



The
Black
Country
Geological
Society



Newsletter No. 198

December 2009



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.

**Copy date for the next Newsletter is
Monday 1st February 2010**

Committee

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F.R.Met.S.

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F.G.S., C.Geol., C.Sci.,
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Graham Worton B.Sc.,
C.Geol., F.G.S.

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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: 0797 333 0706 or email: andrew_harrison@urscorp.com

Monday 25th January (Indoor meeting) Les Nichol Memorial Talk: The Legacy of Past Mining - Stabilisation by Drilling and Grouting. Speaker: Steve Rule (M&J Drilling Services). This is a joint meeting with the West Midlands Regional Group of the Geological Society, arranged by their secretary, Adrian Collings.

Saturday 30th January (Field meeting) Visit to the Lapworth Museum. Led by Jon Clatworthy. Meet at 11.00am in the Lapworth Museum, Earth Sciences Dept. University of Birmingham. This is a chance to view new collections, including the Matthew Boulton Collection recently received from the Birmingham Museum and Art Gallery. Bring a packed lunch. Tea/coffee and biscuits provided.

Saturday 6th February 'Prehistoric Impressions' exhibition at the Dudley Museum and Art Gallery. Official opening and speeches at 1.00pm, followed by a free buffet lunch with wine and soft drinks. Admission by ticket, BCGS members only. (See p.5 for details.)

Monday 22nd February (Indoor meeting) 'Keep the Home Fires Burning. The career of an Opencast Coal Geologist'. Speaker: John Bennet. Opencast mining is the cheapest method of getting coal, but can be environmentally disastrous. Deep mining of coal is very dangerous. This lecture challenges us to weigh up the positive and negative aspects of this industry, which provided the energy to put the Black Country on the map as the cradle of the Industrial Revolution (thus playing its part in the current crisis of global warming).

Sunday 14th March (Field meeting) Visit to Compton, Wolverhampton. Led by Graham Worton. Meet at 11.00am. (location tbc). To look at local Permo/Triassic features and glacial erratics.

Saturday 27th March (Field meeting) Visit to Lilleshall Village, Shropshire. Led by David C. Smith of the Shropshire Geological Society. Meet at 11.00am at the main entrance to Lilleshall Church (on the east side of the church). To look at the Pre-Cambrian and Cambrian of the area, and Carboniferous deposits from the North Shropshire shelf. Bring a packed lunch. There is a possibility of a pub lunch.

Monday 29th March (Indoor meeting) Brymbo and the Clwydian Range Area of Outstanding Natural Beauty. Speaker: Dr. Jacqui Malpass. Jacqui has spoken to us before, and many members have been to see the remarkable Carboniferous fossil site at Brymbo. She will tell us of the progress made to protect and preserve this important place.

Saturday 24th April (Field Meeting) Visit to the Cotswolds to view the Jurassic. Led by Dave Owen of the Gloucestershire Geological Trust. Meet at 10:30am at Car Park Quarry, Cleeve Hill, SO 989 271 (full directions and more details in the February Newsletter).

Monday 26th April (Indoor meeting) Lapworth Museum: West Midlands Fossil and Mineral Collections. Speaker: Jon Clatworthy. Jon will speak about the contribution of these collections to the developing science of geology in the 18th, 19th and early 20th century.

Andy Harrison, Gordon Hensman

Other Societies

Shropshire Geological Society

Wednesday 13 January: New research into glacial geomorphology of the Shropshire-Cheshire Basin (guest speaker: Dr Geoffrey Thomas, Department of Geography, Liverpool University)

Wednesday 10 February: How stalagmites reveal Quaternary climatic history (guest speaker: Dr Ian Fairchild)

All lectures are held in the Shire Hall, Shrewsbury, 7.30pm. Room open from 7pm for a chat or look at the SGS library collection. A nominal charge is levied for attendance by non-members. Website: www.shropshiregeology.org.uk/

North Staffordshire Group of the Geologists' Association

Thursday 14th January at 7.30pm. Speaker: Dr Richard Waller (University of Keele) 'Past, present and future challenges associated with the development of permafrost regions.' The Earth's permafrost regions are of considerable importance for a variety of reasons, most typically in terms of the natural resources they contain and their potential role in determining the course of future climate change.

