Newsletter No. 244
August 2017

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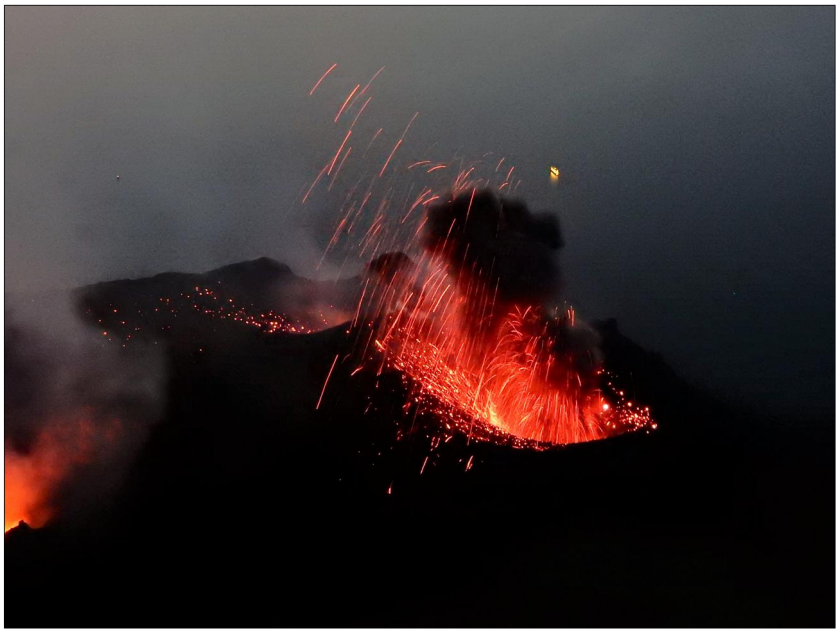


Copy date for the next Newsletter is Sunday 1 October

Robyn Amos, **Honorary Secretary,** ☎ 07595444215 secretary@bcgs.info	**Andy Harrison,** **Field Secretary,** ☎ 01384 379 320 Mob: 07973 330706 fieldsecretary@bcgs.info	**Julie Schroder,** **Newsletter Editor,** 42 Billesley Lane, Moseley, Birmingham, B13 9QS. ☎ 0121 449 2407 newsletter@bcgs.info
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: bcgs.info and Twitter account: @BCGeoSoc		

Future Programme

Indoor 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.

Visitors are welcome to attend BCGS events but there will be a charge of £1.00.

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.

Saturday 16 September *(Geoconservation Day):* Wren's Nest. Directed by the reserve wardens. Meet for a 10.30 start at the Warden's office adjacent to the former Mons Hill college. ***NB.*** *The usual approach along the access road adjacent to the Caves Pub on Wrens Hill Road may not be available.* The day will involve scrub clearance and a 'geo-blitz' to record findings. Bring gloves, stout footwear and packed lunch. Wardens will provide tools, hard hats if necessary and a hot drink. Finish around 2.30.

Monday 18 September *(Indoor meeting):* 'On the move in pursuit of 'black gold' - highlights from three decades of international oil and gas exploration'. Speaker: Graham Hickman. Graham Hickman, a long time member of BCGS, graduated from Leicester University with a degree in Geology and Geophysics. He joined BP Exploration in 1981 and has followed an international career in oil and gas exploration. This has involved his living and working overseas in Egypt, Trinidad, Oman and Texas. While based in London he has worked on projects in Angola, China, Vietnam, Colombia, Ecuador, Peru, Switzerland and Denmark. He will describe the challenges and highlights from his international career and the challenges facing the industry.

Don't forget to look at the BCGS website!

Our web calendar has links to maps to help you find the way to events. You'll find a growing photo archive, our Twitter feed, back issues of our Newsletters, pdfs of our leaflets, and much more...

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, and further helpful information can be found in the Code for Geological Field Work published by the GA and available on our website. 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 not permitted unless specific permission has been sought and granted. Leaders provide their services on a purely voluntary basis and may not be professionally qualified.

Sunday 1 October *(Field meeting):* The South Malverns, led by John Payne. Joint field visit with the Open University Geological Society, West Midlands branch. Start at 10.00. Meet at Hollybush car park (free) on the north side of the Tewkesbury to Ledbury road at the crest of the Hollybush Pass over the Malvern Hills. Grid Reference: SO 759 369.

After a 100m climb we visit a recently constructed earth house to see a thrust fault (an element of the East Malvern fault system). On Raggedstone Hill the scenery, structure and geology will be described, and we will see the first of several volcanic dykes. On the south ridge of the hill is an exposure of the Cambrian/Precambrian unconformity, and lower on the hill is a quarry showing some of the variety of Malvern's metamorphic rocks. We will visit a small waterfall on a Triassic conglomerate, and a small quarry at Coal Hill showing interleaved Ordovician lava and Ordovician shales. On Chase End Hill, the most southerly of the Malverns, is an exposure of Malvern gneiss. We will pass an exposure of baked Cambrian shale, and a quarry in andesitic lava with a nearby much decorated ancient oak. The final stop will be at the recently cleared roadside exposure at Hollybush, showing two distinct intrusions into the Cambrian Hollybush Sandstone. Tour lasts approx 6.5 hours, length: 7km, finish around 4.30. Some fairly steep sections. No facilities anywhere on this walk. Bring a packed lunch. Wear walking boots and clothing appropriate to the weather.

