



# The Black Country Geological Society

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# Newsletter No. 205

## February 2011

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**Copy date for the next Newsletter is  
Friday 1st April 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](mailto:andrew_harrison@urscorp.com)

**Sunday 20th February: (Geoconservation field work) Helping with vegetation clearance work at Moorcroft Wood.** Meet at the Warden's office, Moorcroft Environment Centre, Hawkswood Drive, Moxley, Walsall, WS10 8GB (GR: SO 968951) at 10:30am. Bring a packed lunch.

**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) Visit to Barrow Hill Volcano led by Alan Cutler and Julia Morris.** Meet at St Mark's Church, Vicarage Lane, Pensnett, DY5 4JH (GR: SO 915 894) at 10:00am. Bring a packed lunch.

**Sunday 13th March: (Field meeting) Visit to Erasmus Darwin House, Lichfield for 12:00.** Meet at Erasmus Darwin House, Beacon Street, Lichfield, Staffs, WS13 7AD (GR:SK 114 097). Bring a packed lunch. We will be given a brief (approximately 20 minute) talk and allowed to view the house and exhibits using their audio guide. There is a £2.00 entry fee. The Society will pay this for members. It is important to inform Andy Harrison (*contact details above*) as soon as possible if you wish to attend, as he needs to know numbers well beforehand. The house closes at 16:00.

**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.

**Sunday 3rd April: (Field meeting) Visit to the Saltwells Nature Reserve, led by Graham Worton and Julia Morris.** Meet at the car park off Coppice Lane, SO 933 868, 10:00am. (Adjacent to Saltwells Inn, DY5 1AX.) Bring a packed lunch.

**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. The Society will have the opportunity to help to host this visit and meet and greet the overseas delegates.

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

**Volunteers are needed for the BCGS stand!**

*Please contact the Hon. Sec., Barbara Russell (contact details on p15) if you can assist, morning and/or afternoon on either day.*

## 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/>

## 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.

### Woolhope Naturalists' Field Club - Geology Section

**Friday 18th March: The Magallanes Basin in Southern Patagonia.** Talk by Dr Bill Fitches.

**Sunday 3rd April: Gore Quarry and Stanner Rocks** led by Dr Geoff Steel.

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: £2.00. Further information: Sue Hay on 01432 357138, email [svh.gabbros@btinternet.com](mailto:svh.gabbros@btinternet.com) or visit their web site: [www.woolhopeclub.org.uk/Geology\\_Section/default.htm](http://www.woolhopeclub.org.uk/Geology_Section/default.htm)

### North Staffordshire Group of the Geologists' Association

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

**Thursday 10th March at 19.00: AGM and Chairman's Address. British Earthquakes** by Dr Ian Stimpson (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/](http://www.esci.keele.ac.uk/nsgga/)

### Shropshire Geological Society

**Wednesday 9 March: 'Stone' (lecture).** Dr Ian Thomas, Director of the National Stone Centre.

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/](http://www.shropshiregeology.org.uk/)

### Warwickshire Geological Conservation Group

**Wednesday 16th February: Ediacaran fossils of Charnwood Forest.** Dr Philip Wilby (BGS)

**Wednesday 16th March: Antarctica Rocks.** Tom Sharpe (National Museum of Wales).

Meeting in the Senior Citizens Club, Southbank Road, Kenilworth, CV8 1JZ. If you wish to attend contact Ian Fenwick [swift@ianfenwick.f2s.com](mailto: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/>

### Lapworth Lectures

**Monday 7th February: The evolution of feeding: fossil fish and ferocious dinosaurs.**

Dr. Emily Rayfield, (School of Earth Sciences, University of Bristol).

**Monday 21st February:** To be confirmed.

**Monday 7th March: How trilobites lived.** Professor Richard Fortey (Natural History Museum).

**Monday 21st March: Making Mountains - driver and consequences.** Professor Peter Cawood (School of Geography & Geosciences, University of St Andrews).

All lectures commence at 5.00pm in the Palaeontology Lab (G21), Earth Sciences, University of Birmingham. Each lecture is followed by a wine reception in the Lapworth Museum; all are welcome! Further information at: <http://www.lapworth.bham.ac.uk/events/lectures.shtml>

### 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](mailto: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).

### Mid Wales Geology Club

**Wednesday 16th February: The Geology of Shetland.** Dr Geoff Steele

**Wednesday 16th March: British Earthquakes.** Dr. Ian Stimpson

Meetings are held at Plas Dolerw, Milford Road, Newtown, Montgomeryshire, SY16 2EH. Meet at 7.15 for 7.30pm. Further details: Ed. newsletter & Hon Sec: Tony Thorp: Tel. 01686 624820 and 622517 [jathorp@uku.co.uk](mailto:jathorp@uku.co.uk) Web site: [www.mwgeology.uku.co.uk/](http://www.mwgeology.uku.co.uk/)

### Manchester Geological Association

**Wednesday 9 March 6.30pm: Are the things we do to protect against natural hazards just making things worse?** Dr. Jeff Blackford, University of Manchester. Joint Meeting with the Geographical Association.