Thursday 18th February at 7.30pm. Speaker: Professor Andrew Willmott (Proudman Oceanographic Laboratory) 'Sea Level Science; Global and Local Relevance.' I will discuss what causes sea level to change, where the greatest uncertainties lie in predicting sea level variability on the global and regional scales out to the end of this century, and then focus on some of the challenges faced by the UK related to rising sea level around our coast.

All lectures are held 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/

Geological Society, West Midlands Regional Group

Monday 1st February at 7.00pm. Speaker: Dr. Iain Stewart 'How the Earth Made Us' Venue: Haworth Lecture Theatre, Birmingham University.

Further information at: www.geolsoc.org.uk/gsl/groups/regional/page387.html or contact the Secretary, Adrian Jones: 0121 746 5724 adrian.a.jones@uk.mwhglobal.com

West Midlands OUGS

Saturday 16th January at 10.30am. Dome Lecture Theatre, University of Birmingham. A day of 5 quality speakers all delivering interesting lectures on a variety of geological topics.
Dr James Wheeley (Birmingham University) "Observations on Ordovician Oceans"
Dr Howard Falcon-Lang (University of Oxford) "A new look at the Coal Forests"
Sarah Gordon (Anglo American) "Meteorites: Our Solar System in a Nutshell"
Dr David Bond (Leeds University) "After the Gold Rush: How to get rich in the Klondike"
Dr Rebecca Bartlett (Birmingham University) "Biogeochemical Cycles: Bugs, bogs & labs"

This event is free for OUGS members, non-members £5 per head. **Booking is essential.** Please send cheques, payable to West Midlands OUGS, to Malcolm Frier, 23 Stud Lane, Stechford, Birmingham, B33 9EY. (Include an email address if possible to confirm receipt!) To book your place, please contact: Jo Barnett at job@fastemail.com

Lapworth Lectures

Semester 2 - Spring term. Information not yet available. Check web site below.

All lectures commence at 5.00pm in the Dome Lecture Theatre, 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 20th February 9.30am – 5.00pm (reception). **'Geoscience Frontiers'** A day of lectures at the Sherrington Lecture Theatre, Department of Earth and Ocean Sciences, University of Liverpool. £6.00 non-members and £3.00 Herdman Society Members. See poster: http://www.liv.ac.uk/science_eng_images/earth/News/GeoscienceFrontiers-L.jpg

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 794 5146). Tickets and full programme will be available at the door. However, pre-booking (if possible) by e-mail, phone or mail is requested to assist with catering.

Editorial

The Members' Evening

It is a pleasure to conclude my first year as Editor with another bulging edition of the Newsletter in the wake of a very successful and enjoyable Members' Evening on Monday 30th November.

There were several short and varied presentations: a hilarious spoof video made by the **Dudley Bug** team, Chris and Ali, was followed by some more serious geology from Les Riley. He showed us photos of his recent visit to the KT boundary type site in Italy, with evidence of much geological vandalism. He drew our attention to the 300,000 year discrepancy between the famous iridium layer and the date of the Chicxulub impact crater, and the controversy surrounding the origins of Silverpit crater, discovered in the North Sea in 2002.

One of our new members, Maren Lilley gave us a fascinating insight into the techniques she uses in her drawings and paintings and showed us examples of her work inspired by the geology of the Wren's Nest. Her forthcoming exhibition 'Prehistoric Impressions' will be well worth visiting. **(Details and special invitation to BCGS members, see p.5 below.)**

Adrian Collings then gave us a fascinating talk on 'white trap', the contact metamorphic rock associated with basalt and dolerite intrusions into wet sedimentary rocks, and showed us examples found locally in the Carboniferous rocks of Tividale and Bowman's Harbour. Gordon Hensman brought along his recently acquired Wollemi Pine. Known from Jurassic fossils, it was thought to be extinct until a few specimens were discovered in Australia. Gordon is doing his bit to ensure its continuing survival, and encouraged us all to do the same!

With inimitable enthusiasm and spontaneity, Alf Cole treated us to a fascinating demonstration which graphically explained the phenomenon of Liesegang rings, and Les rounded off the evening with a brain teasing quiz. Thanks to all contributors, and special thanks to Barbara Russell for organising the excellent buffet which contributed so much to the convivial atmosphere of a really memorable evening. ■

Julie Schroder



A Very Happy Christmas to all our Readers

Prehistoric Impressions

**An art exhibition by Maren Lilley at Dudley Museum and Art Gallery
8th February - 20th March 2010.**

Presenting images of the Wren's Nest National Nature Reserve and related subjects (fossils) drawn in various media (pencil sketches, black ink pen, acrylic, oil pastel, mixed media). A powerpoint slideshow will feature the inspiration for this exhibition, by this local living artist.

