



The Black Country Geological Society

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Newsletter No. 229

February 2015



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**Copy date for the
next Newsletter is
Wednesday 1 April**



<p>Linda Tonkin, Honorary Secretary, 4 Heath Farm Road, Codsall, Wolverhampton, WV8 1HT. ☎ 01902 846074 secretary@bcgs.info</p>	<p>Andy Harrison, Field Secretary, ☎ 01384 370188 Mob: 07973 330706 fieldsecretary@bcgs.info</p>	<p>Julie Schroder, Newsletter Editor, 42 Billesley Lane, Moseley, Birmingham, B13 9QS. ☎ 0121 449 2407 newsletter@bcgs.info</p>
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For enquiries about field and geoconservation meetings please contact the Field Secretary.
To submit items for the Newsletter please contact the Newsletter Editor.
For all other business and enquiries please contact the Honorary Secretary.
For further information see our website: www.bcgs.info

Future Programme

**Until further notice meetings will be held in the
Abbey Room at the Dudley Archives, Tipton Road, Dudley, DY1 4SQ
7.30 for 8.00 o'clock start unless stated otherwise**

**Please let Andy Harrison know in advance if you intend to go to any of the field or
geoconservation meetings. If transport is a problem for you or if you intend to drive
and are willing to offer lifts, please contact Andy with at least 48 hours notice.**

Friday 13 February (Geoconservation Day): Smestow Valley, led by Paul Stephenson (Birmingham and Black Country Wildlife Trust). Meet at 10.30. Details tbc. Please contact Andy Harrison (details above) or Paul Stephenson (07791 070929). Wear old clothes and stout footwear. Please bring gloves and garden tools; loppers, secateurs, forks and spades if you have them. Also bring lunch. Finish at 2.30.

Monday 16 February (Indoor meeting): 'A few volcanoes in Lanzarote'. Speaker: Les Drinkwater.

Saturday 21 February (Geoconservation day): Loxley, Moorcroft Wood, led by Paul Stephenson (Birmingham and Black Country Wildlife Trust). Details as 13 February above.

Thursday 26 February (Geoconservation day): Buckpool, Stourbridge, led by Paul Stephenson (Birmingham and Black Country Wildlife Trust). Details as 13 February above.

Saturday 28 February (Geoconservation day): Barr Beacon and Pinfold Quarry, led by Andy Harrison and Helen Sanger (postponed from 31 January). Meet at 10.30 at the entrance on B4154 Beacon Road, Grid ref: SP 060967. Wear old clothes and stout footwear. Please bring gloves and garden tools; loppers, secateurs, forks and spades if you have them. Also bring lunch. Finish at 2.30.

Monday 16 March (Indoor meeting, 7.00 for 7.30 start): AGM followed by 'Minerals and Gems of the Cairngorms'. Speaker: Roy Starkey.

Sunday 22 March (Geoconservation day): Barnt Green Road Quarry, Lickey Hills. Quarry clearance session in conjunction with the Lickey Hills Geo-Champions, directed by Steve Hinton, Senior Ranger, Lickey Hills CP. Meet at 10.30 at the Lickey Hills Visitor Centre, B45 8ER. Bring hard hats if you have them, gloves and a packed lunch. (Some hard hats available at the VC for those who haven't got their own.) Wear old clothes and strong footwear. Tools will be provided. Finish at 2.00.

Monday 20 April (Indoor meeting): 'Dawn of the giants: how dinosaurs rose to dominate the Triassic world'. Speaker: Dr Richard Butler, University of Birmingham.

Saturday 25 April (Field meeting): Broadway Quarry, Worcestershire, led by Steve Birch, (BCGS). Meet at 10.30 at the quarry entrance (NGR: 411951, 236875). Off the A46, follow the A44 and the signs for 'Broadway Tower', visible in the distance. Follow the A44 up a steep zig-zag road, to the top of the hill. At the top, immediately on your right, there is a private road signed 'Fish Hill'. The quarry entrance is just up this road. Please bring stout boots, hi-vis jacket and hard hats if you have them, and a packed lunch.

Saturday 23 May (Field meeting): Droitwich, Worcestershire, led by Andy Harrison (BCGS). Details tbc.

Saturday 13 June (Field meeting): The Wrekin & Ercall Quarries, led by Andrew Jenkinson (Shropshire Geological Society). Details tbc.

Saturday 4 July: BCGS 40th Anniversary - all day event at the Dudley Museum and Art Gallery. Talks and displays to celebrate the Society's 40 year history, a buffet, hopefully a 'keynote' speaker, and a chance to catch up with BCGS members past and present. All details are tbc, but for the moment get this important date in your diaries!



July and August (Field meetings): BCGS 40th Anniversary Field meetings. Details tbc.

Monday 21 September (Indoor meeting): All details tbc.

Monday 19 October (Indoor meeting): All details tbc.

Monday 16 November (Indoor meeting): All details tbc.

Monday 7 December (Indoor meeting, 7.00 for 7.30 start): BCGS Members' Evening and Christmas Social.

Procedures for Field Meetings

Insurance

The Society provides public liability insurance for field meetings but personal accident cover is the responsibility of the participant. Details can be obtained from the Secretary. Schools and other bodies should arrange their own insurance as a matter of course.

Health and Safety

If you are unsure about the risks involved or your ability to participate safely, you should contact the Field Secretary. Please take note of any risk assessments or safety briefing, and make sure that you have any safety equipment specified. The Society does not provide hard hats for use of members or visitors. It is your responsibility to provide your own safety equipment (eg. hard hats, hi-viz jackets, safety boots and goggles/glasses) and to use these 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.