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](mailto:lectures@mangeolassoc.org.uk)

## Editorial

There is no doubt that the Black Country's commitment to its geological heritage is stronger than ever. The recent scientific work carried out in the Wren's Nest caverns before infilling has provided research material to absorb the experts way into the future, and is already yielding many exciting finds (see *Newsletter 201 'Dudley Bug' pages*). Geoconservation has always been a high priority, with numerous Black Country 'Local Geological Sites' (formerly RIGS) identified and recorded. Many of these have been cleared and publicised through information boards (as at Barrow Hill) and through the excellent series of leaflets produced by Alan Cutler under the auspices of the Black Country Geodiversity Partnership, and funded by the Aggregates Levy Sustainability Fund. I am pleased to announce that the final two leaflets in the 'Scorching Deserts and Icy Wastes' series are now published and available (see below, p6).

The Wren's Nest is surely the 'Jewel in the Crown' of Black Country geology, and is currently undergoing a monumental face-lift, enabled by a substantial grant from the Heritage Lottery Fund. This is the 'Ripples Through Time' project. Already substantial engineering work has been undertaken around the Seven Sisters; paths and steps have been renovated and renewed, and a new car park established. But one of the most exciting aspects of this project has been the creation of a new post: the 'Wren's Nest Learning and Community Development Officer', and in this capacity I am delighted to be able to introduce Jessica Welch. She has the task of developing links with the community, and of particular interest to our members, creating opportunities for us to become involved in a variety of different ways. So please read on, contact Jessica, and get involved in this exciting and forward looking project. ■

Julie Schroder

## Wrens Nest National Nature Reserve - Ripples through Time Project

The aim of the Ripples through Time Project is to realise the diverse potential of the Wrens Nest for its natural and cultural heritage and conserve its features of international, national and local importance for future generations. This will be achieved by the following:

- Conserve and enhance the Wrens Nest NNR, its canal links, natural history, unique mining features and infrastructure and allow safe access to them.
- Raise awareness of the natural and cultural heritage of the Wrens Nest NNR and its role in the development of the Black Country.
- Create a visitors experience that acts as a catalyst for the regeneration of the Black Country, its visitor economy and the local area.
- Increase local resident's appreciation and use of the Wrens Nest area.

### How can you get involved?

- Conservation volunteers – hedge laying, scrub clearance, vegetation clearance of rock faces.
- Education Volunteers – helping with outreach activities such as fossil activity days.
- Testers – proof reading new publications or testing new trails.
- Developing new interpretation – have you got ideas on a new trail or leaflet? An art idea that the local community could get involved with? Then let us know!
- Training – attend training courses that we will offer e.g. guided walk training.

Contact Jessica Welch via email [Jessica.Welch@Dudley.gov.uk](mailto:Jessica.Welch@Dudley.gov.uk) for more details.



Have a look at our website at: [www.bcgs.info](http://www.bcgs.info)



## The final two Black Country Geology Leaflets



The last two leaflets to be produced in the Scorching Deserts and Icy Wastes series have been released. The first covers the Stourbridge to Wallheath area and the second, the western side of Wolverhampton, completing the coverage for the Black Country. Like the previous leaflets they have been produced with funding from Natural England's Aggregates Levy Sustainability Fund as part of the Black Country Geodiversity Partnership's project to raise awareness of our geological heritage.

The leaflets are being distributed via local libraries and Dudley Museum and in the case of Wolverhampton also through the Countryside Services. Members can obtain copies of the new leaflets as well as previous leaflets (stock permitting) from the museum when attending Society meetings. They are also available, along with all previously produced leaflets, as downloadable pdf files on the BCGS web site:

[www.bcgs.info/](http://www.bcgs.info/) (Information→Leaflets to download).



It had been hoped to extend the project in 2011-12 to include Birmingham, which is part of our area of activity, but sadly the Government has announced that the funding scheme will not be continuing. New alternative funding sources are being investigated. ■

*Alan Cutler*

## Our Weather & the El Niño Southern Oscillation (ENSO)

As geologists we are inordinately interested in the physical structure of our planet. The atmosphere is part of that, but whereas the rocks reveal long histories of change, the atmosphere is far more ephemeral. There is an obvious interdependence between the lithosphere and atmosphere, so some comments on the recent very cold weather may be revealing to people who basically keep their eyes on the ground, not the sky (with all due respect, of course).

The recent exceptionally cold December 2010, and other contemporaneous extreme weather events, such as the floods in Australia, Sri Lanka, South Africa and the eastern coastlands of Brazil, has given rise to comment that they were in some way the result of an ENSO event in the Pacific Ocean. So, I will do my best to explain what this is, without over simplifying a tremendously complex system.

### Planetary Pressure Distribution

No doubt many of you are familiar with this model. Starting with a belt of low pressure around the equator, (also known as the Intertropical Convergence Zone, or ITCZ), there are two belts of high pressure approximately 30° north and south where the equatorial convection currents descend. High pressure also prevails around both north and south poles with a system of cold outblowing winds. In between there is a broad extent of low pressure where the tropical and polar air meet, between latitudes 45° and 60° north and south. This is the wide belt of westerly winds with frequent lows, or depressions, bringing unsettled weather throughout the year, particularly to windward coasts.