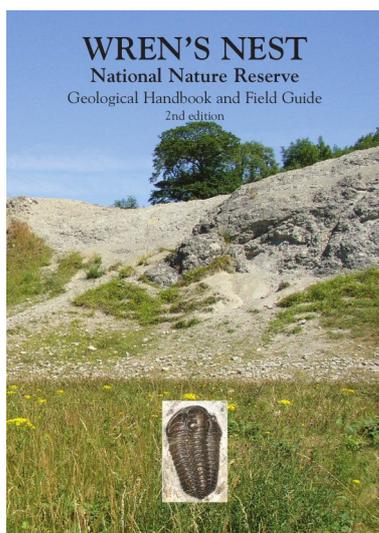


Following from Maren's presentation at the Members' Evening, BCGS is pleased to be able to extend the following invitation to the exhibition preview and official opening:

Saturday 6th February Exhibition preview
10.00am-4.00pm with official opening and speeches at **1.00pm**, followed by a **free buffet lunch** (with wine and soft drinks).

The invitation is only for BCGS members (plus one guest). Admission to the buffet will be by ticket only. Applications stating 1 or 2 tickets (by post or email) should be sent to the Newsletter Editor or Treasurer, (*Mike Williams, contact details on p.14*) by **Monday 25th January 2010**. ■

The New Wren's Nest Geological Handbook and Field Guide



A revised version of the Wren's Nest National Nature Reserve Geological Handbook and Field Guide was published in September 2009. It costs £2.95 and is available for purchase from the Wren's Nest National Nature Reserve by ringing the Senior Warden on 01384 812785 or from Dudley Museum & Art Gallery (*contact details on p.2*).

To quote from the Foreword: "The first edition of this guide has been out of print for some time and continuing demand has demonstrated the need for this reprint. Moreover the opportunity has been taken to incorporate some text changes and to update information where necessary; thus it constitutes a second edition.

The guide is aimed principally at 'A' Level and undergraduate students but its fully illustrated content makes it an approachable and useful aid for all visitors.

Wren's Nest continues to inspire research of international standing in palaeontology, stratigraphy, sedimentology and the age of the rocks. It is also an outstanding outdoor teaching resource for all ages." ■

Alan Cutler, Julie Schroder

Please send material for the next Newsletter to:

julieschroder@blueyonder.co.uk

42 Billesley Lane, Moseley, Birmingham, B13 9QS.

The Dudley Bug

Welcome

Hello and welcome to December's issue of "The Dudley Bug". This issue we are hoping to bring some Christmas cheer with more unique geological comedy, and an interesting overview of nuclear waste disposal. We hope that all present at the Members' Evening enjoyed our video "A day in the life of a geologist", which has taken us the last 2 months to complete. We would also like to take this opportunity to wish our regular readers "Merry Christmas and Happy New Year".

Alison and Chris

I'm a Geologist... Get me out of here!!!!

Recently, a revolutionary new reality TV show has taken the world of TV by storm. It has been creatively called "I'm a geologist... Get me out of here". The geological reality show is based around the danger and excitement of volcanologists smashing hot lava with their rock hammers. The overall plan was to film a pack of geologists completing rock hammer trials, and voting off a member each week. The trials include trilobite racing, brachiopod boxing, sediment slapping, glacier surfing and of course, high risk colouring in. Each week a democratic vote decides which geologist leaves the "field" based on their willingness to face certain danger. The remaining "Hard Core Geologist" would win the title, *King of the Rock Tappers*.



A Geologist, outstanding in his field.

From the beginning, the show has been plagued with difficulties. Firstly, when the crew released the geologists into the wild, they rapidly dispersed and left the crew unable to locate more than 3 at a time. Unfortunately for the viewers, much of the conversation was complete jargon, such as amygdales, volcanoclastics and xenoliths. All of which struggled to provide good TV.

