why does life start, what does it do, where will it be? Dr. Mike Russell (Jet Propulsion Lab., CalTech., USA).

Eyjafjallajökull 2010 eruptions: progress, impact and lessons learned. Dr. Thor Thordarsson (Edinburgh University).

Where was Odysseus' homeland? The geological, geomorphological and geophysical evidence for relocating Homer's Ithaca. Prof. John Underhill (Edinburgh University).

Deep in the mantle something stirred: why there is recent volcanism within Central Europe. Prof. Marjorie Wilson (Leeds University).

Further details from helenk@liv.ac.uk or Mrs H. Kokelaar, Department of Earth and Ocean Sciences, University of Liverpool, 4 Brownlow Street, Liverpool L69 3GP (tel: 0151 427 2001).

Manchester Geological Association

Saturday 15 January at 13:30 - The Scottish Dalradian:

The Dalradian of Scotland, from roadside and coast - Dr. Jack Treagus, University of Manchester.

Dalradian Metamorphism: Patterns and Puzzles - Dr. Giles Droop, University of Manchester.

Dalradian Mineralisation - Professor Richard Pattrick, University of Manchester.

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

This edition of the Newsletter brings a feast of local geology. We are announcing and promoting two new leaflets in the ongoing series produced by Alan Cutler as part of the Black Country Geodiversity Partnership project (*see below*). Since the last Newsletter we have seen the launch of two new web sites: The Black Country History web site www.blackcountryhistory.org which has a geology section featuring the collections from Dudley Museum and Art Gallery, Wednesbury Museum and Art Gallery, and Wolverhampton Art Gallery. The more recently launched 'Geology Matters' www.geologymatters.org.uk is an interactive site dedicated entirely to geology and is also based on the collections from these three Black Country Museum Services. *Please see 'Geology Matters Needs You!' on p.16 and get involved - you might win a £20 Amazon Voucher!*

Recent field trips and geoconservation work have had a local focus, and we've been represented at two local events. *See Andy Harrison's reports of field visits and geoconservation work at the Wren's Nest and Moorcroft Wood Local Nature Reserve, and Gordon Hensman's report 'Flying the Flag for the BCGS'.* (*Volunteers are still wanted for hedge laying at the Wren's Nest on 21st January. Please lend a hand if you can.*)

There is the family story of Bilston Stone Quarry from our web-master, Graham Hickman, and news of glacial erratics in Blakenhall from Mike Williams (*see Members' Forum*). All this and much more! ■

Julie Schroder

More New Black Country Geology Leaflets



Two more free site related leaflets were produced earlier this year as part of the Black Country Geodiversity Partnership project. The Geology of Barr Beacon is another in the 'Scorching Deserts and Icy Wastes' series, following those already available for Norton Covert, Walsall and Sandwell. 'From the Depths of the Earth' explores the geology of the Rowley Hills.

These two leaflets were produced for the general public to help raise awareness of our geological heritage and generally raise the profile of geology. As with the previous site related leaflets for Barrow Hill and Norton Covert, funding came from Defra's Aggregates Levy Sustainability Fund (ALSF) administered by Natural England.

Copies of these new leaflets are available from Dudley Museum and Art Gallery, libraries in Walsall or Sandwell respectively, or from either Walsall or Sandwell Countryside Services. They are also available, along with all previously produced leaflets, as downloadable pdf files on the BCGS web site: www.bcgs.info/ (Information→Leaflets to download).

Work is continuing on the project and we'll bring more information about the completion of the 'Scorching Deserts and Icy Wastes' series when it is available. ■

Alan Cutler, Julie Schroder



The Dudley Bug

Welcome

Hello and welcome to the festive edition of "The Dudley Bug". The recent members evening was again, a great success and we would like to wish you all a Merry Christmas and Happy New Year! This issue we would like to investigate the basics of sequence stratigraphy in the Wessex basin and why it is one of the largest sources of hydrocarbons on the UK mainland.

We hope you enjoy this issue!

Alison and Chris

Stratigraphy of the Wessex Basin

The Wessex basin is located along the south coast of England. It stretches from north Cornwall, eastward towards Dover (fig1 below). The basin is unique in the British Isles because it is the most economical onshore petroleum province in the UK. This includes the Wytch Farm oilfield, which contains 95% of the total known reserves.



fig.1 The Wessex Basin

The origin of the Wessex Basin began during the Pennsylvanian and early Permian, from reactivation of a series of east – west striking Variscan thrust faults. The basin was formed following the Variscan Orogeny when the compressional forces reversed to rebound extension, as a number of extensional sub-basins linked an extensive network of larger basins in the Variscan fold-and-thrust belt hinterland. The extension was a result of a pulsed rifting period during the break-up of Pangea and increased thermal subsidence. The extension continued into the Cretaceous. Pulse faulting has created a fragmented sedimentary sequence within the basin assisted by the periods of high thermal subsidence.

"Sequence stratigraphy emphasizes facies relationships and stratal architecture within a chronological Framework". Due to the palaeogeography of this area, the main sediment provenance was from the southern Armorican Massif, as aeolian and fluvial sand deposits. The oldest sandstone units were deposited during the early Triassic. A marine transgression during the late Triassic caused landward movement of sediments as accommodation space (space for sedimentation) increased more rapidly than sedimentation. This created widespread stratigraphic units. The stratigraphy of the Triassic is dominated by the transgressive sands and muds of the Mercia Mudstone Group.