### The Pacific Pattern

The Pacific is covered by two high pressure systems, at 30° north and 30° south, with the winds spiralling outwards from their high pressure centres in a clockwise direction in the Northern Hemisphere and anticlockwise in the Southern Hemisphere. ►

## **A Plethora of Currents**

The oceanic currents are driven by this pattern of winds, so moving northwards along the coast of South America is the cold Humboldt, or Peruvian Current, and moving southwards along the coast of North America is the less prominent cold California current (incidentally causing the fogs of San Francisco).

When the Peruvian Current reaches the Peruvian coast, it is driven westwards by offshore winds which cause even colder bottom water to up-well, bringing with it nutrients from deep down on which plankton feed, in turn supporting a very prolific fishery.

This pattern of cold water next to a hot land surface causes great aridity as the air is incapable of holding much water vapour, hence the most arid desert on earth, the Atacama.

This cold water drives westwards, bringing abnormally cold water for equatorial latitudes, but also warming up under the vertical sun as it goes. It is now called the South Equatorial Current, balanced in the northern hemisphere by the North Equatorial Current. An opposite current, flowing eastwards, called the Equatorial Counter Current is sandwiched in between. By the time the cold Peruvian water reaches the Philippines, Indonesia and Queensland Australia, having travelled a third of the way around the globe, it is very warm, producing heavy, frequent rains in these lands.

## **La Niña**

This is an exacerbation of the normal South Pacific oceanic circulation, when the water is extra cold, and the rains in the western Pacific more vigorous than usual, and the drought in Peru even worse. This is what has occurred this year, causing extensive flooding.

## **El Niño**

Every so often (averaging every five years, but highly variable), the Peruvian Current weakens, and the Equatorial Counter Current, which normally flows as a tight band between the N.E.C. and the S.E.C., flows more vigorously eastwards towards Peru. Suddenly the Peruvian coastlands are washed by warm water which brings heavy rain and consequent floods, as well as destroying the Peruvian fisheries.

## **The Indian Meteorological Department**

The IMD was founded by the British in September 1875, with the first director, Henry Blanford showing great interest in examining the nature of the Indian monsoon. With most of the Indian population being subsistence farmers, any failure of the rains meant starvation, and unfortunately, still does for many.

There was such a monsoon failure in 1877, and it was noted that the air pressure over the subcontinent was abnormally high. Blanford asked the meteorological services and other observatories around the Indian Ocean, and also other Asiatic and Australian regions, to provide the IMD with their observations of air pressure and general climatic conditions.

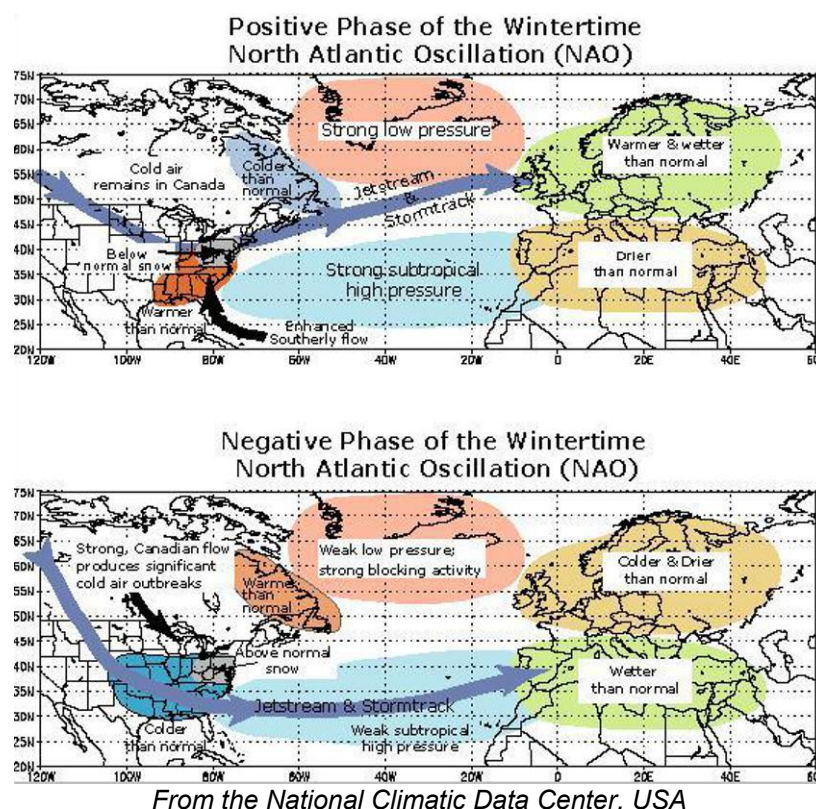
He found that the abnormally high air pressure extended to western Siberia, northern China and southern Australia. He also gathered information about Himalayan snowfall, searching for any indication of effects on the monsoon, and examined possible links with the solar cycle. From 1885/1886 the IMD started to publish regular forecasts of the Indian Monsoon rainfall using the previous January - May snowfall over the Himalayas and the regional climatic patterns.