Monday 16 October *(Indoor meeting):* 'The Corsi Collection of decorative stones: where geology meets the arts.' Speaker: Monica Price, Head of Earth Collections, Oxford University Museum of Natural History, and known to many members as a result of visits to OUMNH. Monica is the author of a major work on the subject: Price, M.T. (2007) 'Decorative stone: the complete sourcebook', Thames & Hudson, London, and she has made a special study of the Corsi collection at OUM. This early 19th century collection made by Roman lawyer Faustino Corsi comprises 1,000 polished slabs, each of a different decorative stone. He first obtained those used by the ancient Romans, and then added Italian stones used from medieval times to his own day. He also included a selection of decorative rocks and minerals from England, Russia, and other countries. In 1827, Oxford student Stephen Jarrett purchased the collection and presented it to the University of Oxford. It is now in the Oxford University Museum of Natural History. Monica has developed an excellent website documenting the contents and history of the Corsi Collection: http://www.oum.ox.ac.uk/corsi/.

Saturday 4 November *(Geoconservation Day):* Barrow Hill. Directed by Mark Williams. Meet on Vicarage Lane off High Street, Pensnett (A4101), at the top end near to the nature reserve and the church (St. Marks), for a 10.30 start. The day will involve vegetation clearance in the East Quarry. Wear old clothing and bring stout boots and gloves. Tools and safety glasses will be provided. Bring a packed lunch. We will aim to finish around 2.30.

Monday 20 November *(Indoor meeting):* 'Cave Development, at home and abroad.' Speaker: Tony Waltham. Most of the world's caves lie in karst terrains that have been eroded out of limestones. Cave passages are polygenetic, developed above, at and below the water table. Current concepts recognise all of these, but also accept significant influence by geology structure. Erosion by through-drainage of rainfall-water forms most caves, but a notable type is formed by rising sulphuric acid. Once formed, caves are modified by collapse (which can be on a truly gigantic scale) and by infill of sediments (which can yield a wealth of palaeo-environmental data). The lecture takes an overview of caves and their geomorphology, with numerous examples from Britain and far-flung karst terrains.

Saturday 2 December *(Geoconservation Day):* Saltwells LNR (Local Nature Reserve). Meet at the Nature Reserve car park (Grid ref: SJ 934 868) on Saltwells Lane for a 10.30 start. Wear old work clothes, waterproofs and stout footwear or wellies. Please bring gloves and garden tools; loppers, secateurs, forks and spades if you have them. Either bring packed lunch or hot food can be acquired from the Saltwells Inn adjacent to the car park. Finish at 2.30.

Monday 11 December *(Indoor meeting, 7.00 for 7.30 start):* Members' Evening and Christmas Social. This is our annual chance for members to share their geological experiences in a sociable atmosphere with a Christmas buffet provided by the Society. We need a few of you to volunteer to do a short presentation - on any topic with geological connections; or perhaps bring along some of your specimens for admiration, discussion and identification. Please contact our Meetings Secretary, Roy Starkey if you can make a contribution to this event: meetingsecretary@bcgs.info.

Monday 15 January 2018 *(Indoor meeting):* 'King Coal'. Speaker: Alan Hill, author of 'The South Yorkshire Coalfield: A History and Development'. Alan is a retired manufacturing engineer, who has worked in the UK and overseas. In semi-retirement he worked for Warwick University, particularly in Hong Kong. Born at Barrow-in-Furness, he was brought up in a mining village in South Yorkshire and later spent much of his career working in Birmingham.

Monday 19 February *(Indoor meeting):* 'Gemstones' (exact title tbc). **Speaker: Gwyn Green, FGA, DGS.** Gemmologist and gemstone collector Gwyn Green has a lifetime of experience in gemmology. Her teaching has inspired many industry professionals and long-term gemstone enthusiasts. A former tutor and examiner for the Gemmological Association, Gwyn was Chairman of the Midlands Branch for ten years. She was also responsible for inauguration of the HND in Gemmology at Birmingham City University School of Jewellery. She is a passionate and knowledgeable speaker about her subject.

Monday 19 March *(Indoor meeting, 7.00 for 7.30 start):* AGM followed by **'Archival Research', Speaker: Roy Starkey.**

Monday 16 April *(Indoor meeting):* 'My favourite science: James Parkinson's *Organic Remains of a Former World*'. Speaker: Cherry Lewis, winner of The Geological Society of London's Sue Tyler Friedman medal. Some of you may know her as a result of her book 'The Dating Game'. She is the author of a recently published book on James Parkinson: 'The Enlightened Mr. Parkinson: The Pioneering Life of a Forgotten English Surgeon'.

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 approximately **two months** is given in our Newsletter. Further information can be found on individual Society websites.

Shropshire Geological Society

Saturday 2 September: Ercall Quarry. Led by Andrew Jenkinson. Meet at 2.00 at the Ercall Wood car park, immediately south of the bridge over the M54 on the Forest Glen to Wellington road (SJ 646 103). A walk around The Ercall and adjacent areas to see how the evolution of this corner of SJ60 is clearly illustrated in the geological variety from Precambrian times to the Permian. For joining instructions and to reserve a place contact Andrew Jenkinson; email: andrew@scenesetters.co.uk; phone: 01938 820 764

Wednesday 11 October 2017: 'Re-interpretation of the Ediacaran fauna on Longmynd as gas bubbles'. Speaker: Latha Menon of Oxford University.