During the Lower Jurassic marine conditions remained shallow, dominated by carbonate parasequences (shallowing cycles) of the Lias beds. The parasequences commence with mudstones and coarsen upward into sandstones or limestones. These were deposited on a shallow marine epicontinental shelf. The controls on sedimentation are likely to be low amplitude tectonic processes and deep Variscan faults on more localised scales. Along with the local tectonic controls, fluctuating eustatic sea levels significantly affected sedimentation. The Lias parasequences are formed as a result of second and more dominantly third order sea level fluctuations, believed to be a consequence of Milankovitch-scale cyclicity and eustatic variation. The Lower Lias is an important oil hydrocarbon source.

The shallow marine, fining upward cycles dominate until the Down Cliff Clay Formation. This formation marks a maximum flooding surface of a highstand systems tract (HST) in a deep marine environment, following a rapid transgression increasing the accommodation space with little clastic supply. A slight grain size increase from clay to micaceous silt provides possible evidence for a further regressive sequence to shallower marine conditions. ►

The Bridport Sands form the youngest unit in the Upper Lias; they continue the shallowing sequence to fine sands and carbonate beds. The porous sands form an effective hydrocarbon reservoir at Wytch Farm, above the Lower Lias source rocks. Alternating beds of sand and muds indicate smaller 4th and 5th order sea level variations. During an overall shallowing trend, the sands prograded seaward intermittently. This is shown by the interfingering with the Down Cliff Clays. The pauses may indicate 4th/5th order small sea level changes, supported by thin carbonate beds on a carbonate platform. It appears that tectonic uplift was a major control on sedimentation from the London Platform, while there was little clastic supply during carbonate production.

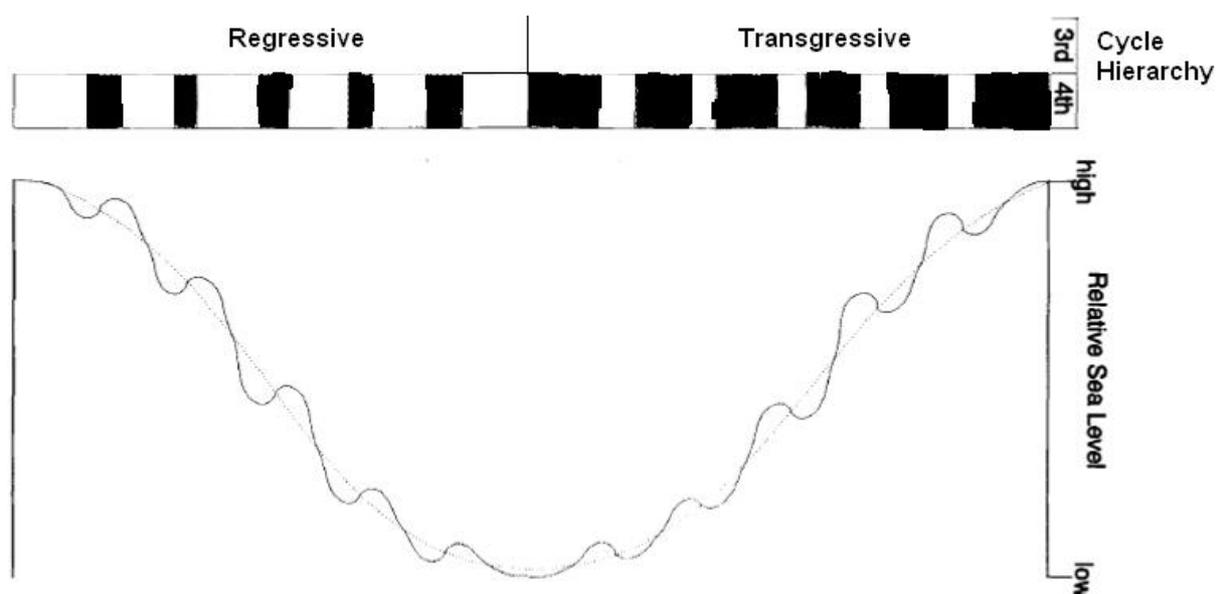


Fig 2: shows how the smaller order sea levels cycles occur within larger cycles

Above the Lias Formation is the Inferior Oolite Group conformable with the Bridport Sands with a small transgression (sea level rise) shown by onlapping relationships on a carbonate ramp. The overall shallowing trend continued to a lowstand systems tract from the Down Cliff Clays to the Lower Inferior Oolite Group. Prograding oolitic limestones denote a slow regression to shallow marine conditions above fair weather wave base. Tectonic structural uplift controls sedimentation at this time by starving clastic supply on a regional scale, and water depths with little eustatic sea level variation. Throughout the Middle and Upper Inferior Oolite Group evidence for deepening can be seen, believed to be controlled by subsidence rather than faulting.

Continued subsidence along with eustatic sea level rise initiated a deepening cycle in the Great Oolite Group. The overall trend is shallowing from the first subdivision, the Fullers Earth Clay forms the maximum flooding surface of a parasequence in highstand conditions. A falling stage systems tract followed, finishing with argillaceous and oolitic carbonates in a lowstand systems tract. A further two transgressions are evident in the overlying parasequences with rapid regressions. Conformably above, a marine transgression is evident from the lowstand systems tract compiling shallow carbonates prograding northward into distal areas and fined to carbonate muds. Controls on deposition comprise of an increase in faulting, rapid subsidence and 3rd order sea level fluctuations. The clay layers provide an ideal hydrocarbon seal above the Bridport Sands reservoir.