Blanford was succeeded by Sir John Eliot in 1895, and he in turn was succeeded by Sir Gilbert Walker in 1904, who, surprisingly, had no training in meteorology or climatology, but he had visited the meteorological services in Germany, France and USA. He quickly realised that there was little scientific basis for making seasonal forecasts, and as it was not a subject to which mathematical reasoning from established scientific premises could be applied, he decided to collect as much information as possible and treat it statistically without tracing cause and effect, although ever mindful that eventually the scientific principles which lay behind the behaviour of the atmosphere would be found. ►

## Statistics and Correlations

Sir Gilbert Walker trawled through existing records from all over the world as well as the records of Indian rainfall which had been started by the British. He noticed something odd and unexpected. The Pacific Ocean underwent regular dramatic changes in the distribution and amount of rainfall, accompanied by changes in the intensity of air pressure. We now call this the Southern Oscillation, or El Niño Southern Oscillation (ENSO). His crucial conclusion was that there is a relationship between what happens in the Pacific and the intensity of the Indian Monsoon. Now we know that this type of relationship is found all over the world in other climatic zones.

He also introduced the terms 'Southern Oscillation', 'North Atlantic Oscillation' and 'North Pacific Oscillation'. They all reveal the same type of swing from high to low pressure. For example, measurements in the North Atlantic show that the Azores Sub-Tropical High, is more intense in some years than others, whilst at the same time the Icelandic Low Pressure is deeper than usual. This causes a very vigorous flow of westerly winds across the Atlantic bringing mild, rainy and very disturbed weather to North-West Europe. This is the cause of our mild winters, and rainy, cool summers. In other years the Azores High is less intense and the Icelandic Low less deep than average, producing a weak westerly flow of air, frequently blocked by anticyclones. This type of pressure distribution brings our climatic extremes, of great heat in summer, and very cold spells in winter, as it is favourable to airflows from both north, east and south - cold and hot airstreams depending on season. We now know that it is also associated with the position of the high sinuous jet stream being located to the south of the British Isles - as it was in December 2010, and also for much of the 2009-2010 winter.



## Our Weather

So, the recent severe cold weather in the British Isles owes something to the behaviour of the atmosphere on the other side of the planet, and those of you familiar with James Lovelock's "Gaia Theory", will be pleased to see how the atmosphere, although a chaotic system, behaves as one unit on a planetary scale.

We are now in a position to "number crunch" vast amounts of data on a scale that would have left the early pioneers, like Blanford and Walker dumbfounded! The more research that is carried out into the relationship between CO<sub>2</sub> and rising temperatures, and the more computers are developed to cope with the fantastic amount of data we acquire all the time, the more we realise that the climate in a specific location such as North-West Europe, is intimately related to the rest of the world's climate. ■

Gordon Hensman



# The Dudley Bug

## Welcome

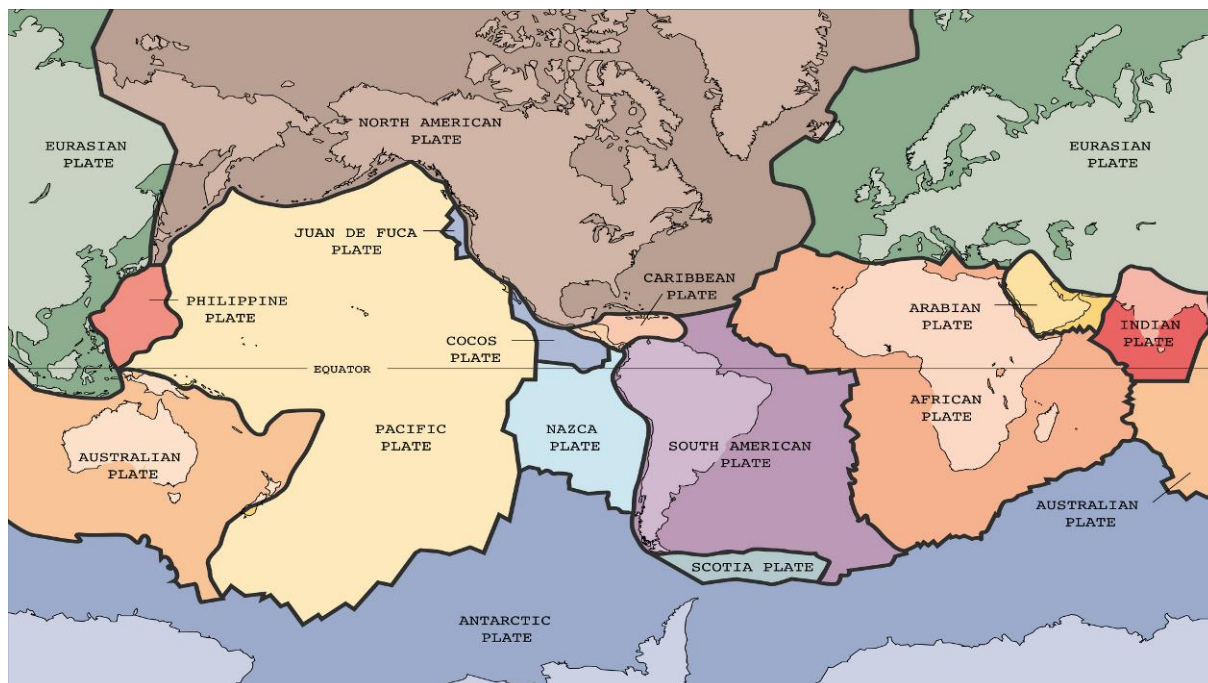
Welcome to 2011 which is going to be another year filled with geology related fun! After the big December freeze we thought we would warm you up with a quick guide to the lithosphere and then a nice short geo-quiz to keep you entertained during these long winter nights. Don't forget we are still looking for help with blogs for the Geology Matters website too.