During the first rock hammer trial, a fight broke out between a volcanologist and a palaeontologist about which alcoholic drink was best for use in the field. The crew returned with very little footage; what they did have was of little use as they didn't have a clue what the geologists were waffling about. The second trial involved "stalking" a particular rock type, without spooking the rocks and scaring them away. In the end, an enormous boulder field was left featureless and without a rock insight, as all the geologists failed. Fortunately the geologists were not left to go hungry, as strangely they were able to produce chilli for a meal every night. After a week in the field, it became clear that the geologists did not have a change of clothes. This was later found to be linked to the excess of alcohol which had been smuggled into the field camp within the geologists' bags. This was unknown to the crew. Other tasks such as dust tasting were no problem to the geologists, in fact the producer struggled to keep the geologists from attempting to eat many of the rocks they found.

Further problems were encountered when it became clear that the geologists did not understand the concept of "voting off". With the help of the local geological society, the crew explained that they were competing for research funding. Strangely this was unsuccessful too, due to the geologists complaining that they did not have time to submit a detailed research proposal. Finally, after a series of debates, they decided that the geologist with the worst rock hammer aim would leave the field.

The final task was T-rex taunting. The intended dramatic effects were lost from this event due to the geologists being too nervous to attempt the task, as were the crew. Eventually the crew gave the geologists individual cameras to film themselves attempting the task. When the film was recovered, the producer was shocked to find that the footage was almost completely of rocks, and commentary about the formation of volcanoes and fossil preservation. The only footage containing humans was to provide a scale for the outcrops.

After one month, most of the camera crew had quit and 4 geologists had gone missing from the original pack. They had not been voted off, but had actually become over excited by rock outcrops and refused to leave. At this point, most of the budget had been spent on Real Ale for the geologists and transporting their oversized rock samples around, wrapped in layers of field clothes. The plug was finally pulled on the show when the geologists predicted how soon the volcano would erupt, causing the camera crew to become extremely nervous and flee back to the city.

If you want any more information on anything, have comments, or suggestions about how to improve the Dudley Bug then please email us at... thedudleybug@hotmail.co.uk. We will try our best to help!

Disposal of nuclear waste

In this section, we will give a very brief overview of the options for nuclear waste disposal and what the consequences may be, if disposed of incorrectly. The waste is produced from nuclear fission for electricity.

There are a number of ways to dispose of our growing nuclear waste. One such way is to dump in the deep ocean. This is not a viable option due to increasing ecosystem stress and potential for future leakage. Even when dropped from the surface, a barrel would bury itself into the sediments to a depth of 50 meters. Another option is to dump in high latitude ice caps, again not an option as there is evidence to suggest potential for significant ice cap reduction throughout the next century. The preferred option would be to eject the waste into space. Unfortunately present technology is too high a risk for such methods. It has been suggested that it may be safe to dump at subduction zones and allow the barrels to be subducted over a period of geological time. Subduction dumping is unpredictable and an untried method, with possible unseen consequences.

The most common and favoured way of storing nuclear waste for the long term future is within the rocks of the crust, this is known as a repository. The main consideration when planning for a site is the huge amount of geological time for which the waste must be stored, for example lead isotope Pb^{239} has a half life of around 24,000 years. The depth must be at least 500 meters for high level radioactive waste, within an impermeable rock type (usually igneous) such as Granite. The rocks must prevent any radioactivity reaching the surface. Once a suitable rock type has been chosen, there are yet more considerations to be addressed. These include, the tectonic stability of the area over geological time to minimise risk from future faulting or volcanism. The sites are usually sited in continental centres with relatively low tectonic activity. Even in Scotland there is a high risk from faulting, due to the land rising (Isostatic Rebound) approximately 1-2 mm/yr since the last ice age maximum and for the next 5000 years. The sites must be located away from existing faults and porous sedimentary rocks to minimise groundwater flow, which could potentially spread any leakages into the surrounding environment and ecosystems.

When storing the waste in rocks, at least a 3 barrier system is used. These are:

- 1) Sealed in metal barrels built to last for several thousand years; unfortunately over geological time they will eventually leak.
- 2) Concrete lining of the underground repository, to prevent further spread of leakage.
- 3) The surrounding impermeable country rock.

One major problem encountered when storing high amounts of high level nuclear waste in one site, is the massive heat released as a by-product of radioactive decay. This heat can build up to 1600°C, and can melt the surrounding rocks.

Further reading: Bennett M.R. & Doyle P. Environmental Geology. Wiley & Sons. pp 312 – 324.

Field Meeting Report

27th June 2009: Return to Brymbo Fossil Forest, near Wrexham. Led by Dr. Jacqui Malpas.