The overlying units are dominated by relative highstand systems tract coarsening up cycles with intermittent transgressive periods. During the Oxfordian a larger tectonically forced regression formed the overall trend, punctuated by smaller 4th or 5th order transgressive events. The sandy sediment supply was from a recently formed intrabasinal high with carbonates deposited during periods of transgression (deepening). ■

Alison Roberts and Chris Broughton

Flying the flag for the BCGS

Your committee has been hard at work this year representing the BCGS and publicising its existence. We have flown the flag at two events: Perton Science Fair, near Wolverhampton, and the Black Country History Day at Birmingham University. We are also becoming increasingly involved with geoconservation in the Black Country, with two recent events to assist in the maintenance of geological sites. (*See Field and Geoconservation reports below.*)

Perton Science Fair Saturday 12th June, Perton Library

We were invited to display a stall in the Library at Perton on 12th June. We took two pull-up displays, courtesy of our Vice Chairman Alan Cutler, numerous leaflets and a selection of fossils and mineral specimens from Dudley Museum. Several of our members helped in manning the stall which proudly proclaimed the importance of geology in the West Midlands. Alf Cole, our last Chairman and his wife Anne, and Barbara Russell (our honorary secretary) took it in turns to explain to people what it was all about. The next stall to us was a great attraction to children - both young and grown up - as it specialised in making science fun. No child could resist the temptation to blow very large smoke rings, or plunge their hands into non-wetting jelly! The Lapworth Museum was also represented with a stall close to ours.

This science fair was surprisingly well attended with over 7,000 people parading past the stalls. Many of them should now be aware of the existence of the Black Country Geological Society, who knows - some may even join us sooner or later!

The Black Country History Day Saturday 16th October 2010, Birmingham University.

For the last 5 years the centre for West Midland Studies under Dr. Malcolm Dick has held a Black Country Day on the history of the region. Having attended the last three such days it occurred to me that it would be an ideal occasion to make people aware that it was geology, in the form of minerals that led to the rise of the Black Country. It was also a good opportunity to publicise our society.

So, armed with the displays we had used at Perton, plus leaflets and the fossils and minerals from Dudley Museum, we erected a stall at the entrance to the lecture theatre. Our Treasurer, Mike Williams manned the stall and was very pleased to report a great deal of interest. Practically all our leaflets disappeared, and we can now claim that everyone there knows about our society. We have also offered to provide speakers for next year's Black Country Day, thus providing another opportunity to publicise our Society. ■

Gordon Hensman

Field and Geoconservation Meeting Reports

The Wren's Nest

Wednesday 18th August: Evening Field Visit starting at Mons Hill Campus, 19.00. Led by Graham Worton (Black Country Geological Society & Keeper of Geology, Dudley Museum and Art Gallery).

Importance and History

In recognition of its significant scientific integrity, Wren's Nest became the UK's first National Nature Reserve in 1956 and gets its name from the Anglo Saxon word WROSNE, meaning link. Wren's Nest forms a ridge with Castle Hill and Hurst Hill, which represents part of England's watershed. From here rainfall drains either southwards into the River Severn and the Bristol Channel or northwards into the River Trent and out to the North Sea. ►



The reserve is bordered by the Wren's Nest and Priory Estates. This has produced many issues over the years but the Wren's Nest is a place close to the hearts of the locals. It is an important stamping ground for local kids, dog walkers and many others. To mark its 50th anniversary in 2006, a plaque created by local primary school children was laid near to Locality 1 on the Wren's Nest Geological Trail, which shows what the reserve means to them. As Graham likes to point out, the very fact that this plaque and also the locally created trilobite bench have not been vandalised is indicative of how important the reserve is to the local community and kids. Many other artistic Council projects have not remained for long. The WROSNE project of 2008 saw Graham involved again with local kids to develop in them a greater appreciation of what is on their doorstep. (See *Newsletter 195 Editorial, Ed.*) This project was a great success although underplayed by the media and local authority at the time.

The ridge is believed to have formed part of an important communication route connecting northern and southern England in the past. The perimeter of the reserve is scarred with excavated and partly backfilled trenches and mine entrances, such as the Seven Sisters Caverns. These are a legacy left over from the Industrial Revolution in which the Wren's Nest played an important part. By 1665 Dud Dudley had developed the process of smelting iron using coke rather than charcoal and he also started using limestone as a flux. In 1678 Abraham Darby, the so-called father of the Industrial Revolution who would later marry into the Dudley household, was born at Wren's Nest Lodge. This was located near Locality 1 mentioned above. By 1851 approximately 90 million tons of limestone had been extracted from the Wren's Nest trenches and caverns for use as flux and lime mortar.

Mons Hill College, originally Wren's Nest School, was built during the 1960's. Behind is a flat open green space today used as sports fields, but during Medieval times it was a shooting range.