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

Other Societies and Events

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

Warwickshire Geological Conservation Group

Wednesday 18 February: 'Roaming on Mars'. Speaker: Dr John Bridges, University of Leicester Space Research Centre.

Wednesday 18 March: 'Chips off the old block: a geological perspective on the Stonehenge bluestones'. Speaker: Dr. Rob Ixer, Institute of Archaeology, University of London.

Wednesday 15 April: 'Minerals, Magmas & Man'. Speaker: Dr Paul Olver, Herefordshire & Worcestershire Earth Heritage Trust.

St Francis Church Hall, Warwick Road, Kenilworth CV8 1HL. Starting at 7.00 for coffee before a 7.30 start. For more details visit: <http://www.wgcg.co.uk/> or contact Ian Fenwick swift@ianfenwick.f2s.com or 01926-512531. There is a charge of £2.00 for non-members.

Lapworth Lectures

Monday 16 February: 'Escaping from Snowball Earth'. Speaker: Professor Ian Fairchild, University of Birmingham.

Monday 2 March: 'India-Asia collision and its tectonic effects along the Himalaya, Karakoram and Tibet'. Speaker: Professor Mike Searle, University of Oxford.

Monday 16 March: 'Fire on Earth: An intimate history'. Speaker: Professor Andrew C. Scott, Royal Holloway, University of London.

Lectures at 5.00 in lecture theatre WG5, Aston Webb Block A, University of Birmingham. Entry via the main entrance from Chancellor's Court, as the Lapworth Museum is closed for a major redevelopment. All are welcome to attend and there is no admission charge. For further information phone: 0121 414 7294 or visit: <http://www.lapworth.bham.ac.uk/events/lectures.shtml>

Teme Valley Geological Society

Monday 16 February: 'The Minerals of the Malverns'. Speaker: Adrian Wyatt.

Monday 23 March: 'The Russian Meteorite'. Speaker: Dr Elizabeth Pearson.

7.30 at the Martley Memorial Hall B4197 by Sports Ground. £3 non-members. For more details visit: <http://www.geo-village.eu/> or contact Janet Maxwell-Stewart, 01886 821061

Geological Society, West Midlands Regional Group

Tuesday 10 March at 7.00: 'Maximising Data, Minimising Cost: Do Standalone Hydrogeological Investigations provide value for money?' Speaker: Lauren Ballerini, Principal Hydrogeologist (Wardell Armstrong). Venue: University of Wolverhampton, Room tbc.

For further details and enquiries, please contact the Group Secretary, Daniel Welch at: geolsoc_wmrg@live.co.uk

Manchester Geological Association

Wednesday 11 February at 7.00: AGM and 'Evolution of the Mars Atmosphere and Hydrosphere'. Speaker: Dr Ray Burgess, President, Manchester Geological Association.

Wednesday 4 March at 6.30: 'Coastal Dunes and Climate Change'. Speaker: Dr Paul Rooney, Liverpool Hope University. Joint Meeting with the Geographical Association.

Most MGA Meetings are held in the Williamson Building, Oxford Road, opposite The Manchester Museum. For further information about meetings go to: <http://www.mangeolassoc.org.uk/> or email lectures@mangeolassoc.org.uk Visitors are always welcome.

East Midlands Geological Society

Saturday 14 February at 6.00: 'William Smith'. Speaker: Dr Hugh Torrens. Followed by the Society's Annual Dinner.

Saturday 21 March: AGM at 6.00 followed by 'Istanbul: On the Brink of a Mega-Disaster'. Speaker: Ekbal Hussain.

Non Members are welcome. Meetings will take place in lecture theatre B3 of the Biology building at the University of Nottingham. Further info at: www.emgs.org.uk or email: secretary@emgs.org.uk

Mid Wales Geology Club

Wednesday 18 February: 'Quartz and other forms of silica '. Speaker: Bill Bagley.

Wednesday 18 March: 'Strategic Ground Water Management'. Speaker: Kevin Voyce, Technical Specialist, Hydrogeology with the Environment Agency.

Further information: Tony Thorp (Ed. newsletter & Hon. Sec): Tel. 01686 624820 and 622517 jathorp@uku.co.uk Web site: <http://midwalesgeology.org.uk> Unless otherwise stated, meetings start at 7.15 (tea/coffee & biscuits) with talks at 7.30 at Plas Dolerw, Milford Road, Newtown.

Shropshire Geological Society

Wednesday 11 February: 'Instability in the Ironbridge Gorge'. Speaker: Neal Rushton, Telford.

Wednesday 11 March: 'The 60 million year magma chamber on Rhum'. Speaker: Dr Brian Driscoll, Keele.

Generally held at Shire Hall, Shrewsbury, commencing at 7.15 for 7.30. Note that the venue might have to be changed, depending on the possible sale of Shire Hall. A nominal charge is levied for attendance by non-members. Further info at: www.shropshiregeology.org.uk/

Woolhope Naturalists' Field Club - Geology Section

Friday 20 March: 'EARS, the East African Rift System in Kenya'. Speaker: Dr Bill Fitches

All indoor events are held in the Woolhope Room, Hereford Library starting at 5.30 unless otherwise specified. Guests are welcome, but must take day membership of the Club: £2.00. Further information: Sue Hay on 01432 357138, email svh.gabbros@btinternet.com or visit their web site: www.woolhopeclub.org.uk/Geology_Section/default.htm

North Staffordshire Group of the Geologists' Association

Thursday 19 February: 'Sinking Cities'. Speaker: Dr Tony Waltham (ex-Nottingham Trent).