*Alison and Chris*

## The Lithosphere

The Earth is divided into different layers - the inner core, the outer core, the mantle and the crust. The lithosphere is defined as being the outermost layer of the Earth, the solid outer shell, which includes the crust and the upper mantle. It deforms in an elastic manner. The lithosphere is divided up into two types, oceanic lithosphere and continental lithosphere and can be up to 100km thick in places. Below the lithosphere is the asthenosphere which is the plastic (ductile) part of the earth. It isn't fully molten or fully solid, it's half way between.

The lithosphere isn't a solid mass of rock; it is broken up into approximately 12 large plates and a number of smaller ones. These plates slowly work their way across the surface of the Earth by convection currents, and this process is known as continental drift. The UK is on the western side of the Eurasian Plate as shown below:



*Map showing the tectonic plates of the Earth (Wikimedia Commons)*

Plate tectonics is only a recent discovery to science. Today, modern techniques such as the use of global positioning systems (GPS) can help track the distance, speed and direction in which plates are moving. Other methods used include an ancient science known as astronomical positioning, which is when the position on the Earth is measured in relation to the stars in the night sky.

Oceanic lithosphere consists of oceanic crust which is created at mid-ocean ridges such as the Mid-Atlantic Ridge, and is therefore youngest at such locations. The oldest oceanic lithosphere is Jurassic in age. In general, oceanic lithosphere is about 6km thick but in places such as Iceland it is thicker. As oceanic crust cools it becomes denser and thicker, causing it to sink. Because of this slow cooling, the lithosphere becomes more rigid. Basalt is the main rock type found within the oceanic crust. ►

Oceanic lithosphere has a layer of sediment on top of it which builds up over time as sediments get deposited. In places such as the Mid-Atlantic Ridge the area around the ridge is shallow because of the new, warm upwelling magma. But if you were to travel to either side of this ridge then you would see very deep basins full of thick layers of sediment. The thickness of the sediment helps determine the age of the system.

Continental lithosphere consists of continental crust which can be up to 90km thick. Like the name suggests the continental crust consists of the continents, but also includes the land off the coast of these continents, known as continental margins. In composition the continental crust is mainly made up of granitic material. Sedimentary, igneous and metamorphic rocks all form continental crust. Even though continental lithosphere is thicker than oceanic, it is less dense. This is why, at subduction zones, the oceanic crust is forced beneath the continental crust.

There are three types of plate junction: constructive, destructive and transform. Each one creates a different land form. Constructive margins form ridges; destructive margins form mountain chains, and transform margins cause ridges with high earthquake activity. The different plate boundaries form different types of volcanism.

New plates form where the plates separate and they are recycled where the plates converge. This process is continually happening, so once a plate melts at a converging boundary, the whole process starts again. The lithosphere is constantly moving and is very active. All of our volcanic eruptions, earthquakes, mountain building and structures are caused by the lithosphere and its constant cycle. ■

### Geo-fact Quiz

Here is a quick geo-fact quiz, have fun!

- What mineral group does chromite belong to?
- Which mineral is sometimes referred to as 'rock crystal'?
- During which geological period did mammals first appear?
- A nappe is a body of rock which hasn't moved from its original position. True or false?
- An illite is a group of mica-like clay minerals with a three sheeted structure. True or false?
- What is the date range of the Neogene?
- Where is the driest place on Earth?
- What magnitude was the Glenmuir earthquake which occurred on January 23<sup>rd</sup> 2011 in the Highlands of Scotland?



Answers will be provided in the next Dudley Bug (April 2011)



Geology  
Matters ***Needs You!***

[www.geologymatters.org.uk](http://www.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 - just search for "Geology Matters" and get involved with discussions.
- Writing a short text blog (approx. 400 words)

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](mailto:Christopher.Broughton@wolverhampton.gov.uk)

## Geobabble



Leonard J. Wills

Geologists are well used to interpreting rocks in terms of their environment of origin. In the Black Country we can talk about coral reefs, tropical coal forests, vast deserts and even volcanoes. When we look at rocks of one particular age, say the Silurian Wenlockian, it soon becomes apparent that the rocks are not all of the same type, the same facies, and if we move into Wales the coral limestones can be replaced by black shales and turbidite sandstones or greywackes. It is then a simple step to draw a map of the geography of the Wenlock indicating land and sea areas, deep water, shallow water, indeed any environment you wish to indicate, and so we have represented the *palaeogeography* of the time.