Geology

Ask most geologists if they have heard of Wren's Nest and they will recall university or school visits here. Sir Roderick Murchison, the David Attenborough of his day, founded the Silurian System in 1839, from the rocks of Wren's Nest. He was sponsored to study the rocks of the Dudley area and described a large portion of the fossils here. Rocks and fossils belonging to the Wren's Nest can be found in museums across the UK and globally. Well over 600 fossil species have been discovered at Wren's Nest of which over 100 species are found nowhere else. The 'Dudley Bug' or 'Locust' (*Calymene blumenbachii*) is probably the most celebrated trilobite fossil from Wren's Nest and was formerly on the Dudley coat of arms.

The table below summarises the rock strata that underlie Wren's Nest.

Ludlow Series	Lower Elton Formation	
Wenlock Series	Much Wenlock Limestone Formation	Upper Quarried Limestone Member
		Nodular Member
		Upper Quarried Limestone Member
	Coalbrookdale Formation	

The Wren's Nest strata represent relatively shallow variable marine environments, roughly 420 million years old, home to a myriad of tropical reef and associated fauna. During the Hercynian Orogeny of the Late Carboniferous the rocks of Wren's Nest were folded into an antiformal dome. The views from Wren's Nest look out over the two estates and the Black Country towards Birmingham and the Rowley, Abberley and Clee Hills. Much of the landscape is underlain by rocks of Carboniferous age.

During our walk Graham explained how geologists use landscapes, the nature and stratigraphy of rock layers, fossils, radioactive isotopes and structures, dips and discontinuities etc., to build pictures of ancient environments, energy and environmental conditions, ancient life, tectonic activity, time, stratigraphy and seasonal/daily cycles.

Improving Wren's Nest

As BCGS members know, big plans are afoot to attract more people to Wren's Nest. These include opening up the Seven Sisters, the Step Shaft and Cathedral Caverns, constructing a visitor centre and improving access and the image of the reserve. Since the failed bid for the peoples' £50 million from the lottery fund, money has had to be found from elsewhere making the process slow going. ►

The first steps are already under way and include stabilising the Seven Sisters and other caverns, improving access to the reserve, especially for wheel chairs, by widening and regrading footpaths, building new viewing platforms and improving existing ones. A new user friendly staircase has been installed at Locality 10 on the Wren's Nest Geological Trail (the Quarry Viewpoint) and a haulage road has been built to the Seven Sisters Caverns, using Rowley Regis dolerite.

Future work will involve opening up the deeper caverns and the canal basin, constructing a railway between the canal basin and seven sister's caverns, building a visitor centre and improving interpretive information for the reserve possibly with electronic guided tours.

New findings

Hand in hand with these works Graham told us of new discoveries being made at Wren's Nest, which include:

- Shifting the boundary of the Ludlow/Wenlock series by approximately five million years because of a bentonite band discovered in the Lower Elton Formation;
- Confirming that the volcanic source of the bentonite layers found within the Nodular Member, is beneath Cheltenham;
- Discoveries of new fossils both macro and micro.

Wednesday 24th November: Geoconservation work

Four BCGS members joined Wardens Rob and Dave along with two other council volunteers to undertake scrub and hazel clearance within the quarry below Locality 10. We met at 10:00am and although it was cold, we had a very productive day performing work that Rob said required constant management to keep it under control. Hopefully this has opened the door to more opportunities for BCGS members to get involved with further conservation work at Wren's Nest. Our next visit will be on **Friday 21st January 2011** to help with some hedge laying.



I would like to thank Graham for yet another very interesting visit to the ever changing face of Wren's Nest and Anna, Rob and Dave for allowing us to help out. We look forward to working with them in the future, and also hope to run more evening field trips next year to local sites.

Moorcroft Wood Local Nature Reserve

Sunday 24th October: Geoconservation work

During September's Indoor meeting, Alan Cutler spoke about geoconservation projects around the Black Country both past and present. Noting the conservation work of neighbouring groups and societies, and the leaflets produced by Alan, BCGS members have often asked 'How can we get more involved?'

Red tape and health and safety have always been the main issue. In July 2010 Alan, Graham and I met with Julia Morris from the Birmingham and Black Country Wildlife Trust, who is heading their Living Landscapes Project (LLP). The meeting highlighted four sites, (Moorcroft Wood Local Nature Reserve, Springvale near Wolverhampton, Barrow Hill and Saltwells Nature Reserve) all under the LLP that require clearance and improvement work and also some geological interpretation. Under the cover of the Wildlife Trust, Julia invited BCGS members to help out.

Moorcroft Wood Local Nature Reserve, is owned by Walsall Council who hold authority over what happens there. Funding is consequently an issue, but is aided by a management clearance fund from Tarmac. The Wildlife Trust is responsible for the conservation and management of the Reserve, for public education, involving the community in its upkeep and getting them to use the reserve. ►

Julia, Alan and I had an initial site walkover on 25th August 2010, to see what was there and what needed doing, and on Sunday 24th October, BCGS members joined several other Trust volunteers to help in removing scrub and trees to expose some large mounds of furnace slag. The trees were later chipped and used to improve muddy areas of path.



Sunday 7th November: A walk around the reserve. Led by Julia Morris. Just 2 weeks after the conservation work, this was an opportunity for BCGS members to see what the site has to offer, the work required, and what has already been undertaken.