Lecture meetings are held at 7.30 in the William Smith Building at Keele University. Further information at: www.esci.keele.ac.uk/nsgga/

Stones and Bones Exhibition

Discovering 600 million years of Midlands History

The Library of Birmingham 12 February - 17 May
The Gallery, Level 3, Admission Free

This exhibition is presented by the Library of Birmingham in partnership with the Lapworth Museum of Geology (University of Birmingham) during the temporary closure of the Museum for refurbishment.

Visit the Stones and Bones exhibition and take a trip through time! At different times the Midlands was like the Mississippi delta, the Bahamas and the Sahara desert. More recently, the area was a cold glacial landscape with mammoths and woolly rhinos, separated by warmer periods when hippos and lions roamed the area.

Come and discover more about the early history of the Midlands and how that history was uncovered, recorded and told by prominent local geologists and scientists. The Stones and Bones exhibition will explore what impact these discoveries had on the region, culturally and industrially and what these investigations can tell us about our world today. The exhibition will have a strong family focus with interactive workshops, family events and talks. Don't miss the Great Dinosaur Egg Hunt or the Exploding Volcanoes Workshop!

Monday 16 February 2.00 - 3.00: 'Survivors of the Ice Age'.

Speaker: Professor Alice Roberts in the Studio Theatre. Tickets £3.00.

Stones and Bones Curator Tours led by one of our expert curators:

Saturday 7 March 2.00 - 3.00

Thursday 19 March 6.00 - 7.00

Saturday 11 April 2.00 - 3.00

Tuesday 28 April 2.00 - 3.00



Tickets available from The Box: www.birmingham-box.co.uk Tel: 0121 245 4455

For more information go to: www.libraryofbirmingham.com/event/1318252723775

'Wild About Perton' - Spring Festival

Saturday 25 April in and around Perton Library. The Spring Festival is a community event organised in partnership with Perton Library and South Staffordshire Council. With a strong wildlife and environmental focus it aims to inform and engage a broad audience including young families and older teenagers and has linked events organised with local schools, community and local businesses to maximise outreach within the local community. The 2014 Festival was our most successful yet with some 2,000 people attending and 30 participating organisations. This year we hope to introduce some science based activities.

Photographic Competition 2015

Once again the BCGS and West Midlands Branch of the Geological Society will be running a photographic competition along with other regional branches of the Geological Society. At this stage we can announce that the competition will open at Easter and will close at the end of the year. This year is the 200th anniversary of the publication of William Smith's famous geological map: 'A Delineation of the Strata of England and Wales'. Numerous events are planned throughout the year to celebrate Smith's seminal achievement, so this year's photographic competition will chime with this theme, and will focus on British geology, and British applied geology.

Judging will be independent and once again there will be prizes! We will keep you posted as details are confirmed, but it's not too soon to start looking at our own home-grown geology with a photographer's eye.

Herdman Society Symposium

Saturday 21 February: 'Geoscience Frontiers' 2015

A day of lectures presented by the student-run Herdman Society at Liverpool University, Central Teaching Hub, Lecture Theatre A. This year's speakers will be:

Prof. Andrew Aplin (Durham): Unconventional Hydrocarbons
Dr. Juliet Biggs (Bristol): Volcanoes and Remote Sensing
Prof. Sanjeev Gupta (Imperial College): Fieldwork on Mars
Prof. Jennifer McElwain (Dublin): Palaeobotany
Prof. Iain Stewart (Plymouth): Oil and Hydrocarbons
Dr. Esther Sumner (Southampton): Modern and ancient turbidites and gravity flows

Ticket Price £10.00: includes Talks, Abstracts, Refreshments, Buffet Lunch and Wine Reception

Advance Registration Essential. For more information and to register and pay go to: tinyurl.com/nybf5pm
Last date for booking: 13 February. To confirm attendance and purchase tickets on the door please contact Amy Shore with names and contact information: sgashore@student.liverpool.ac.uk

The Oxford Colloquium

Saturday 7 March 10.00 - 4.30: Day of Lectures at the Oxford University Museum of Natural History. The Oxford Colloquium gives you the opportunity to attend six lectures given by eminent speakers from distinguished UK academic and research institutions. The topics are drawn from across the geosciences.

The speakers are: Prof. Richard Fortey, Prof. James Jackson, Prof. Ros Rickaby, Prof. Mark Williams, Prof. Katharine Cashman, and Prof. Jane Francis.

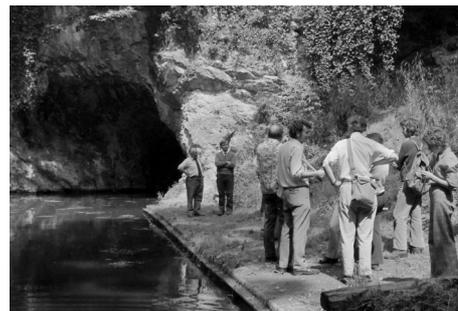
Tickets: £20 and must be purchased in advance. See the OGG website for full details of the speakers and abstracts of their talks: www.ogg.uk.com/#!/the-oxford-colloquium/c8s8 The website also provides methods for purchasing tickets including an on-line secure facility.

Editorial - BCGS 40th Anniversary Year

This year we are celebrating our Society's 40th anniversary, and below is an excerpt from Newsletter No. 1 to mark the start of this auspicious year. We have also created a special tag which you'll see attached to anniversary-related items in this year's Newsletters. Our programme of field visits during July and August will reflect some of the early field trips undertaken by the Society, and the committee is in the process of planning the programme for our special celebration on Saturday 4 July. For this we need your help! There will be a Society archive display, so if you can submit any photos of early field visits, conservation sessions or indoor meetings, or any other relevant archive material please let us know via our Secretary, Linda Tonkin (contact details above). ►



This 40th anniversary year will also bring a new look to the BCGS web site which is in the process of development. The current web site already holds a complete archive of the Society's Newsletters, and it is intended in future to create a photo archive. Peter Parkes, one of the Society's founder members has set the ball rolling by submitting his photos for scanning. Here's one which may bring back memories to some of our members! During the year, I would like to present in the Newsletter a series of reminiscences from those of you who have long memories of the Society's activities. Please think back, and send items to me - with or without photos.