This joint trip with the North Staffordshire Group of the Geologists' Association (NSGGA) saw members of both groups meeting at the gates of the site on a drizzly, grey Saturday morning at 11:00 am. Although a first time visit for NSGGA members this was a return for BCGS members for a chance to catch up on the continued conservation work at the site.



Brymbo Fossil Forest (in 2007)

Dr. Jacqui Malpas works as a Geodiversity Officer within the Clwydian Range Area of Outstanding Natural Beauty, which stretches from the Vale of Clwyd in the west to the foothills of the Dee Estuary in the east. It was whilst undertaking work through RIGS that Jacqui first heard about the Brymbo site.

The site is a former ironworks founded by John 'Iron mad' Wilkinson in 1794, which became a steel works as the quality of iron became poor. It closed in 1992 when the steel industry was taken over by Corus. Many of the original buildings and furnaces are still present on the site and we started our visit in an old machine shop, which today acts as a centre for offices and display material. Here Jacqui gave an introduction to the history and background of the works and an update on the conservation works that have been taking place since the fossil forest was discovered in 2005 during the development and restoration of the steelworks site.



Lepidodendron root

Since our last visit in 2007 some noticeable changes included the introduction of information boards outlining the history and conservation at the site, and the designation of an area dedicated to displaying and cataloguing fossil specimens found around the site. Dominating some of the floor space was the lower trunk and spread out root system of a large fossil *Lepidodendron* rescued from the threat of weathering outside.

The solid geology at Brymbo comprises Coal Measures strata that formed during the Silesian Epoch of the late Carboniferous from swamps and vast forests growing in a hot humid climate on the coastal deltas of vast rivers. These conditions have left behind a cyclic strata sequence comprising thick marine mudstone and sandstone layers overlying a fossil soil layer (palaeosol) and coal seams of varying thickness. Delineating the site is the Brymbo fault, which has resulted in some shifting of the strata sequence at the site.

In present times, with the recession, money for conservation works is tight and local volunteers have helped with collecting as much material as possible for storage in the old machine shop. At the time of our visit the redevelopment work at the site was at a standstill; however, collection of the many specimens across the site was still on-going. Since our last visit work has now started on cataloguing the specimens so far recovered and numerous institutions like Chester Natural History Museum and Aberystwyth University have expressed much interest in the site. Private collection of fossils from the site is also still forbidden.

As ever, stability and weathering are still a big issue since the site is open to the elements, and subsidence from coal mining has exaggerated the dip of the strata making it unstable. Since our last visit much loose and unstable material has been removed, reshaping the topography of the site. However, all was not lost, for during the removal of this material a new discovery was made in the mudstone layers of round penny sized worm burrows, distinguishable from roots since they do not occur in the same layer. ►

At Brymbo a thick sandstone bed forms the top of the sequence. This was the result of widespread flooding of the coastal swamps and forests during tropical storms. Sediment deposited by these floods would have buried and encased the various plants (mostly Lycopods) inhabiting the swamp/forest, thus preserving them. These sandstone layers are typically grey in colour, fine grained and thinly laminated; they show evidence of ripple marks and are rich in vertical fossil Lycopods, an early variety of club moss.



Worm burrows

The thick sandstone beds are underlain by a layer of fossil soil, or Palaeosol, and a thin coal seam (the 2 yard coal), which in turn is underlain by a bed of nodular mudstone. The nodules are iron oxide (limonite) concretions, formed by the precipitation of iron oxide around a nucleus of usually organic debris. At the bottom of the sequence is a thick coal seam known locally as the Crank Coal.

After lunch in the old machine house, Jacqui showed us the mudstone beds, associated with the coal seams, in which the fossils of calamites and the worm burrows occur.

During the Late Carboniferous an ancient forest covered this area comprising three classes of early plant two of which, the tree like Lycopods, included *Lepidodendron* and *Sigillaria*. These grew in high density up to 35m to 40m in height with roots (or *Stigmaria*) branching out from the base. The third class of plant includes *Calamites*, an early variety of horsetail, distinguished from the Lycopods by several stems growing from a central base point. *Calamites* grew up to approximately 10m in height. They show an absence of bark or lignin and have a similar appearance to modern bamboo.



Calamite

The fossils of both Lycopods and *Calamites* are seen in vertical and horizontal positions. Many fossils appear broken and flattened, as if squashed or crushed as the plants collapsed, or were washed up as debris and buried. Faint traces of swirls and flow patterns preserved in the mudstone suggest gentle movement of water through the ancient forests and swamps, which would have transported and deposited mud and plant debris as it ran out of energy. During flooding, the deposition of muds and sands would have buried fallen plants and plant debris, and encased those still standing, thus preserving them.