The Reserve is located off Hawkswood Drive, approximately 2km west of Wednesbury and comprises approximately 31 acres of woodland with several pools. The largest pools are Long Meadow and Moorcroft Pool, which is reportedly 30 feet deep. The Reserve is located on Moorcroft Junction where the Bradley Canal Arm delineates the southern boundary, the Walsall Canal the eastern boundary, and Hawkswood Drive the western boundary, beyond which is a housing estate. The Wildlife Trust's Visitor Centre is at the western site entrance.

During the 18th and 19th centuries this area was generally rough ground, extensively mined and the site of an iron foundry with associated engine houses. The foundry may have been owned by John (Iron Mad) Wilkinson, considered the godfather of the Industrial Revolution, who lived in nearby Darlaston and was inventor of the blast furnace. It is said that he was buried nearby in an iron coffin.

As resources beneath the area became uneconomic and too difficult to mine, iron working ceased and the foundry closed. In 1904 the Wednesbury Hospital Board bought the area to use as a recreation ground for convalescing patients at Moxley Hospital opposite. Locally known as the Sanatorium, the hospital was owned by the Freemasons who planted the area with North American sycamores and false acacias in 1905. After the hospital closed in 1995 the land was sold for housing and the woodland sold to Walsall Council who declared it a Local Nature Reserve. There is still much to learn about the Reserve's history, such as the age of the foundry, and so the Wildlife Trust have set up a history project utilising local help to find out more.

The sycamores have a lifespan of approximately 100 years, are now considered aged and a good storm could bring them down. The Trust is steadily replacing them with more traditional trees and scrub. As part of its management plan the Trust is creating areas of open ground and glades to provide habitats for wild flowers, other low lying species and for birds and bats. Reserve Wardens occasionally cut down trees and create log piles to provide more open ground. However, it takes time for the log piles to rot down. Locals help by taking the logs to use in their log burners, but taking wood from the reserve has to be managed. Some taller trees are also left to provide habitats for greater and lesser spotted woodpeckers.

British Waterways won't manage the Bradley Canal Arm as it is not used and has become overgrown with bull rushes. This provides an ideal habitat for many song birds. Moorcroft and Long Meadow Pools contain a rich abundance of insect life; water scorpions, water stick insects, dragon flies and pond skaters. Illegal poaching has diminished the fish stocks that have to be replenished, and the pools are known to contain tench, carp and perch.

Middle Carboniferous Coal Measures underlie the Reserve, and these were extensively mined for ironstone, coal, sand and clay. The Reserve also lies within the boundary of the Moxley Channel, a well known glacial meltwater channel from the last Ice Age. Long Meadow and Moorcroft Pools may be old sand and gravel pits excavated within these deposits to reach the underlying Coal Measures.

A small exposure of glacial deposits remains adjacent to Moorcroft Pool, which requires some clearance and interpretation. Colliery waste from the mining and iron smelting operations overlie the glacial deposits and most of the site. The clearance work is intended to expose the geological features found within the reserve, which will be explained through interpretation boards. ►

South of the Reserve, Murby's Brick Works used the Coal Measures clays to produce blue bricks.

Much deprivation and unemployment came with the closure of the mines, which had a negative effect on the Reserve. For a long time urban myths have made it a no go area to the locals, and the Trust is trying to overcome this.



The reserve has suffered from serious antisocial problems in the past and present including motorbikes, shooting, fly tipping, wire and cable stripping, illegal fishing and removal of waterfowl. Also a bridge across one end of Moorcroft Pool suffered continuous vandalism and had to be removed. The Trust hopes that improving security and maintaining local support through the LLP (Living Landscapes Project), will help to combat these problems. Julia began the LLP in November 2009. It aims to encourage local people to come in and use the park, and this has been a slow process. However, holding

events such as wildlife walks appears to be attracting local interest.

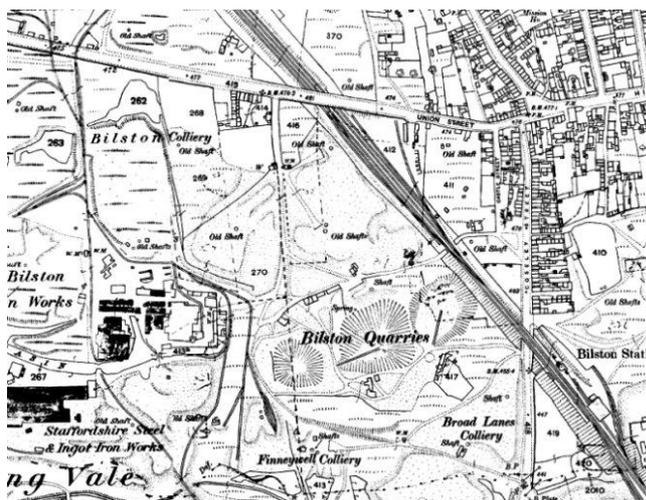
Moorcroft and Long Meadow Pools have suffered from fluctuating water levels since 1989. After a full recovery, they started to fall again earlier this year. The cause of this is unknown. However, recent work carried out on nearby mine shafts, Patent Mine, may provide an answer. A grey silty tide line on the shore and perimeter vegetation indicates the maximum height of the water. According to Julia, on a misty morning the pools have a distinctly primordial look, like something from Lord of the Rings.