BCGS 1st field trip, Castle Mill Basin

Apart from the anniversary celebrations we have a full programme, including many opportunities to become involved in our geoconservation work. We also bring news of the forthcoming photo competition, and the 'Stones and Bones' exhibition in Birmingham. Then there's a feast of other events and meetings a bit further afield to tempt you. With your support, this promises to be a very exciting year for the BCGS. ■

Julie Schroder



THE BLACK COUNTRY GEOLOGICAL SOCIETY

CHAIRMAN	A. CUTLER, B.Sc.
VICE CHAIRMAN	P. G. OLIVER, B.Sc., Ph.D., F.G.S.
HON. SECRETARY	D. J. WRAIGHT
HON. TREASURER	Mrs. E. BAKEWELL

NEWSLETTER NO. 1 AUGUST 1975



Introduction

This is the first of an intended regular series of Newsletters to be produced for the members of the Black Country Geological Society.

It is hoped that the Newsletter will provide a convenient medium for the dissemination of information about the Society's activities in a lively and informal manner. It may also be particularly useful for keeping those members who are not able to attend every meeting in touch with the Society.

This is also a convenient point to invite you all to forward any suitable material for publication in a future issue. Notes and news will be particularly welcomed as will details of new exposures. We shall also be pleased to receive "Letters to the Editor" on any relevant subject, particularly if they are brief and to the point.

Inaugural Meeting - 3rd July 1975

The B.C.G.S. officially came into being at the inaugural meeting held in Dudley Museum on the 3rd July. The meeting was attended by about 25 people, the majority of whom became members immediately. Most of those present were former Extra-Mural Geologists but we were also delighted to see many new faces.

Dr. Oliver, a former tutor to many of us, was first to speak and gave a lucid account of the history of geological courses in the area and the events leading up to the formation of the Society. He also stressed the importance of conservation and the important role that the Society could play. Mr. Cutler then followed Dr. Oliver by reiterating the importance of conservation and also the desirability of recording data of new and/or temporary exposures. He also expanded in some detail the proposals for the Society's other activities, including lectures and field-trips. After a short open discussion period the draft constitution was read and with the additions of two extra articles was approved by the meeting and was formally adopted by the Society. Copies of the constitution may be inspected on application to either the Chairman or the Hon. Secretary. Following the constitution the officers as listed at the top of this Newsletter were elected with the addition of Mr. D. Bedson, Mrs. M. Oliver and Mr. T. Bond as committee members. All in all it was a most successful evening.



Black Country

Geopark project

Progress Report

The processes involved in the application to join the Global Network of Geoparks are long and complex, and our Chairman, Graham Worton, has been at the spearhead of the Black Country Global Geopark Project since its beginnings in 2013. Graham reported on the early stages in Newsletter 220 (August 2013), then our next up-date (Newsletter 225, June 2014) revealed how much work was going on behind the scenes, and introduced us to the Geopark's logo and website. At that time it was hoped to be able to present the application dossier to the Global Network by the end of 2014, but there was more work to be done and the Project Partners are now aiming for the next window of opportunity to present the application in October this year. The following is a summary from Graham of the current 'state of play'. Ed.

The Black Country Global Geopark Project is very firmly in front of us now. The geology of the area is a 'golden thread' that unites and weaves all of the local heritage together into one huge and amazing story of the Black Country. 2015 will see this story being told through the coming together of a huge body of work that has occurred over many years. The final application when made to the European and Global Geopark network in October will herald a new and unified direction for this work.

We have been carefully and sensitively discussing this initiative with some great people across the geological and Geopark communities of the Black Country, the UK, and overseas. This has been a truly fascinating and inspirational process that has guided us to the advent of our own application. We now have a distinctive brand and logo that focuses on the coal (which is amazingly abundant and at outcrop almost everywhere across the area). Our brand echoes the colours of the Black Country flag - which reflect the "country black by day and red by night": words of Elihu Burritt, the American consul to Birmingham who visited and was blown away by what he witnessed here in the 1800's, and whose heart was moved by the human cost of this. That humanity is captured in the logo too, which features a red heart. This reflects the Black Country's geographic position at the heart of England, and also the generic pride, warmth and friendliness of the Black Country peoples. In 2015 this imagery will begin to appear on a number of heritage sites and feature widely in literature. It will begin the physical process of linking places and people together across the area and across time.



Singing Caverns (from the Geopark website)

A fair amount of time was spent in 2014 simplifying and selecting highlights from the complex and intimately interwoven storyline of the Black Country, carrying out a detailed audit of heritage, and the attendant infrastructure needed to support tourism, leisure and education. We have formed strong and very well-skilled partnerships and a Black Country Geopark Management Team. We also constructed a first draft of the required application dossier which includes a plan of actions to take us to 2019. It's been a busy time!

To give a hint at some of the Geopark actions in the plan, we are, for example working on geo-art/geo-cultural projects which link and relate to the International Festival of Glass (to create a glass chandelier using local limestones and silica rock from the Czech republic), and the 200th anniversary celebrations of 'the map that changed the world' - William Smith's first ever geological map of England and Wales. This was a milestone in geological thinking, vision and achievement at that time.