Some events have an attendance charge, indicated where known. An additional daily membership charge of £3 is levied for attendance by those who are not existing Members of the Shropshire Geological Society. Lectures are generally held in the Conference Room of the Shropshire Wildlife Trust HQ in Abbey Foregate at 7.00 for 7.30. Further info: www.shropshiregeology.org.uk/

Mid Wales Geology Club

Sunday 20 August: Late Devensian glacigenic deposits in a cliff section. Tonfanau, Towyn. Led by club members.

Wednesday 20 September: 'Thin Sections'. Speaker: Tony Thorp.

Sunday 24 September: Blaen Onneu Quarry (9 miles SE of Brecon). Carboniferous limestone. Led by Prof. Paul Wright.

Further information: Tony Thorp (Ed. newsletter & Hon. Sec): Tel. 01686 624820 and 622517 tonydolfor@gmail.com Website: 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.

Manchester Geological Association

Sunday 3 September: Castleton area. Led by Lucy Manifold. This excursion will examine the sedimentology of the northern margin of the Derbyshire Platform, focusing on the Castleton area. It will involve walking on rough, but well-marked, paths between Castleton, Cave Dale and Pin Dale.

Wednesday 18 October at 7.00: 'The Science and Engineering of Shale'. Speaker: Prof. Ernie Rutter.

Contact email: outdoors@mangeolassoc.org.uk For further information about meetings go to: http://www.mangeolassoc.org.uk/ Visitors are always welcome.

Open University Geological Society - West Midlands Branch

Sunday 1 October: The South Malverns. Led by John Payne. Joint field visit with BCGS. Start 10.00. Meet at Hollybush car park (free) on the north side of the Tewkesbury to Ledbury road at the crest of the Hollybush Pass over the Malvern Hills. Grid Reference: SO 759 369.

Contact Sandra Morgan: sandra.morgan.13@gmail.com
For more details visit the OUGS web site here: http://ougs.org/events/index.php?branchcode=wmi

North Staffordshire Group of the Geologists' Association

Thursday 7 September (Evening Walk): Tegg's Nose, Macclesfield. Led by Steve Alcock. Meet at the Tegg's Nose car park at 17.30. **Note re-arranged date.**

Sunday 17 September: Clee Hills. Led by Andrew Jenkinson (SGS). Meet at the car park in Clee Village at 11.00. Grid ref: SO 594 753. Bring a packed lunch. The visit should finish at 5.00.

For field trip enquiries: Steve Alcock, Longfields, Park Lane, Cheddleton, Leek, Staffs, ST13 7JS. Tel: 01538 360431 or 07711 501028. Email: steves261@aol.com More info: www.esci.keele.ac.uk/nsgga/

East Midlands Geological Society

Saturday 9 September, 10.00 - 4.00: Jurassic Limestones - Ketton Quarry. Led by Ken Nye of Stamford Geological Society. Joint visit with Stamford Geological Society.

Tuesday 19 September, 2.00: Major Dinosaur Exhibition. Led by Adam Smith. Meet at Wollaton Hall main entrance.

Saturday 14 October: 'The Lairg Meteorite'. Speaker: Michael Simms.

Non-members are welcome. Further info: www.emgs.org.uk or email: secretary@emgs.org.uk

Warwickshire Geological Conservation Group

Saturday 19 August: Chinese fossil exhibition (day visit). Wollaton Hall, Nottinghamshire (provisionally booked). *NB: This exhibition runs until 29 October 2017. For more information go to: http://www.dinosaursofchina.co.uk/ Ed.*

For more details visit: http://www.wgcg.co.uk/ or email: WarwickshireGCG@gmail.com. There is a charge of £2.00 for non-members.

Abberley and Malvern Hills Geopark - Geofest

The 2017 Abberley and Malvern Hills Geofest continues until 3 September, with a variety of exhibitions and events. To view or download the Geofest programme click here: 'GeoFest 2017 What's On'. For further information go to: http://geopark.org.uk/

The Geologists' Association Annual Conference
Climate: past present and future?

Saturday 21 October: Lecture Programme in the Reardon Smith Lecture Theatre, Amgueddfa Cymru - National Museum of Wales, Cathays Park, Cardiff, Wales CF10 3NP.
Colin Summerhayes: Earth's climate evolution - a new geological perspective; **Ian Fairchild:** Snowball Earth; **Dianne Edwards:** The impact of pioneering colonisers of the land on the biosphere, lithoshpere and atmosphere; **Chris Berry:** Devonian; **Chris Cleal:** Come visit the jungles of south Wales - the Carboniferous coal-swamps; **Andy Newell:** Triassic; **Hugh Jenkyns:** The Cretaceous greenhouse climate; **Carrie Lear;** Descent into the Icehouse: A Cenozoic perspective on climate change and ice sheet stability; **Suzanne Bevan:** Quaternary; **Jan Zalasiewicz:** The Anthropocene.

Sunday 22 October: Field excursions: The last glaciation of Wales (Gower peninsula) - John Hiemstra; **Fforest Fawr Geopark** - Alan Bowring; **Building Stones in Cardiff** - Welsh Stone Forum.