More work is planned for Moorcroft Wood next February. I would like to thank Julia for the recent opportunity and hope we can arrange work for the other sites soon. ■

Andy Harrison

The Bilston Stone Quarries – A lost local heritage site

As a small boy my father often told me about a sandstone quarry in Bilston that my great grandfather had owned. It was not until recently however that I managed to research the subject more fully. The quarry known as the “Bilston Stone Quarries” had been worked from the late 17th century. It came into my family ownership in about 1826 and was operated by Job Hickman (1783 – 1855). He was the first of a line of my ancestors who worked the quarry for the next 100 years.



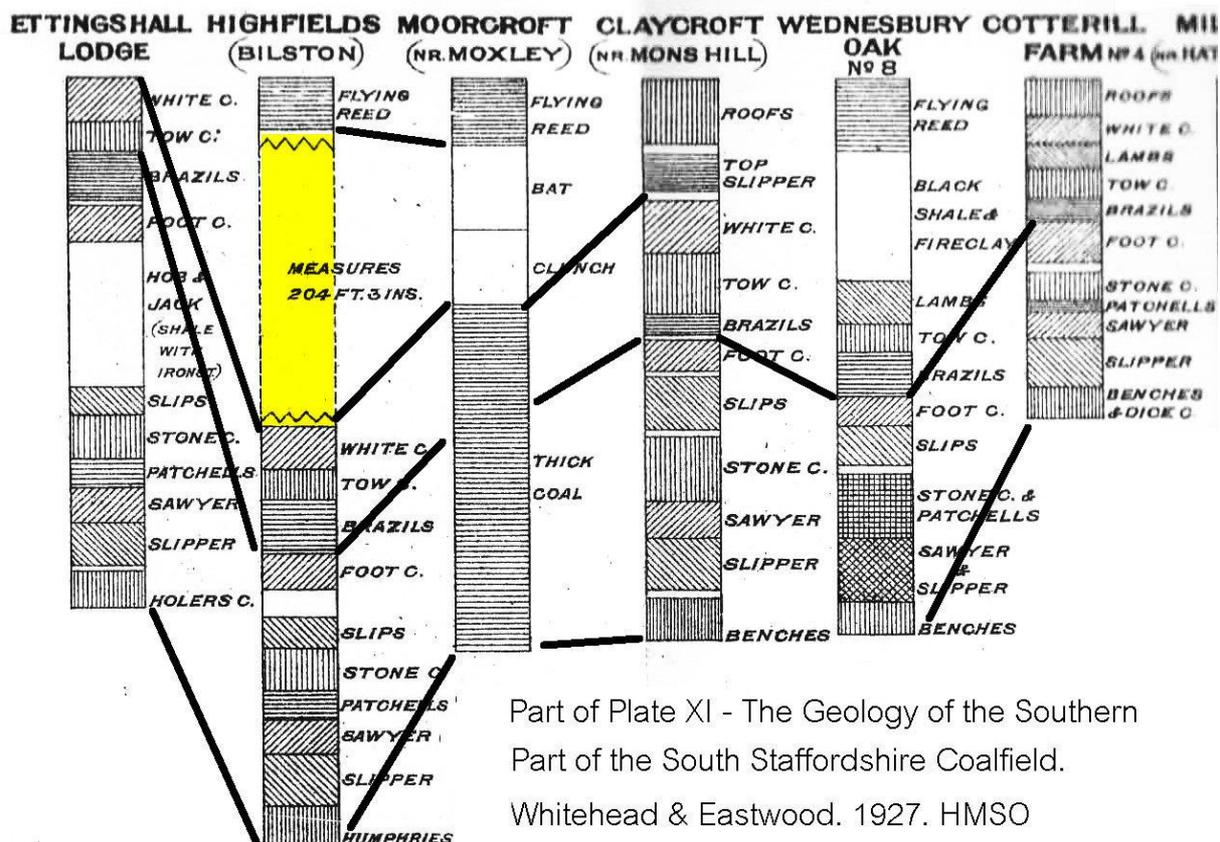
1887 Map showing Bilston Quarries

The quarry was situated on the south-west side of Bilston. The area was redeveloped in the 1980's, so unfortunately nothing remains, and a large Matalan superstore is all you will find there today. The quarry was a source of well cemented fine grained sandstone suitable for grindstones and masonry quality stone.

The geology can be deduced from an account in 1817 which states “The quarry at Bilston is also remarkable, it laying in beds in horizontal planes one under another, twelve beds deep, every bed being thicker than that above it an inch or more; so that the lower bed is about a yard thick, of which they make troughs, cisterns, &c. The grind-stones dug here are of a peculiarly fine grit, and frequent exportations of them to America have been made. The

stone is also excellent for building-stone, and fit for cornices and mouldings”. This description of a “thinning-upwards” sequence of beds suggests a fluvial channel origin. The vertical stacking pattern would result from a cyclic pattern of deposition with either a reducing amount of accommodation space or the lateral migration of a point bar in a meandering river. It is likely that the sands would also show a “fining upwards” character but this detail has not been recorded. The total thickness is estimated to be about 25ft thick. ►

VARIATIONS OF THE THICK COAL



The 1927 Geological survey states “Bilston Stone – this appears to be a sandstone that lies about 100ft. above the main portion of the Thick Coal, in the measures between the latter and the Flying Reed.” Records from the nearby Highfields Colliery, Bilston confirm the occurrence of 30ft 4in of Rock within the 204ft of Coal Measures above the Thick Coal and below the Flying Reed Coal. (See section shaded yellow in diagram above).