There are also *Calamites* and *Stigmaria* growing inside the fossilised trunks of the Lycopods, which suggests that after the Lycopods were buried and died either: the resulting void left behind was filled with sediment and the *Calamites*/*Stigmaria* grew up through it; or the *Calamites*/*Stigmaria* grew up within the empty void, which was later filled by sediment.

Jacqui has agreed to give a talk to the BCGS in 2010 to give an update on the work going on at Brymbo and the latest finds (*now confirmed: Monday 29th March. Ed.*). Conservation work at the site is always ongoing and it is hoped in 2010 that BCGS members may get a chance to help. Members interested in volunteering their services please contact me (Andy Harrison, 0797 333 0706, e-mail andrew_harrison@urscorp.com) and I will make arrangements with Jacqui.

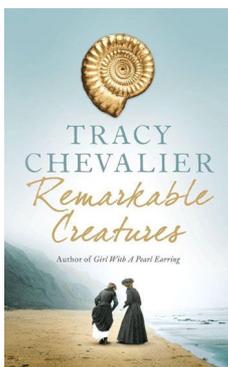
I would like to thank Jacqui for another very interesting trip and members of the NSGGA for attending and hope we will meet on another joint field trip soon. ■

Andy Harrison

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What do you want for Christmas?



I don't want any aftershave or socks, but I do like a good book. I am now old and wise enough to have a few titles ready, mostly connected with geology, so I was very pleased to see that there is a new novel about Mary Anning. It is called '*Remarkable Creatures*' by *Tracy Chevalier*. I must emphasise that it is a novel, not a detailed, cross referenced account, but it is closely based on her life and her struggles in an atmosphere of male dominated science. Mary is one of my great geological heroes; she was the best 'fossil finder' of the early 19th century, is only just getting the recognition that she deserves, and I am looking forward to curling up over the holiday with this book.

I have always been interested in how attitudes to our science have developed over time, particularly when brilliant people had to fight to get their views heard, because of the establishment. There is no lack of titles, and most of us will be familiar with the works of *Richard Fortey* and *Simon Winchester* and even *Bill Bryson*, but I have been through my shelves to find some lesser known books that I have enjoyed. *William Smith* is another of my heroes. His story is well known: a canal engineer, fighting against poverty and shunned by the scientific hierarchy. *John L. Morton's* book '*Strata*' is a very factual and serious little book. Perhaps it does not have the panache of *Simon Winchester's* '*The map that changed the world*' but I enjoyed the attention to detail. I also liked his Appendices, being a lover of lists: the fossil species named by William Smith with his original localities; the principal publications of Smith, and also a 'William Smith trail' with grid references of his birthplace, where he lived, canal structures he designed etc etc.

Another brilliant geologist who had to struggle to put forward his ideas in a harsh world was *Gideon Mantell*. His great rivalry with *Richard Owen* at the time when dinosaurs were being recognised and named is explored in '*The Dinosaur Hunters*' by *Deborah Cadbury*. It chronicles this time with great feeling and I was left with Mantell being added to my hero list, and Owen becoming a villain. He seemed to use his position in the scientific community to gain every possible advantage in his struggle with poor Mantell. I don't think I would have liked Owen very much, but you must read the book and make up your own mind. I don't think that *Roderick Murchison* was a genial man of the people either, but he has become, justifiably, a local hero. I am looking forward to reading another book by *John L Morton: 'King of Siluria: How Roderick Murchison changed the face of geology'*, Santa permitting.

There are three other books I would like to mention: '*Aeons: The Search for the Beginning of Time*' by *Martin Gorst*, is a chronological study of the history of geological time from *Archbishop Ussher* to the '*Big Bang*'. *Arthur Holmes* is another who is known to most geology fans, if only through his '*Principles of Physical Geology*', but he also had to struggle against personal hardship to establish a geological time scale, in years. He really did establish that the Earth was much older than most imagined. '*The Dating Game: One Man's Search for the Age of the Earth*' by *Cherry Lewis*, cleverly combines a personal biography of Holmes with complex science; a very good read. Finally, I mentioned the role of the novel to paint a picture of the atmosphere surrounding the development of geology; '*The French Lieutenant's Woman*' by *John Fowles* is one such book. Set in Lyme Regis in the 1860s it portrays the changing face of society, and if I tell you that Darwin and Lyell are mentioned in the first 13 pages... well, you must read it! ■