For more information and to register visit: www.geologistsassociation.org.uk
or email: conference@geologistsassociation.org.uk

The Geologists' Association Festival of Geology

Saturday 4 November, 10.30 - 4.30: Admission Free. UCL, Gower Street, London WC1E 6BT.
Exhibitors from the World of Geology: Fossil and mineral displays, stonecraft, books, maps, geological equipment, jewellery, Building Stones walk around University College London, Tours of the UCL Earth Science Laboratories and more... **Discovery Room:** Rockwatch with activities for children of all ages with fossils, racing trilobites, Jurassic dioramas and more....
Geological Talks: Lidunka Vocadlo: Core! What a scorcher! Hot and squashed in the centre of the Earth; **Chris Jackson:** Hot Rocks Under Our Feet: What can we learn about Volcanism From X-raying the Earth?; **Iain Stewart:** Hot Rocks: the Fall and Rise of UK Geothermal Energy; **Susannah Maidment:** How to weigh a dinosaur.

Sunday 5 November - Festival Trips

Building Stones Walk - Central London. Led by Matthew Loader.
Riddlesdown Quarry, Croydon: London's best chalk exposure. Led by Liam Gallagher.
The Route of HS2 in the Misbourne valley. Led by Haydon Bailey.

Further Festival details see website. Email: festival@geologistsassociation.org.uk Tel: 020 7434 9298.

Exhibition in Bath - 'Riches of the Earth; the Beauty of Minerals'

Monday to Saturday 10.00 - 16.00 until 30 September: Temporary exhibition at the Bath Royal Literary and Scientific Institution (BRLSI), 16 Queen Square, Bath, BA1 2HN, **Admission Free.**

The BRLSI Collections' new exhibition reveals the beauty of minerals through the astounding forms and vibrant colours of more than a hundred carefully selected specimens. Alongside these, exquisite close-up photographs allow visitors to appreciate tiny details of crystal form and colour. The Institution's collection of more than 2300 mineral specimens was built up during the 18th and 19th centuries, through the donations of many collectors. It includes beautiful rarities from many different countries, and this is a unique opportunity to see them on display in Bath.

Editorial

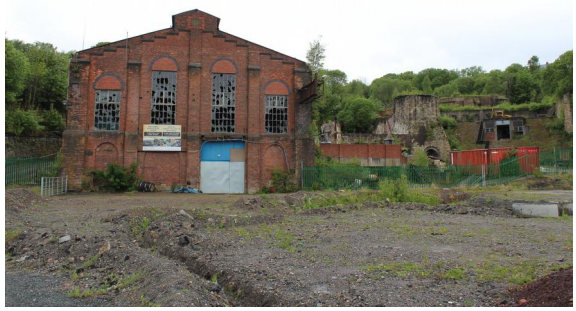
We apologise for the somewhat belated publication of this issue of the Newsletter, which was due to our absence on holiday. However, we are pleased to have returned to a post-bag of meaty items which we hope you will all enjoy. We are also pleased to present a very full programme of indoor meetings right through to next April, with thanks to our Meetings Secretary, Roy Starkey. In the last issue Roy suggested the idea of making a list of members and their interests (for internal circulation only), so that we might be able to get to know each other better. Response so far has been rather limited. Have another look at Roy's item (Newsletter 243, p.8) and please get in touch with him!

Finally, during the holiday season it is likely that many of you will have had some geological experiences and taken photos which you can share with us. Please get in touch. We are very thankful to our regular contributors, but would like to hear from more of you. We have the 'Members' Forum' section for short items, requests, comments, and queries. It would be good to see it re-instated next time. ■

Julie Schroder

Field Meeting Report

Saturday 20 May: Return to the Brymbo Fossil Forest. Led by Gary Brown (Brymbo Heritage Group).



The Old Machine Shop, Brymbo

Background

BCGS members first visited the Brymbo Fossil Forest in March 2007, following a talk by Dr. Jacqui Malpas at a BCGS indoor meeting shortly after the forest's discovery. A subsequent BCGS visit took place in June 2009. *(See Newsletters 182, Apr. 2007 p.6, and 198, Dec. 2009 p.9 for Andy's reports on those visits - and here's a timely reminder that you can find all back issues of our Newsletters on the BCGS website here: bcgs.info/pub/the-society/newsletters/ Ed.)* Dr. Malpas, then a Geodiversity Officer for the Clwydian Range 'Area of Outstanding Natural Beauty', and Peter Appleton from the Brymbo Heritage Group (BHG) were our guides for both visits. Dr. Malpas has since moved on, but Peter Appleton still acts as a lead conservationist along with Professor Barry Thomas of Aberystwyth University, who has taken over from Jacqui.

For this visit our guide was Gary Brown (BHG), who has been involved with Brymbo for the past few years and has a background of history and heritage regeneration. This was a joint visit with members of the Woolhope Naturalists' Field Club and the NSGGA.

The village of Brymbo (pronounced 'Brumbo') is located approximately 5.7km north-west of Wrexham town centre, Clwyd, at approximate grid reference: SJ 295 536. The Fossil Forest is situated within the grounds of the former Brymbo steelworks, off Blast Road and Gwalia Road on the southern outskirts of the village. The site is towards the northern end of a roughly north-south trending valley, the slopes of which rise to over 200m to the east and west. The northern and western parts of the valley have been in-filled with waste slag from the days of iron and steel production, to form a level plateau at an elevation of approximately 195m. The plateau falls away to the east and south. Following a programme of remediation work, the southern end of the plateau has been developed into houses and gardens. ►

Site History

Coal mining around Brymbo dates back to medieval times (14th century) when shallow coal was worked using bell pits. The former steelworks occupies what were once the grounds of Brymbo Hall, built in 1642. In 1792, celebrated ironmaster, inventor and entrepreneur John 'Iron Mad' Wilkinson purchased the 500 acre estate for £14,000 and immediately recognised its potential wealth of coal and ironstone. In 1796, Wilkinson opened the first ironworks at the site, which he ran up to his death in 1808.