Our most pressing priority is on-site establishment of the brand across the Black Country, and raising the funds to support this work. It is a pre-requisite of accession that when a visitor comes to the place the Geopark brand is clearly visible around the territory, and that activities are branded 'Black Country Geopark' wherever appropriate. In addition, literature, leaflets, web pages etc need to start adopting the brand so ►

that things across the Black Country begin to join up as a single area with commonality of information. There also needs to be a map produced of these key sites and features showing where they are and how they relate to each other, both in space and in storyline. These things need to be done or well under way before the scrutiny visit in spring 2016.

With the guidance and support of our partners we should be submitting our Global Geopark application in October 2015 in the hope that in 2016 the Black Country will become the next European and Global Geopark from the UK. This initiative has the potential massively to raise the profile of the Black Country, make knowledge of and perceptions about this area change significantly, kick start a host of new and international initiatives and boost the economy and environment of both the Black Country and the areas around it - so it's probably worth having a go! ■

For further information about the Geopark Project see: www.blackcountrygeopark.org.uk

Graham Worton

'Geology Matters' and Himley Hall

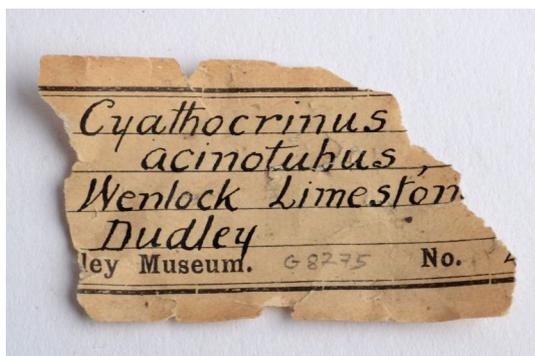
Question: What links the website 'Geology Matters' with the old stately home of Himley Hall?

Most of the first floor of this once impressive old house (photo 1) is in a state of neglect but the front rooms facing the grounds are home to two invaluable collections. One section houses racks of some beautiful glassware, containing the history of the glass making industry in Stourbridge and the overflow of exhibits from the Glass Museum at Broadfield House. In the remainder there is the overflow of fossils, rocks and minerals from Dudley Museum and Art Gallery, estimated to be about 20,000 in total.



In 2005 Graham Worton initiated a project to move the collections to Himley, 'Geology on the Move', and then to catalogue, photograph and enter these on to the 'Geology Matters' web site, so providing an accessible reference source to this unique collection of specimens. Initially, funding was obtained to employ Chris Broughton to start this rather daunting exercise but this proved to be only temporary. For the last 3 years the work has been carried out by volunteers with the authors of this report being the main participants,

aided and abetted occasionally by young graduates, who use the work to gain some practical experience whilst looking for gainful employment.



The process is managed and supervised by Graham, who keeps the volunteers happy with a liberal supply of chocolate biscuits and tea or coffee. The specimens are housed in drawers within purpose made cabinets and occupy most of two rooms with space in one for a small photographic studio and facilities for identifying and cataloguing. Many of the collections have been donated by individuals over many years, some dating back to the 19th century and the details recorded in beautiful handwritten script (photo 2).

Cataloguing

Some items from the collection have already been catalogued and only need photographing, but others have very little information and the identification has to be researched using a comprehensive collection of text books and good old 'Google' (photo 3). If all else fails we have to disturb Graham from whatever task he is engaged with and seek his help. He never fails to come up with the answer!

Once identified the specimen is given a unique six digit Accession number and comprehensive details are entered ►



into a database (CALM). A card summarising the details is also filled out and placed with the specimen in an individual box. The Accession number is also scribed on the specimen itself.



Photography

Initially a reference photograph (photo 4) showing the specimen, accession card and a size/colour chart is taken of every specimen and then one of the whole specimen. Several others may then be taken at different magnifications depending on the detail to be illustrated. In a normal day between 150 and 200 photographs will be taken. Afterwards (Peter's homework!) each photograph is edited, renumbered with the Accession number and then 3 sizes of images are produced, including a 'web-ready' image for posting on the internet.

Post Photography

Graham now has the responsibility for transmitting the processed images to the IT department, who backup the images and upload them to the website and the CALM servers. The final task is then back to the team to attach the correct image to the written record on CALM. Once the process is completed all the information recorded can be accessed freely on the 'Geology Matters' website: geologymatters.org.uk

Would you like to get involved?

Graham is always open to offers of help and support for this collections care work, which he sees as the 'heart and soul' of the Museum's reason to be, and a most important gift to the future. We try to fix the day to Thursdays but life is not always predictable. The work is always sociable, interesting and gives us a sense of handling something special to the current and future generations. If you feel you could occasionally come and help, let us know by contacting Graham Worton: chairman@bcgs.info ■

Peter Twigg, Graham Worton and Linda Tonkin

The Great Sinkhole Invasion 2013 - 2014

The winter of 2013 - 2014 will be remembered for many things, especially the winter storms and floods across much of the UK. However, 2014 will also be remembered as a bumper year for the appearance of numerous sinkholes. Across the UK and globally in the United States, Australia and India, the media were awash with reports of buildings, vehicles and people falling victim to the sudden appearance of sinkholes. Recently I was involved with a project near London for a proposed residential development where the potential impacts from sinkholes were a going concern.