The family tomb of Job Hickman in the church yard of St. Leonards, Bilston, is almost certainly constructed from stone extracted from the family quarry. The stone fits the description, shows only limited weathering and has maintained sharp edges. There are probably many other examples waiting to be identified in the Bilston area or as antique grindstones waiting to be discovered. Have you seen any? ■



Graham Hickman

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

Indoor Meeting Report and Comments

Monday 18th October: Is Man's Role in Climate Change Significant? Lecture by Colin Knipe (Senior Partner, Johnson, Poole & Bloomer)

We have not recently reported indoor meetings, but this one provoked some controversy and has inspired the following response from our Chairman (Gordon Hensman). Colin's lecture was a geological review of past climates and the processes that created them, with an eye to understanding what is happening to the climate now. His argument played down the significance of human activities adding CO₂ to the atmosphere in favour of the far greater significance of natural causes, based largely on data showing the Earth's long history of climate change. Gordon has followed his response with the concluding section of the recent (and timely!) statement on climate change from the Geological Society of London (November 2010). The full statement can found at the following address: http://www.geolsoc.org.uk/gsl/views/policy_statements/page7426.html (Ed.)

This was an unusual lecture as it presented a challenging view of Global Warming. Colin Knipe's first statement was controversial as it challenged the enormous amount of evidence which is accepted by practically every authority in the field, that present warming of the lower troposphere is largely due to the release of greenhouse gases by human activities. It was stated that in the lecturer's opinion, increases of CO₂ followed the warming, and did not precede it. However, the speaker accepted that warming at the moment was a fact.

We were shown many graphs at a speed which made it difficult for proper understanding of their complexity. However, they showed relationships between warming and CO₂ in past geological periods using studies of fairly esoteric marine organisms. We were shown world maps of oceans which contained areas of warming and cooling, from which the conclusion was drawn that the areas of cooling proved that overall warming was not taking place.

The Arctic Ice has been steadily decreasing in area for at least the last 20 years, reaching an historic low in 2007, but because it has not shrunk quite as much in 2008 and 2009, the conclusion was drawn that the warming had ceased. No account was taken of ice thickness. The last couple of years has also seen a slight increase in the Antarctic ice cover surrounding the continent and it was asserted that this is evidence of a cessation of warming. This was almost certainly due to increased flow of Antarctic glaciers as a result of warming, thus enhancing the winter freeze up of the Antarctic Ocean. The Antarctic Peninsula (Graham Land), has had the fastest rate of warming of anywhere in the world!

The most challenging part of the lecture was the questioning of the accuracy of land temperature records. The UK has the longest continuous temperature record in the world - the Central England Temperature Record, starting in 1659. As one who has maintained a weather station for the last 40 years, I am aware of the stringent conditions imposed by the Met Office and other climatological organisations, and the World Meteorological Organisation, to maintain accuracy and comparability. The only reason given for the view expressed was that temperatures change too rapidly (diurnal and seasonal), and observing stations become engulfed by urban sprawl. The three world data bases (see below) all take this into account when looking at the positive and negative forcing factors of temperature changes, and in their increasingly sophisticated computer programs.

This was a very challenging lecture which, in my view came nowhere near to disproving the world consensus of warming, but only highlighted some of the inevitable uncertainties. Nevertheless, this is the way science progresses.

Gordon Hensman (Fellow of the Royal Meteorological Society)

The world's three data bases which produce the measurements are all independent.

1. Met Office, working with the Climate Research Unit (CRU), at the University of East Anglia UK.
2. Goddard Institute for Space studies (GISS), which is part of NASA USA.
3. National Climatic Data Centre (NCDC), which is part of NOAA USA ►

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

Climate Change: evidence from the geological record. Conclusion of a statement from the Geological Society. *(Printed with permission. Italic highlights added by Gordon Hensman.)*

Over at least the last 200 million years the fossil and sedimentary record shows that the earth has undergone many fluctuations of climate, from warmer than the present climate to much colder, on many different time scales. Several warming events can be associated with increases in the 'greenhouse gas' CO₂. There is evidence for sudden major injections of carbon to the atmosphere occurring 5, 120 and 183 million years ago, perhaps from the sudden breakdown of methane hydrates beneath the sea bed. At those times the associated warming would have increased the evaporation of water vapour from the ocean, making CO₂ the trigger rather than the sole agent for change. During the Ice Age of the past two and a half million years or so, periodic warming of the Earth through changes in its position in relation to the sun, also heated the oceans, releasing both CO₂ and water vapour, which amplified the ongoing warming into warm interglacial periods. That process was magnified by the melting of sea ice and land ice, darkening the earth's surface and reducing the reflection of the sun's energy back into space.

While these past climatic changes can be related to geological events, *it is not possible to relate the earth's warming since 1970 to anything recognisable as having a geological cause* (such as volcanic activity, continental displacement or changes in the energy received from the sun). This recent warming is accompanied by an increase in CO₂ and a decrease in Arctic sea ice, both of which – based on physical theory and geological analogues – would be expected to warm the climate. Various lines of evidence, reviewed by the Intergovernmental Panel on Climate Change, clearly show that a large part of the modern increase in CO₂ is the result of burning fossil fuels, with some contribution from cement manufacture and some from deforestation. In total, human activities have emitted over 500 billion tonnes of carbon to the atmosphere since around 1750, some 65% of that being from the burning of fossil fuels. Some of the carbon input to the atmosphere comes from volcanoes, but carbon from that source is equivalent to only about 1% of what human activities add annually and is not contributing to a net increase.