Following Wilkinson's death Brymbo Hall changed hands several times before being abandoned and eventually demolished in 1973, after the ironworks had fallen into disuse. However, back in 1841 the works were saved when barrister Robert Roy, one of Wilkinson's trustees, and Henry Robertson purchased the site and formed the Brymbo Mineral & Railway Company. Together they restarted iron production in 1843.

Robertson doubled capacity at the works, changing the landscape from Wilkinson's time, eventually to cover 900 acres. Iron goods (such as pipes, rails and girders) were predominantly manufactured until 1885 when steel production took over. Iron production continued until 1985, but steel production continued until the works finally closed in 1990. Iron and coal were all originally sourced from on-site, but in the 1930s and 40s ironstone was imported via mainline railway from a quarry in Hook Norton, Oxfordshire.

Excavations for a house extension during the 1950s brought historical fame to Brymbo with the discovery of 'Brymbo Man' or 'Beaker Man'. Dating to the Bronze Age the find was put on display in Wrexham Museum complete with a facial reconstruction courtesy of a forensic pathologist from Manchester University.

Through the 1960s, 70s and 80s, the steelworks was disconnected from the mainline railway. The local landscape continued to change as the waste slag in-fill continued to expand southwards, casting an eerie glow when still hot. When the steelworks closed, the loss of thousands of jobs and mass heavy industry left behind a landscape of dereliction, decay and despair. All the machinery from the steelworks was carefully packaged up and shipped off to China.

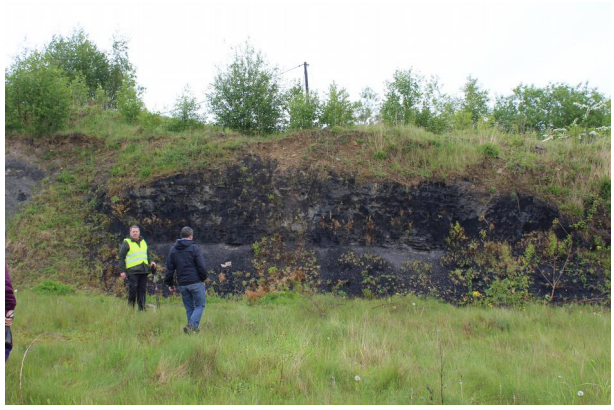
Fossil Lycopsid, Brymbo

Regeneration of the former steelworks through the 2000s created the current landscape with only around 10% of the original buildings and structures still remaining. Excavations to remove a shallow coal bed, approximately 9m to 12m below ground level revealed the Fossil Forest in 2004. This resulted in the first scientific investigations in 2005, under the guidance of Dr. Malpas and Peter Appleton, with further investigations following in 2007, 2008 and 2009. No further excavations have been undertaken since 2009, when the Fossil Forest was covered with a layer of plastic, sand and topsoil to protect it. The next door Enterprise Centre was built in 2007 and provides commercial space, a cafe and day nursery. In 2015, funds from the National Museum and Natural Resources Wales enabled an exhibition about the Fossil Forest to be put on display in Wrexham Museum. ►

Geology

Brymbo sits within the North Wales Coalfield, which stretches from Point Ayr in the north to Oswestry, Shropshire in the south. The bedrock strata comprise sandstone, mudstone, seatearth and coal layers belonging to the Carboniferous Pennine Lower and Middle Coal Measures Formation (formerly known as the Lower and Middle Coal Measures). These rocks have been dated to between 280 and 320Ma and were deposited during the Silesian Epoch.

Trending roughly south through the western fringe of the site is the Brymbo Fault, which has downthrown the strata to the west by approximately 122 - 152m. Therefore, coal and ironstone workings were shallow on the eastern side of the fault and deep to the west.



The Two Yard Coal, Brymbo

The sequence stratigraphy containing the Fossil Forest includes a thick sandstone layer overlying a coal seam called the 'Crank' or 'Two Yard coal'. Underlying the Two Yard coal is a layer of seatearth - or ancient soil, which in turn overlies a nodular mudstone layer. At the base of the mudstone layer is a second coal seam - the 'Brassey' coal. The base of the Fossil Forest is situated within the seatearth and the top of the mudstone layers at the base of the Two Yard coal. The forest penetrates upwards into the overlying sandstone.

Up to 20 trees, or rather giant club mosses (lycopsids), including *Lepidodendron*, have been found within the Fossil Forest. They grew in high density and up to 40m in height. Also within the Fossil Forest grew many giant horsetails or *Calamites* in clusters of 3 - 4, up to 10m in height, that would have appeared similar to modern bamboo. Together the lycopsids and *Calamites* have left behind intricately detailed fossils and impressions of their trunks and leaves within the entombing mudstone and sandstone. Within the underlying seatearth the root systems of lycopsids, or '*Stigmaria*', have been discovered, which can be traced laterally across the surface. Professor Thomas has undertaken studies of the spores from these ancient plants to try and reveal how they reproduced.

Other fossils found within the Fossil Forest include fish debris, crustaceans similar to the modern horseshoe crabs, mussels, small crayfish-like creatures and worm burrows or casts. The fossil flora and fauna together with fluvial channels and the presence of ripples and swirl patterns within the sandstone, indicate deposition in coastal swamps that were occasionally flooded and inundated during tropical storms.