Sinkholes in Chalk

Unlike 'Crown Holes', which result from the collapse of ground above mineral workings, sinkholes (or dolines) result from collapsing or subsiding ground above solution features. Typically, sinkholes will form from the slow action of slightly acidic groundwater percolating downwards through soluble strata such as Palaeozoic and Jurassic limestone, Permian/Triassic salt and gypsum bearing strata, or dolomite and Cretaceous chalk, especially where they are covered with deposits of superficial strata. Overlying deposits will locally act to confine percolating groundwater, resulting in solution features through slow dissolution or erosion of weakly consolidated material. The resultant sinkhole can be less than a metre to several metres across and up to several metres

deep, enough to swallow buildings or vehicles. Sinkholes are not necessarily vertical, since percolating water will find the easiest path through the rock stratum, ie along fractures and bedding planes, creating sinkholes that are bent or have apparent direction. The overlying deposits will subside into the forming sinkhole, backfilling it, and it potentially becomes 'bridged' to form a void. This provides another pathway for percolating groundwater. At the surface the slowly forming depression may become backfilled with sediment that masks the identity of the sinkhole below. ►

Although they will take a long time to form, what brings sinkholes to the attention of the media and the public is their sudden failure and collapse. Failure may result from a number of causes, generally involving water, such as heavy rain, surface flooding, changes in the groundwater table, leaking or burst water mains, irrigation, or even the emptying of swimming pools. Sinkholes rarely cause injury or death, but are more likely to promote shock, surprise, worries and inconvenience whilst resulting in structural damage and loss of property or expensive repair costs.

In the UK, the sustained winter storms of 2013 - 2014 made it one of the most exceptional periods of winter rainfall in around 248 years. The highest number of sinkholes occurred after the heaviest period of rainfall in February 2014. Most events centred on the south-east and were associated with Lambeth Group strata overlying chalk within the vicinity of former brickwork sites. A 'dene' hole opening up beneath the M2 in Kent was one example of such an event. Another occurred in Ripon, North Yorkshire, which resulted from the dissolution of gypsum deposits and caused severe property damage. In the Black Country the threat of sinkholes is not so much an issue given the nature of our underlying geology - Silurian limestone, Carboniferous Coal Measures and Permo-Triassic mudstones and sandstones. The greater threat here is, and has been, the formation of crown holes from the past extractive activities of man, illustrated by the caverns and tunnels of the Wren's Nest.



Ripon, North Yorkshire

Sinkhole hazards can be mitigated through appropriate planning, good site investigation, appropriate design and proper maintenance of infrastructure such as drains and services. Site investigation can include geophysical techniques - drilling and dynamic probing, or a combination of both, although results can be varied. Strategies and solutions for dealing with smaller sinkholes and ground stability issues include avoiding such features, localised reinforcement of foundations, piled foundations into more competent strata below the depth of the sinkhole, ground or cruciform beams and rafts to span the sinkhole. Grouting using cement or concrete is very often the only way to tackle larger sinkholes and improving ground stability.

This winter (2014 - 2015) has, so far, been somewhat milder and drier than the previous one, yet it remains to be seen whether or not the threat from invading sinkholes will hit the headlines of the media once again.

More information about sinkholes can be found on the BGS website: www.bgs.ac.uk

Andy Harrison

Geology of the Azores (Part 1)

Introduction

This article is a follow-up to the talk I gave at a BCGS meeting last year. It is based on a group visit made to the Azores in 2014. For the Newsletter, I have split the article into two parts. The first is a general introduction and a description of some of the locations we visited on São Miguel. The second will deal with locations on Faial and Pico islands, and will follow in a later issue.

The Azores islands are located in the middle of the Atlantic about 1500km west of the Portuguese mainland. They are spread across about 600km of ocean, lying in three clusters along a line running broadly WNW-ESE. There are nine inhabited islands, varying in size from Corvo, the smallest at 17sq km, up to São Miguel, the largest at 746sq kms. In the east are the islands of São Miguel and Santa Maria. The central cluster of islands is the main group: Terceira, Graciosa, São Jorge, Pico and Faial. Far out to the west are the two islands of Flores and Corvo.

Geologically, the islands of the Azores are all quite young. Santa Maria was the first to break the surface above sea level, about five million years ago. This was short-lived, however, and it became submerged again soon afterwards. Around four million years ago, what is now the eastern part of São Miguel emerged and Santa Maria also re-emerged around that time. The islands in the west (Flores and Corvo) date back to around two and a half million years, while the central cluster (Faial, Pico, São Jorge and Terceira) are all under one million years old. The youngest island is Pico, at 300,000 years. Almost all the rocks on the islands are volcanic, the only exception being Santa Maria, where a period of erosion and submergence soon after its early formation led to the laying down of marine deposits. When the island was uplifted, ►



1. Lava stalactites within the Gruta do Carvao lava tube on the outskirts of Ponta Delgada

sediments containing marine fossils became exposed on land. Apart from this, all the other islands are entirely volcanic, mostly consisting of outpourings of basalt lavas, or basaltic ashes.

Although the islands making up the Azores are very young, the origins of the plate tectonic setting go back to the mid-Triassic period, about 200 million years ago. It was then that the great supercontinent of Pangaea began to break up. What were to become the continental plates of North America, Africa and Eurasia started to separate, with the development of great rift-valleys (grabens), as sections pulled away from each other. Over time the continents became completely separated and the grabens became the site of the newly forming Mid-Atlantic Ridge. Throughout the past 200 million years, the North

American continent has continued to move in a generally westward direction, away from the ridge, while the Eurasian landmass and Africa have pulled away to the East. In the area of the ridge, new lithosphere is constantly forming, adding to the size of the oceanic plates. The new lithosphere is moving at a few centimetres per year away from the ridge on both sides.