A remarkable local geologist was a master of producing palaeogeographic maps. Leonard J. Wills, known as 'Jack' was born in Birmingham in 1884, became Professor of Geology at the University and produced a series of papers and books on stratigraphy and palaeogeography, particularly referring to the Midlands. His last publication, a memoir, was written when he was 93, in the year before he died. One of his most notable books was *'A Palaeogeographic Atlas of the British Isles'* published in 1951. It was an invaluable resource for geologists and geology students at that time; I was a student in the late fifties and early sixties and I still have my copy, much annotated.

Figure 1 is a palaeogeographic map of Wenlock times adapted from that atlas, and if you look at our local area it still holds good. We are under a shelf sea with reef limestones, indicated with a letter c. The Wenlockian sediments of Pembrokeshire which are not reef limestones are represented by a letter o, and in the key these are called *'Shelly Coastal and Shallow-water deposits'*. The terminology used is typical of that used before we knew of plate tectonics. *'Cratons'* or on this map *'Kratons'* were stable areas of ancient, resistant rock, in this case the Precambrian Lewisian Gneiss, exposed NW of the line that represents the Moine Thrust. A *'Geosyncline'* was, indeed still is, a downwarp in the crust that is receiving great thicknesses of sediments, evidenced by the rocks found in central Wales and the Southern Uplands of Scotland. The key describes these sediments as *'Geosynclinal Deposits, Pelagic Graptolitic mudstones'* and *'Coarse detrital "Greywacke"'*. The latter we would now call *'turbidites'*, such as the Aberystwyth Grits.

The problem area is between the Moine Thrust and the Highland Boundary Fault, labelled *'Eo-Caledonian Mountains'*; we now know that this was the area of the Iapetus Ocean, a vast expanse, and when it closed would provide

the energy required to form the Caledonian Mountains. In the fifties we did not know of *'Plates'* or sophisticated palaeomagnetic measurements, and the dating of rocks was still developing, so Wills knew nothing of this; or did he? The brilliant man that he was knew that there were some anomalies to be explained. In the small print at the very bottom of his map he has written *'The breadth of the geosynclines was originally much greater than now'*. In his Preface he recognises that in a *'progressive science'* there are bound to be features of the Atlas that will be shown to be mistaken. ►