Bill Groves

Wrens Nest's Hidden Treasures

In May 2009, Dudley Metropolitan Borough Council began a project to infill the huge Cathedral Gallery of the Wren's Nest East Limestone mine with loose sand. (*For background, see Newsletter 194, p.7. Ed.*) This mine and the adjacent vast underground canal basin contain some of the world's most important geology and mining heritage. The project was designed to ensure the future potential of the underground features is retained for future generations. This would also safeguard future access for geotourism, science and conservation. ►

The very first stage of this work was 9 days of scientific study of the underground environment co-ordinated by Dudley Museum and Art Gallery's Keeper of Geology, Graham Worton. Several key pieces of work were undertaken including:



Graham sampling far tunnel

- *A high resolution laser survey of all areas of the mine*
- *Geological and Archaeological surveys*
- *Detailed photographic surveys*
- *Sampling programmes*
- *High resolution moulding and casting programme of rock surfaces within the mine prior to sand infill.*

The infilling programme was completed by August 2009. Images and samples from the project are now being analysed in the new lab facilities at Dudley Museum, and already many new discoveries are coming to light.

An example of this is the programme of lab work, focussing on the ancient volcanic ash layers which occur occasionally within the limestone layers of the mine. A dozen or so samples have been washed and sieved to extract microscopic fossils and mineral grains. The fragments range in size from 2mm to 63µm (63 thousandths of a millimetre). These are being painstakingly picked through by the museum's Geoteam. They are revealing a host of planktonic and mud-dwelling life-forms that occupied those ancient seas, and include the 425 Ma scolecodont (worm jaw) illustrated. This is in the sieve size range 63 -106µm (63 -106 thousandths of a millimetre). Many of these micro fossils have never been recorded at Wren's Nest National Nature Reserve before and some may be totally new to science.



Scolecodont

Mineral grains like tiny grains of Zircon (the mineral often used as a diamond simulant) will be collected and used in 2010 for radiometric dating of the rocks. This will provide the first ever accurate date of the rocks of the Wren's Nest.

In 2010 a range of special exhibits will be put on display in Dudley Museum and Art Gallery from these works. This will include;

1. *casts of some of the finest sections of the underground rock surfaces covered with fossils,*
2. *a selection of fine fossils from the works*
3. *microscope pictures and samples showing the small scale wonders of the site.*

At regular intervals in 2010 the museum lab will be open while the Geoteam and associated scientists are actually carrying out the research work for the public to see and have their chance to ask the scientists about this work.

For further details please contact The Keeper of Geology, Dudley Museum and Art Gallery 01384 815575. ■

Graham Worton

Geobabble



Describing the coarse grained sedimentary rocks used to be so simple. A *conglomerate* has clasts over 2mm in diameter, although they were usually much coarser, pebbles, cobbles or even large boulders. They are good examples of high energy deposits analogous to modern river and beach pebble beds. We can see them locally in the Kidderminster Conglomerate; the photograph (left) is from the Brierley Hill Road section, GR: SO 8970 8679. The pebbles here are well rounded, indicative of lengthy transport; but if they

are predominantly angular we use the term *breccia*, and again we have good local exposures of the Clent Breccia. These are scree deposits that have travelled a very short distance and so have not been rounded. There are also rather special coarse grained rocks deposited by ice ►

with various sizes of clasts in a predominantly clay matrix and this was called *boulder clay*, later to be called *till*.

As our knowledge of sedimentary rocks has increased it has been found necessary to widen the vocabulary as the above terms proved inadequate. Some conglomerates were found where the clasts were not touching each other, so the rock was supported by the matrix as opposed to the pebbles being laid down and the matrix or cement filling in the voids as it became a rock. This matrix supported conglomerate was often called a *slide conglomerate*, as it was formed as a result of a submarine slump of some description. There has also been great interest and discussion about very old glacial deposits in the *Neoproterozoic*, which is late Precambrian up to 1000ma. They appear to be former tills, so they are called *tillites*; but are they old tills or were they formed by sub-aqueous slumping? We therefore call them *tilloids*, meaning they look like tillites but we are not sure.