In the area close to the Azores, there is a 'triple' junction of three plates: the North American, the Eurasian, and the African Plates. Along most of its length, the summit of the Mid-Atlantic Ridge lies well below sea-level. In a few places, however, much more magma has been formed and built up to such an extent that islands have emerged above sea-level. The best-known example is Iceland, but the Azores also fall into this category. Both are believed to lie above 'hot-spots', or points lying above a particular large heat source emanating from the mantle which has persisted for many millions of years. Such hot-spots cause much more melting of the asthenosphere than elsewhere along the ridge, and explain the existence of the islands. In the case of the Azores, the oldest island, Santa Maria is now so far away from the hotspot that all volcanic activity has ceased. It is the only one of the Azores islands that is regarded as extinct.

Another important factor needs to be considered. The ridge, like all mid-ocean ridges around the world, is regularly offset by huge lateral 'transform' faults broadly at right angles to the ridge. These allow different sections of the plate to move at different rates, essential on the curved surface of a sphere. Two of these faults, the 'East Azores Fracture Zone' and further north, 'Terceira Rift', run broadly NW-SE through the region.

Some scientists have recognised the existence of an 'Azores Micro-Plate', lying to the east of the Mid-Atlantic Ridge. This separates the Eurasian and African Plates, with the two faults forming its northern and southern boundaries. Evidence to support this is the fact that this supposed micro-plate forms a submarine plateau (the Azores Platform) where the ocean floor across the whole region is only 2kms below sea level, considerably shallower than the Eurasian and African Plates lying to the north and south.



2. A view of the crater lakes within the Sete Cidades caldera and the crater rim beyond

In summary, the two islands furthest west (Flores and Corvo), lie on the North American Plate to the west of the Mid-Atlantic Ridge. The Mid-Atlantic Ridge runs NNE-SSW through the region. The other seven islands are all to the east of it. There is some dispute as to which plate they lie on. One view is that they all lie on the Eurasian Plate. Another holds that Faial, Pico, São Jorge and Santa Maria are on the Azores Micro-Plate, with Graciosa, Terceira and São Miguel on or close to the Terceira Rift, forming the junction between the micro-plate and the Eurasian Plate.

São Miguel

The island is the largest in the Azores. It is formed largely by four large composite volcanoes, each with a caldera. The volcanoes lie broadly in a WNW-ESE line and generally consist of alternating layers of basaltic lava and airfall deposits of trachytic pumice and/or ash. The four volcanoes are Povoação and Furnas in the east, Agua de Pau in the centre, and Sete Cidades in the north-west. There are also numerous cinder cones, again following the same broad alignment. In a number of places there are hot springs and fumaroles. ►

There are few signs of any basalt lavas exposed at the surface. Those that once existed at the surface have either been weathered over time and carpeted with soil and vegetation, or have been buried under a covering of pumice and ash from more explosive volcanic eruptions.

Our base on the island was Ponta Delgada, the main island town. We started with a descent into the Gruta do Carvão, on the northern outskirts of the town (see photo 1). It is a large lava-tube around 2500m in length, although the public only have access to a small section of it. Within it, there are excellent examples of lava stalactites and stalagmites, some fused into pipes.



3. One of the many fumaroles in the village at Furnas

We then moved on to see Sete Cidades, the large stratovolcano forming the bulk of the north-western part of the island (see photo 2). It grew up as a seamount from the ocean floor before breaking the surface around 290,000 years ago, at first forming a separate island and then eventually becoming joined to São Miguel.

The summit caldera was formed due to cauldron subsidence around 22,000 years ago, as a result of the magma chamber below emptying at the time of a violent explosive eruption of trachyte pumice. This explosive eruption has laid down a thick layer of pumice over much of the western part of the island. The layer is 60m thick at the coast nearby. The central section at the summit dropped and created the caldera, which has a perimeter of 12km and a diameter of around 3.5km. Today there are two lakes within the caldera, Lagoa Azul and Lagoa Verde (the Blue Lake and the Green Lake).

Following the caldera formation, the volcano remained quiet for almost 17,000 years. Then, about 5,000 years ago there was renewed activity, with a number of violent explosive eruptions from a ring-fracture near the caldera wall. It created a set of tuff cones within the caldera. The last eruption within the caldera is believed to have taken place around the time of the first discovery and colonisation of the island, in 1439.

Our route then took us to the western coast outside the caldera, where there have been numerous eruptions from radial fissures. Some eruptions involve the production of lava, which then flows or cascades over cliffs at the coast and builds out to form a coastal platform. One such example is at Ponta da Ferraria, where a classic rootless explosion crater has formed from lava flowing over water-saturated beach sediment below. At nearby Mosteiros, the cliff section displays layered ash deposits containing numerous lava bombs and associated sag-craters (see front page photo).



4. Looking down into the Furnas caldera with Furnas Lake to the right

The next day, we journeyed to the east of the island, spending time in a geothermal zone with hot springs, fumaroles and even a hot waterfall at Caldeira Velha, where people can bathe in the natural hot shower. The power is harnessed nearby at a small geothermal power station.

Our last major stop took in what is possibly the most famous geological site on the island: the caldera of the Furnas volcano. Furnas village itself developed on the fertile land within the caldera. The whole area seems alive, with bubbling hot springs and the hiss of steam being emitted under pressure from the fumaroles within the village (see photo 3). At a higher level above the village, but still within the huge caldera, lies Furnas crater lake (see photo 4). At one time there were two other lakes within the caldera, but the situation changed as a result of the most recent eruption at Furnas, which took place between 4 and 6 September 1630. At that time, violent hydromagmatic eruptions occurred as a result of the mixing of rising magma from below meeting water from the lakes above. The explosion blasted a thick blanket of pumice and lapilli over the whole of São Miguel. It produced a Plinian column up to 14km high, creating pyroclastic flows and plunging the island into darkness. The eruption is thought to have killed a total of 195 people, including 115 from the nearby village of Ponta Garça. When it ended, the landscape had been transformed, two of the three lakes no longer existed, and the Cova do Burra tuff-ring had been created. ■

Alan Clewlow

Geobabble



Portrait of James Hutton

The Society has in the past commemorated the greats of geology, particularly Sir Roderick Murchison and his interest in Black Country rocks and fossils. We have dressed in 19th century costume, and convened in the workings beneath the Wren's Nest, and Alan Cutler has repeated Sir Roderick's words from the same place where he originally delivered them. We can get to know these people through the books they wrote, and the early nineteenth century was a time of great geological flowering. In addition to Murchison there was Adam Sedgwick, Charles Lyell, William Smith, Charles Darwin and later Charles Lapworth. At that time it was accepted that geological time was greater than 6000 years, and that there were igneous and metamorphic rocks as well as sedimentary, and that there were more scientific ways of looking at the past than studying ancient literature, notably the Bible.