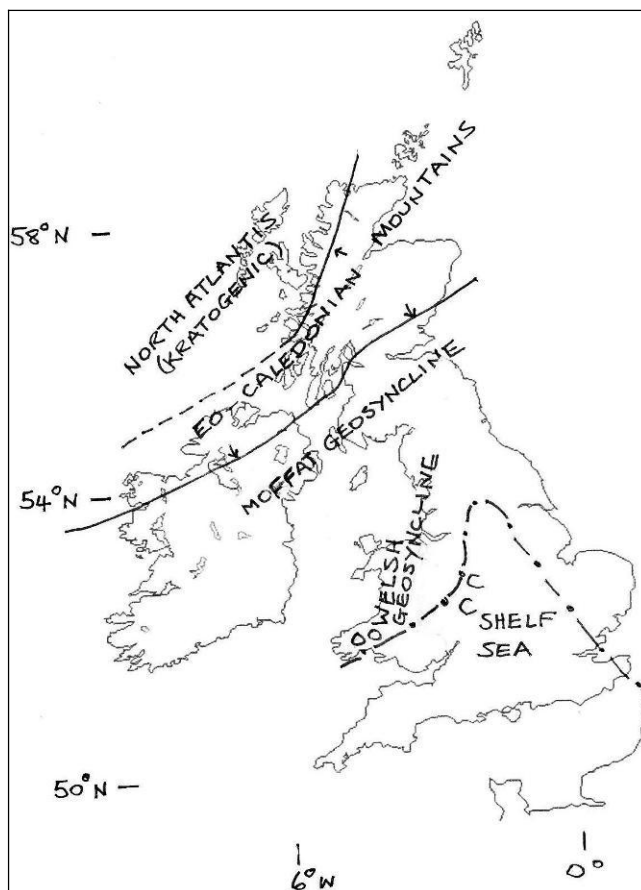


Figure 1

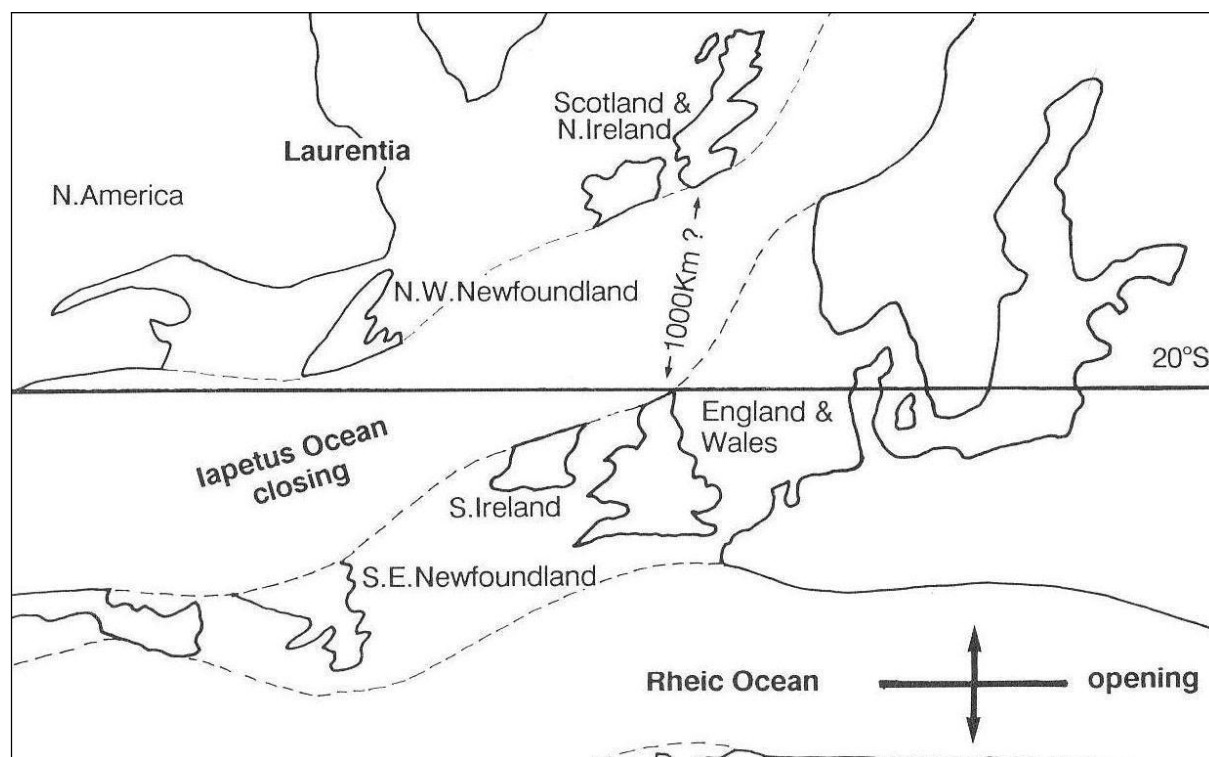


Figure 2

The formation of fold mountains was explained by geologists at that time as an 'orogeny', when the sediments of geosynclines were compressed, folded and metamorphosed by 'Earth movements' of great magnitude, but we did not have an overall picture of how the energy for these movements came about. Wills' comment about the distances involved reflected the feelings at the time. Palaeontologists knew that the fossils in the Southern Uplands were distinct from those of Wales; for example the trilobites differed, and so there were two contrasting *faunal provinces*, two areas, remote from each other giving distinct faunas. Great distance would provide this separation. In figure 2, Toghill has put in the line of latitude for Wenlockian times; we were about 20°S of the equator, which explains many of the environmental parameters. Wills had no such information and so puts on his map the present day latitude and longitude. He did not know that the 'geosynclinal deposits' of the Southern Uplands were on the passive margin of Laurentia slowly moving towards the subduction zone and the deposits of England and Wales.

Although it is always interesting to compare books and papers of different times, one must not lose the sense of wonder of the genius of people such as Jack Wills and their thought patterns when trying to explain geology when so much valuable evidence had not yet been unearthed. The science moves so quickly that much of the interesting overall developments are in living memory, and we must never let our up-to-date explanations blot out the genius of these 'elders of geology'.

My thanks to Jon Clatworthy, Curator of the Lapworth Museum for the portrait of Jack Wills.

My thanks to Andrew Johnston of Quiller Publishing, Shrewsbury, for permission to use part of the map from 'Geology of Shropshire'. ■

Bill Groves

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## Field Meeting Report

**Sunday 19th September 2010: Martley, Worcestershire.** Led by Dr Paul Olver (Woolhope Naturalist's Field Club, Geology Section).

This field trip was another joint one between the BCGS and Woolhope Naturalist's Field Club (Geology Section). The day started cloudy, warm and dry when we met at 10:30, outside Martley Village Hall. Here Dr Paul Olver provided an overview of the area and geology before ushering the group down the road to order lunch at the Admiral Rodney.

The day centred round the village of Martley, located approximately 8km south of Abberley, Worcestershire. We visited three localities: Martley Pit, Scar Cottage and Penny Hill Quarry, each illustrating the variety of geology underlying the region and the tectonic forces that shaped it.

### Martley Pit

Martley Pit, to the west of the village, is a landfilled quarry dating back to Victorian times, which by 1990 had been closed and planted with trees. In February 2010 the Woolhope Naturalist's Field Club arranged for the excavation of two perpendicular trenches that exposed the edge of Martley Pit, the fill and the underlying rock strata.

Within the first trench we saw sheared and shattered Cambrian quartzite thrust over sheared Precambrian diorite. These rocks continue to dip northwards from Martley, below Abberley Hill, and the thrusting that occurred is similar to that associated with the Malverns but on a smaller scale. In the second perpendicular trench we saw how these Precambrian/Cambrian rocks had been thrust over younger Palaeozoic and Triassic rocks. The source of this thrusting was from east-west compressional forces relating to Variscan earth movements, resulting in north/south folding around the Welsh block and east/west shearing along a very narrow thrust zone. The Herefordshire and Worcestershire Earth Heritage Trust plan to open up the Martley Pit site, developing and protecting the exposures for groups to view, and to produce an interpretative geological trail guide.