There is so much discussion and argument about these ancient sediments that other terms come to the fore. A *diamictite* is a well used word which appears a great deal in literature to embrace a wide range of coarse rocks; it is a poorly sorted, coarse grained rock (conglomerate or breccia), with angular or rounded *clasts* making up 25% or more of the bulk in a clay sized matrix. Many are glacial, but not all; diamictites can be produced by debris flows, mass wasting or lahars and it is a very general term for a coarse unsorted rock. *Diamictite* is often replaced by *mixtite* but whether the two words are synonymous I am not sure. The second photograph is of a Neoproterozoic diamictite. There is one more term; *Olistostrome*, which is used for any chaotic, ill sorted material deposited by a semi fluid gravity slide under water.



However, it could be worse. The broad terms to describe sediments by grain size include *arenites* for sandstones and *rudites* for the conglomerates and related rocks. Prefixes could also be used to indicate the composition, for example *sili-* indicates clasts of predominately silicate minerals and *calc-* for carbonate minerals; the word *calcirudite* is used as a reasonable term for a limestone with clasts over 2mm. *Silirudite* never seemed to catch on! ■

Bill Groves

Members' Forum

Let me take you to 'Shakey Toun' (With apologies to P Barrere & M Kibbee, lyric writers)

'Shakey Toun,' otherwise known as Comrie in Perthshire is the earthquake capital of Great Britain. Although the largest recorded earthquake, at 4.8 on the Richter, scale does not quite eclipse our own Dudley earthquake revised to 5.0 by BCGS. (*Recorded as 4.7 ML by BGS. Ed.*)

Comrie is located on the Highland Boundary Fault, the most earthquake prone location in the UK. Recordings of earthquakes date from July 1597, with the Great Earthquake of 1839 leading to the establishment of the first seismometer on the site in 1840. However, renewed seismic activity in 1869 resulted in the building of a small house directly onto bedrock in 1874 to contain a model of the original Mallet seismometer. The house subsequently led a somewhat chequered history until in 1977 it was designated a building of special historical interest and is now one of the smallest listed buildings in Britain.



Comrie

For further information see:

<http://www.secretscotland.org.uk/index.php/Secrets/EarthquakeHouseComrie>

<http://www.strathearn.com/pl/earthquake.htm>



Bonus information see: www.tullibardine.com Distillery 6 miles to the south, reopened in 2004 producing Perthshire's finest Single Malt. The author has an unopened bottle of 1993 vintage last produced prior to closure (this information especially for Gordon Hensman!) ■

Mike Williams

More Observations on Charles Darwin the Geologist

Further to Bill Groves' article on Charles Darwin in the last Newsletter I thought members may be interested in a couple more observations on his prolific writing, before this special Darwin year comes to an end.

An extract from his letter to his friend William Darwin Fox written in July 1835 whilst on his voyage in the Beagle, and posted in Lima (from 'The Beagle Letters') was as follows:

*"I am glad to hear you have some thoughts of beginning geology - there is so much larger a field for thought, than in the other branches of Nat: History. - I am becoming a zealous disciple of Mr Lyell's views, as known in his admirable book - Geologising in S. America, I am tempted to carry parts to a greater extent, even than he does. Geology is a capital science to begin, as it **requires nothing but a little reading, thinking & hammering.** - I have a considerable body of notes together; but it is a constant subject of perplexity to me, whether they are of sufficient value, for all the time I have spent on them, or whether animals would not have been of more certain value."*

I found it somewhat surprising that about 75% of his notes in his diary of his 5 year voyage in the Beagle ('Voyage of HMS Beagle') were related to geology rather than zoological observations, for which he became famous. One particular entry when he arrived in Concepcion, Chile just after a major earthquake is very relevant to recent tragedies:

"In almost every severe earthquake, the neighbouring waters of the sea are said to have been greatly agitated. The disturbance seems generally, as in the case of Concepcion to have been of two kinds; first, at the instant of shock the water swells high on the beach with a gentle motion and then quietly retreats; secondly some time afterwards, the whole body of the sea retires from the coast and then returns in waves of overwhelming force"

He then goes on to consider the probable causes, which are very close to modern explanations of a tsunami. I wonder how many lives would have been saved if the inhabitants of S.E Asia on Boxing Day 2004 had been aware of this observation made 170 years earlier! ■

Peter Twigg

This space has been left empty so that members with printed copies will not lose any of the Newsletter when they cut off the membership renewal form on page 14 (though they may have to sacrifice Rudolf!)



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email: bungalowmike@blueyonder.co.uk

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