The 2017 Field Visit

It was a wet start when we met outside the Old Machine Shop, a building which still acts as office, storage and display space. Here Gary provided us with coffee and an introduction to the day. He gave a historical, geographical and operational overview of the former iron and steelworks, including how the Fossil Forest was discovered, and discussed the on-going conservation work and future plans for the site. We then ventured out into the rain where we saw evidence of medieval workings, and the denuded faces in the Fossil Forest from 7 to 8 years of weathering. ►

There was little to see of the rock layers we viewed on our previous visits due to the protective cover of plastic and topsoil. The covered surface had been profiled to allow free drainage of surface water off and away from the Fossil Forest to prevent further damage. Worm burrow casts, the clustered stems and imprints of *Calamites* and lycopsid S*tigmaria* were still visible on some exposed areas of mudstone. Above the northern fringe of the covered Fossil Forest was an exposure of the Two Yard coal, which had crumbled away as scree along its bottom edge. Yellow gorse delineating the western fringe of the Fossil Forest marked the location of the Brymbo Fault.

After lunch we reconvened in the meeting room of the Old Machine Shop, where Gary presented a pictorial history of the works. This was followed by a guided tour of the surviving and most critical buildings and structures. The oldest standing buildings, constructed of local Cefn Sandstone from a nearby quarry, belong to John Wilkinson's era. These include Wilkinson's No.1 blast furnace, which only survived because it was used as a sand hopper when it was no longer used for iron making. Many other buildings were rebuilt during the Robinson era of the 1840s and some later still, such as the Old Machine Shop, which was built in 1920.

The Fossil Forest

Our tour started with a look at Furnace No.1 and other surviving furnaces situated at the base of a charging wall. Molten iron would have been poured from the furnaces into casting pits to form ingots. Railway wagons were loaded with the waste and molten slag, which would be tipped into the valley to form the plateau. As the plateau progressed southwards the railway would have been extended.

From the furnaces we walked up a gravel track to the top of the charging wall. Here stood a two-storey building - the charging house, where raw materials were stored prior to being barrowed to the charging wall and tipped into the furnaces below. Further along the track we came to an area of high ground with views to the south, towards the Wrekin and northwards to Liverpool.

Continuing up the track we passed the Agent's office, which will eventually be restored and used as office space. Beyond the Agent's office, the track ended in an area of old overgrown red brick buildings and sandstone walls. Here also stood an old dump truck and two vast 'buckets' used in the iron making process. The old buildings were the pit head, pit shaft and lamp room, winding house and winch room belonging to the deep mine workings to the west of the Brymbo Fault. It is proposed to keep and maintain the old mine buildings for storage and to develop the overgrown outside area as a wildlife reserve for visitors to enjoy.

Future Conservation Work

Future regeneration of the former steelworks is the focus of the BHG, which is a voluntary organisation, set up in the 1990s. It has steadily grown from a couple of conservationists to around 20 people. The BHG is involved with conservation work, maintenance and holding public events at the site. Their ultimate vision is to create a visitor attraction, learning centre and business hub that merges the site's geological and industrial heritage. This vision forms part of the Brymbo Heritage Project. ►

The Brymbo Heritage Project is part of a master plan to reclaim and develop the Fossil Forest site and the surrounding area. The site itself occupies the north-west corner, and the plan includes the development of housing, a school and retail units on the land to the east and south. The plan requires a condition survey to be undertaken, plus stabilising and restoring the surviving buildings. Construction of a building to cover and protect the Fossil Forest is also planned, at an estimated cost of over £30 million. In the current financial climate the BHG is unable to raise such a sum of money.

The Group has therefore focussed on dividing the project up into sections that can be undertaken in separate steps. They received approximately £50,000 from the Welsh Government in 2015, to help with preservation of the existing buildings and structures. Local teenage volunteers helped to construct a gravel path from the blast furnaces to the upper parts of the site. The BHG have used the surviving buildings to hold public events such as a classic car show. In 2015 they held a ceremony and pop concert in memory of the final closure of the steelworks, and hope to make this an annual event.

There are plans to build a solar farm on an old spoil heap overlooking the site and the BHG have secured £300,000 for this project. This will add another angle to the story of energy production, coal formation, industry and pollution at the site. Redevelopment of the former narrow gauge railway will allow visitors to travel round the site, from the Old Machine Shop to the Enterprise Centre and the solar farm, using electric trains. The Old Machine Shop will be used as a visitor centre, training space and rental space for small businesses, which will provide a little income. Hopefully, building work on the Old Machine Shop will be completed within the third quarter of 2019 in time for an opening ceremony in 2020, one hundred years after it was built.

Fossil Leaves, Brymbo

The Brymbo Heritage Project also includes developing and restoring two to three miles of surrounding industrial landscape. £3,000 of big lottery funds has been secured to construct trails and footpaths over the surrounding area. However, the BHG is mainly focussing on the former steel works and over the next five to seven years hopes to secure £9.5 million to help with its regeneration.