The emergence of 'modern geology' is credited to James Hutton and the enlightenment, in particular the Scottish enlightenment based in Edinburgh. He went to University at the age of 14 to study chemistry and medicine but then moved into looking at rocks and geology. He thought it was a mistake to rely on literature to look into the past; you need to have field observation, and he travelled all over Scotland and into England, often on foot, becoming a master of observation and deduction. He maintained that you must have data as evidence, not prejudice and false theory. He used the very modern idea that you must conjecture, and then test the idea in order to refute it, then move on to a new conjecture. This is the basis of Karl Popper's ideas on scientific research published in 1989!

Hutton put the results of his observations and research in a book, 'Theory of the Earth', published in 1788. Modern editions of this text are available, and it is not an easy read. It is written in a very awkward style, and you have to work hard at it. The ideas at the time said that all rocks were formed from a primeval ocean with granite the oldest sediment underlying all the others. Hutton argued that you cannot explain the formation of all rocks by sedimentation and crystallisation from water alone. Heat and fusion are required. He methodically describes geological features that must have heat for their formation: siliceous matter in granite and what he called felspar; crystals in metal ores and agates; crystals growing in cavities in igneous rocks and of course volcanoes:



The Basalt/Dolerite of Salisbury Crags

"A VOLCANO is not made on purpose to frighten superstitious people into fits of piety and devotion, nor to overwhelm devoted cities with destruction; a volcano should be considered as a spiracle to the subterranean furnace, in order to prevent the unnecessary elevation of land, and fatal effects of earthquakes..."

Not far from Hutton's house in Edinburgh are the Salisbury Crags, so obviously a sill, but of course there was no terminology to describe this. He called the basalt/dolerite suite of rocks a 'rockstone' and also used the terms 'erupted lava' and 'subterranean lava'. He says that this type of rock is very common with a regional terminology: 'trap' in Sweden, 'whinstone' in Scotland, 'toadstone' in Derbyshire and 'ragstone' in South Staffordshire, hence the 'Rowley Rag'.

However, Hutton recognised that the basalt had been forcibly injected, and one of the two photographs of Salisbury Crags shows where the sediment has been distorted by the injection of the igneous rock. For all of this to happen, more than 6000 years were required. He visited the classic unconformity at Siccar Point and understood its formation perfectly. He even recognised what we now know as the 'sedimentary cycle', suggested weathering and erosion, but it just could not be fitted into 6000 years. The last sentence of his book is well known: ►

"The result, therefore, of our present enquiry is, that we find no vestige of a beginning, - no prospect of an end."

'Theory of the Earth' was published in 1788, but generally went unnoticed outside Hutton's circle of Edinburgh philosophers; it was difficult to read with its awkward style. Hutton's genius was not recognised until after his death in 1797. It was then that the text was reworked by Playfair and Charles Lyell, and so modern geology took off. ■



The disturbed junction at the base of the sill that Hutton recognised

References:

'Theory of the Earth' (1788) by James Hutton. Printed in Great Britain by Amazon, 2007.

'James Hutton, the founder of modern geology' by Donald B. McIntyre and Alan McKirdy. National Museums of Scotland, 2001. ISBN: 978 1 905267 73 6

Bill Groves

Gordon Hensman

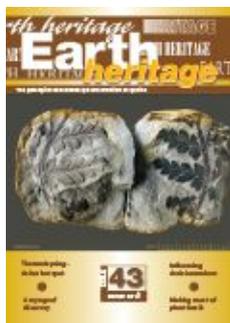
It is with great sadness that we have to report the death of Gordon Hensman, BCGS Chairman until March 2014, and prior to that he served the Society as Meetings' Secretary for many years.

There will be a funeral service at Gornal Crematorium on Wednesday 18 February at 2.50 and a wake afterwards (3.45) at the Five Ways Inn on the Himley Road, Gornalwood, DY3 2PZ.

On Thursday 19 February Gordon's ashes along with those of his wife and son will be scattered at Gornal Crematorium at 3.45. All are welcome to attend.

Gordon's long and dedicated association with BCGS will be recognised in a full obituary in the April Newsletter. If any of you wish to add your own tributes please send them to the Newsletter Editor (details on p.2)

Members' Forum



'Earth Heritage' magazine is published by Natural England, Scottish Natural Heritage, Natural Resources Wales and the Geologists' Association. It is produced twice yearly to stimulate interest in geodiversity and a broad range of geological and landscape conservation issues within the UK and further afield. It is free to download in pdf format from the Earth Heritage website: www.earthheritage.org.uk

Issue 43 of 'Earth Heritage' has just been made available on line. Articles in this issue include: 'Thermal spring is visitor hot spot again'; 'Vote for your top fossil'; 'Carving out rock routes'; 'Making the most of Brymbo's plant fossils'; 'Curry Fund boosts Jurassic Coast', and lots more.

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Roy Starkey