In the coming centuries, continuing emissions of carbon from burning oil, gas and coal at close to, or higher than today's levels, and from related human activities, could increase the total to close to the amounts added during the 55 million year warming event – some 1500 to 2000 billion tonnes. Further contributions from "natural sources" (wetlands, tundra, methane hydrates, etc.) may come as the earth warms. *The geological evidence from the 55 million year event and from earlier warming episodes suggests that such an addition is likely to raise average global temperatures by at least 5-6C, and possibly more, and that recovery of the earth's climate in the absence of any mitigation measures could take 100,000 years or more.* Numerical models of the climate system support such an interpretation. In the light of the evidence presented here it is reasonable to conclude that emitting further large amounts of CO₂ into the atmosphere over time is likely to be unwise, uncomfortable though that fact may be. ■

Geobabble

It is interesting when you hear a geological term that you have not come across before. I say interesting; it can be embarrassing, particularly if someone is pointing out a feature and seems to assume that you will understand what the term means. There are various techniques that we can use; one is to hide at the back of the group and pretend you are following it, and perhaps write down the term to be investigated later. The better policy is to say, "I'm sorry, I have not come across that before, could you explain?" What you must not do is pretend you know all about it, and make sham comments such as; "of course", or "yes I agree with you". You will be found out!

Recently I was looking at exposures of the Bridgnorth Sandstone in Bridgnorth with an expert sedimentologist. We were at the top of Hermitage Hill, and pointing to the exposure in the first photograph he said, "there's some good pinstripe lamination". I could not hide as there were only the two of us, and so I asked him to explain. When I got home I googled pinstripe lamination, I am now well versed on fashion accessories and smart suits. So I turned to the latest book I had on sediments, and all became clear. ►





Dune sandstones formed in desert environments, such as the rock we were looking at in Bridgnorth, have a simple explanation. Looking at the second photograph of the dunes in Death Valley, the wind blows from left to right, sand saltates or bounces up the gentle sloping stoss side, and then periodically avalanches down the steeper slip face. When it reaches a lower angle of rest, 20° to 30° or so, it can form beds up to about 5-6cm thick.

But all is not quite that simple. Wind may not have a constant direction, and water levels are very important, particularly in the lower areas between individual dunes. Also, the wind can form smaller ripples on the surface of the dunes as shown in the third photograph. These have a small wave length, no more than 5cm and a height of no more than a centimetre. The sands often show an inverse grading, meaning that the coarser grains accumulate on the crests of the ripples. This can result in a lamination only a few grains thick, and this has led to the term "pinstripe lamination". I am now looking at the Bridgnorth Sandstone from a slightly different viewpoint; it is complex.



*Namib-Naukluft Park, Namibia
photo by Bjørn Christian Tørrissen*

The very good book is: 'Sedimentary Structures' (Third edition), Collinson, Mountney and Thompson. Terra. 2006 ■

Bill Groves

Members' Forum

Geodiversity in the community: Blakenhall children's play area Wolverhampton



In a recently regenerated area of Wolverhampton, glacial erratics have been used to enhance a new children's play area bounded by Lower Villiers Street, Baggott Street, Sedgley Street and Bromley Street.

These superb glacial boulders show multi-source derivation and include Granite and Gneiss. Exactly how they came to be incorporated into the play area awaits further investigation, which will hopefully show that they have been relocated from less accessible areas around the city into the play area where they can now more easily be appreciated by visitors and local residents. ■



Mike Williams

Geology, God & Evolution

Les Riley has sent the following web link for our amusement!
http://www.apologeticspress.org/pdfs/courses_pdf/hsc0304.pdf



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Geology Matters

Needs You!
<http://geologymatters.org.uk/>

Following the launch of our new website showcasing the geology collections of three Black Country Museums - the largest collective museum collection in the Black Country - we need your help! We are seeking help from geology enthusiasts - both amateur and professional. This is a great opportunity to share your enthusiasm and get involved with the wider geological community.

Here are a number of ways you can "get stuck in"...

- **Joining our facebook group "Geology Matters" and get involved with discussions.**
- **Writing social media posts (Facebook and/or Twitter).**
- **Helping document and catalogue a museum geology collection.**
- **Writing a short text blog.**
- **Writing a short video blog.**
- **Helping photograph museum geology specimens.**



If you can help, please contact Graham Worton at Dudley Museum and Art Gallery or send you name and contact details to Christopher.Broughton@wolverhampton.gov.uk

Please tell us why geology matters to you?

Either send your response to Christopher.Broughton@wolverhampton.gov.uk or write on our Facebook page – <http://www.facebook.com/home.php?#!/pages/Geology-Matters/111714625523633>

There is a **£20 Amazon Voucher** for the best response by the end of December, so get your thinking caps on! Remember to include your contact details on the e-mail. Good Luck and Thank You!

Chris Broughton

Subscriptions 2011

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Mike Williams, The Bungalow, Parkdale West, Wolverhampton, WV1 4TE
 email: bungalowmike@blueyonder.co.uk

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