I would like to thank Gary for a very enjoyable visit and up-date and wish the BHG all the best with their future plans. I would also like to thank the members of the Woolhope Group and the NSGGA for their attendance, and hope they enjoyed the visit and that we will see them again soon. ■

Photos from previous visits to the Brymbo Fossil Forest can be seen in the BCGS photo archive here: http://bcgs.info/pub/bcgs-photo-archive/2007-2/

Andy Harrison

Stromboli 2017

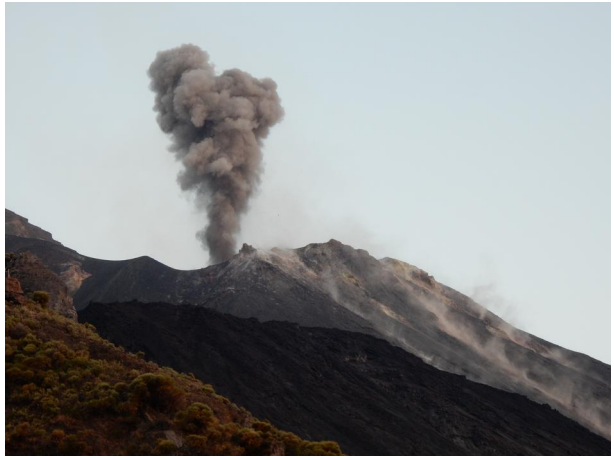
Having recently returned from leading two separate trips to view the volcanic features of Sicily and the Aeolian Islands, I thought that it would be a good opportunity to share some background information and describe the recent activity of the volcano which forms the island of Stromboli. ►

Taken from the boat on the approach to Stromboli, showing its steep-sided nature

The island lies approximately 70km due north of Milazzo, the nearest port on the north coast of Sicily. About 250km away to the north, across the Tyrrhenian Sea is the Bay of Naples on the mainland. Stromboli is just one of the chain of island-arc volcanoes making up the Aeolian islands. In simple terms, the islands have formed in a classic plate convergence situation, where the oceanic lithosphere forming the leading edge of the African Plate is being subducted beneath the oceanic lithosphere at the southern margin of the Eurasian Plate. In reality, the situation is quite complex, as there are believed to exist a number of 'Sub-Plates' in the region (the Tyrrhenian, Adriatic and Ionian Sub-Plates). These are all moving independently in relation to each other and their existence is proposed as an explanation for the volcanic activity in Sicily and in the Bay of Naples area.

What is beyond doubt is that the oceanic lithosphere of the African Plate is being subducted back into the Upper Mantle. At depth, partial melting occurs, resulting in the formation of magma, which subsequently rises to build up volcanoes. These develop first as sea-mounts and then eventually build above the surface to create volcanic islands. The oldest exposed rocks found in the region are on the islands of Panarea and Filicudi, dating back 330,000 years. Stromboli is the youngest island in the chain, forming only around 40,000 years ago, although the tiny island of Strombolicchio, lying only 2km away to the NE, is believed to be the neck of a much older eroded volcano dating back 230,000 years and sharing the same magmatic source as Stromboli.

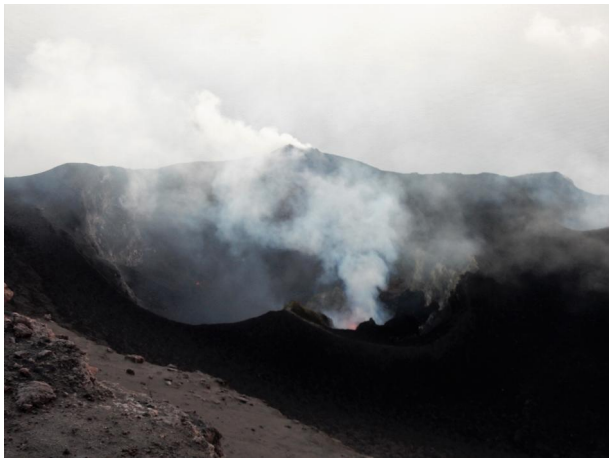
Stromboli is broadly circular in shape, and has the classic appearance of a steep-sided composite-cone volcano, built up from alternating layers of andesitic lava and ash. The average slope on its sides is between 25 and 30 degrees. Its summit at Vancorri is 924m above sea-level. The steep slope of its sides continues below the water-line to great depth. 98% of its mass lies below sea-level and only a short distance from the shore, the bed of the Tyrrhenian sea reaches a depth of 2km.



From the viewpoint at 250m (above the Observatory) alongside the Sciara del Fuoco, looking up to see a large ash eruption.

There is some evidence of a gradual northward shift of activity during the island's existence, with the oldest rocks exposed on the lower southern flanks and younger flows more to the north and east, although with very few exceptions, eruptions have focussed on the summit area. Older craters and vents lie only a short distance south from the present summit craters, indicating a northward migration of activity of little more than one kilometre.

Throughout historic time, the volcano has been characterised by activity which has given its name to the generic term 'Strombolian'. Every few minutes, the volcano produces an explosive burst of lava bombs, which are thrown up to 200m into the atmosphere. On returning to the surface, those bombs which do not fall back into or around the crater end up on a steep slope running to the NW called ►



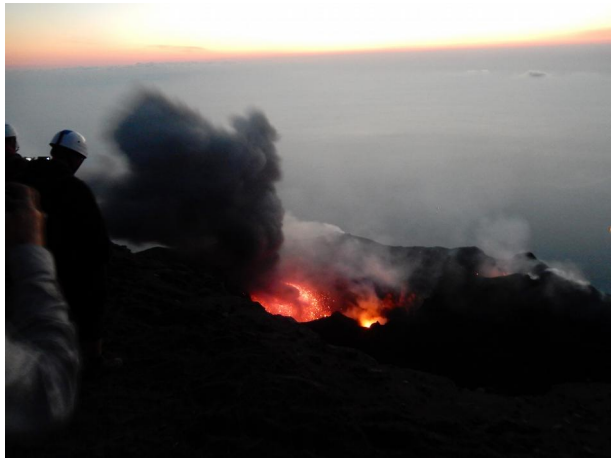
View from the Pizzo Sopra La Fossa ridge before dusk, looking down on the craters

the 'Sciara del Fuoco' mostly building up as debris on its upper flanks, although sometimes rolling down the slope all the way to the sea.