*Martley Pit*

### Scar Cottage



*Bromsgrove Sandstone, Scar Cottage*

Scar cottage in Martley is situated in a former quarry where in Medieval times Triassic Bromsgrove Sandstone was extracted to build the local church. Paul pointed out how the sandstone was red, medium to coarse, with softer bands showing signs of biodegradation from sand wasps. These beds were deposited within transient lakes under an arid climate. Carbonate rich groundwater, drawn upwards from calcareous rocks below has left pinkish white markings within the sandstone, including a rather impressive cross. The original high sandstone walls of the former quarry bound the garden of Scar Cottage and show dipping sandstone beds and chisel marks from the original quarrying activity.

### Penny Hill Quarry

Penny Hill Quarry, north of Martley, was our final stop for the day. Here, beds of Wenlock Limestone equivalent to the Nodular and Quarried Limestone Beds of Wren's Nest, are exposed and have been overturned by the same Variscan east-west compressional forces that also formed Abberley Hill. ►

The quarry itself was used for coal extraction in Victorian times and has since been landfilled, capped and landscaped after extraction ceased. We headed to the highest point of the site past trees, bushes and the occasional gas venting pipe. From the highest point we received great views over Worcestershire and the Black Country looking towards the Malverns, the Worcestershire Basin, with Bredon Hill and the Cotswolds beyond, the Midland Plain, the Lickey Hills and Clent Hills. Not only was the Cambrian, Silurian, Carboniferous and Permo-Triassic geology of the underlying landscape displayed before us but also the results of tectonic and glacial movements that have shaped the landscape.



*The Malverns & Berrow Hill from Penny Hill*

Finally we were given a chance to pick over the beds of Wenlock Limestone close to the quarry entrance, for fossils. According to Paul these beds represent a tropical lagoonal environment rich in the same Silurian reef fauna as those found at Wren's Nest and Wenlock Edge. These beds also contain the same layers of bentonite, or volcanic ash, which originated from the same volcanic episodes as those seen at Wren's Nest.

I would like to thank Paul and the members of the Woolhope Club for a very interesting field trip, for making us feel welcome, and I look forward to our next trip together. ■

*Andy Harrison*

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## Members' Forum

### A Geological Wonderland in Golspie, Sutherland

En route to a remote cottage in Skerray (on the Scottish north coast near Tongue), John and I passed through the little town of Golspie on the east coast of Sutherland. We stopped in our tracks when we saw the words '**Geological Exhibition**' emblazoned on a building to the north of the town centre. We soon discovered that we had stumbled on a geological treasure trove, and all thoughts of travelling onwards were forgotten while we steeped ourselves in the many marvels of this collection. Indeed, it proved to be one of the most memorable highlights of our 2010 summer holiday. ►



We were greeted at the door and shown around by Anne Shelley, widow of Donald Shelley, and the story behind the exhibition gradually unfolded. Donald developed his passion for geology whilst serving as the first warden at Knockan in the Inverpoll Nature reserve. In 1970 he and his wife Anne started the Orcadian Stone Company in Golspie, and this was the start of a long labour of love to build the collection. Don travelled widely and collected specimens from all over the world, for sale and for the collection, but there is a strong emphasis on local geology.



The exhibition starts with displays outside, and the purpose built exhibition house beckons the visitor with a wall at the entrance constructed entirely of beautiful beach stones. This provides a feast for the eyes and an absorbing identity parade of rock specimens without going a step further - but the £4 entry fee is worth every penny!

The collection is divided into three rooms; the fossil and rock rooms are on the lower floor, and the upper floor is devoted to minerals. The fossil room has some superb specimens of Devonian fish and plants from NE Scotland, and many from the nearby Jurassic deposits. The rock room has splendid samples of early pre-Cambrian gneiss and highly folded Moine schists, through to the Tertiary

volcanics from the Western Isles. But the

jewel in the crown of this exhibition (quite literally!) is the mineral display on the first floor. As Anne unlocked and opened the door we gasped with amazement at the dazzling spectacle before our eyes. From enormous geodes to small, beautifully polished agates, the exhibition displays magnificent specimens from all over the world, arranged with eye-catching artistry. Photography does little to capture the full magic of this exhibition but it gives some idea, and if this small selection whets your appetite, you can see more on our website at:

<http://johnschroder.homelinux.org/Golspie/Golspie.htm>



The shop is housed in an older building, and feels like an Aladdin's cave of tempting treasures for the geology enthusiast. This provided a welcome opportunity to acquire maps and books for our holiday, and we continued on our journey rather wishing that we'd had more time to spend at this amazing place. ■

*Julie Schroder*

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The Orcadian Stone Company Ltd. web site <http://www.orcadianstone.co.uk/>

The Geological Society (Obituaries 2002, Donald Robert Shelley):  
<http://www.geolsoc.org.uk/gsl/site/GSL/lang/en/page2573.html>

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