The cause of this type of eruption is believed to be a build-up of gas in the magma. Following each explosion, the surface of the magma forms a thin skin, preventing further escape of gas. Over a period of several minutes, the gas pressure builds until it reaches a critical point, eventually bursting through the skin and creating the typical explosion. The process continually repeats itself, although there is no set regularity. Sometimes, there can be 10 or more explosive events in an hour. At other times, hours can pass between explosions. It is unclear what causes the volcano to be more or less active, but the likely cause is the supply of magma from below. What is clear is that the volcano has been erupting this way throughout recorded time. The Greeks and Romans described Stromboli as the 'Lighthouse of the Mediterranean'.

Interrupting the usual pattern of activity, there have been a number of more violent events. One of these took place in September 1930. Within the space of 24 hours, there were ash emissions, two giant explosions which hurled lithic blocks from the vent several kilometres onto the coastal villages at either end of the island, a fall of lapilli (pellets of solidifying lava) which built up in the main island town to a depth of around 10cm, as well as landslides of hot tephra into the sea down the Sciara and in the valley beside. The events also triggered tsunamis which reached the other Aeolian islands. In total, six people died and many were injured. The event caused a mass evacuation from the island, whose population had been around 3500. Although many went to the mainland, a large number took the opportunity to emigrate to Australia, creating a close link which still exists between the island and family members of those emigrants.

Over time, the activity returned to its normal level, and some of the population returned, but even today, the permanent resident population is still below 500. The original economy of the island had largely been based on subsistence farming and fishing, but today it is mainly tourism and the attraction of the erupting volcano which draws people in large numbers to visit the island.



An ash eruption from the SW crater

Another significant event took place in late December 2002, when lava flows developed on the slopes of the Sciara del Fuoco. Two days later, this triggered two massive landslides on the slope, moving more than half a million cubic metres of debris. When debris from the slides reached the sea, it triggered two tsunamis, with damage to buildings in Stromboli village and Ginostra. The lava flows continued for several months, but then a major event took place in early April 2003, when a huge explosive summit eruption created a mushroom cloud about 500m high, throwing out bombs and blocks as far as the village of Ginostra in the south, and triggering bush-fires in vegetation on the lower slopes. No-one was killed or seriously injured but, following the eruption, public access to the summit area was banned for safety reasons, and was not re-instated until 2005. ►

Local guides then took the opportunity to create a new, shorter, route to the summit area. It now takes around 3 hours to climb from Stromboli Town to the Pizzo Sopra La Fossa, a ridge at 918m. This offers the best viewpoint from a safe distance to look down on the summit craters at about 200m below. There are three active craters, each fed by its own vent. These are the SW, Central and NE craters. My own experience of viewing the eruptions suggests that the NE crater is the most active and produces the noisiest and most spectacular explosive bursts. In contrast, eruptions from the SW crater produce more of a deep roar and often send out an ash cloud, carried by the wind to be deposited over a wider area, and experienced by those viewing from the Pizzo ~ heard as a gentle rattle on our hard-helmets and felt in the form of grit between the teeth.

Although Stromboli erupts continuously and the summer months can usually guarantee good weather, a visit can be frustrating - two years ago, there was a cloud cover and last year we climbed to the summit but only saw one minor explosion in the hour we spent there. This year, however, the volcano was very active and put on a superb display for those in our group who had done the climb. Most of the accompanying photos were taken on that visit.

For those not able to climb to the summit, there are other alternatives. My first trip, in mid-June was with an adult group ~ a mix of individuals from around the UK and a sizeable contingent from the Irish Geological Association, based in Dublin. About half the group climbed to the summit, but some chose to take a low-level walk to 'The Observatory' (Osservatorio), actually a bar and pizzeria at the foot of the Sciara, from where an excellent view of the eruptions can be obtained from below. On the following trip, in early July, with a sixth-form college group from Shrewsbury, we took the path past the Observatory on the original route to the summit as far as a viewpoint at 250m height, again offering excellent views. On this second visit, the volcano was just as active, with many explosive eruptions and ash emissions. Feedback from those who took part on each of the trips indicated that it was the highlight of their time in the Aeolians. ■ *Front cover photo: 'an explosive burst from the NE crater'.*

Alan Clewlow

Mike's Musings No. 10 - What's In a (Mineral) Name?

Having considered the origins of our rock nomenclature in my last article, I now move on to consider mineral names. Once again, the suffix '-ite' is a recurrent theme, often after the name of a place (of discovery or association) or the name of a person (the discoverer, or someone, usually from the mineralogical or geological world or sometimes just an associate or friend, whom the discoverer has chosen to honour). A few, like Monsieur Biot, were even bold, or bare-faced, enough to name a mineral after themselves (a practice I believe to be frowned upon these days).

One tongue-in-cheek example (recollected from my foolish student days) was the idea of honouring two celebrated geologists, Janet Watson and Edgar Tilley, at the same time, creating (with a little bit of manipulation) the more-memorable-than-most new mineral species 'watsontilleytonite'! O.K., that one never saw the light of day (quite rightly so), but you could have some fun inventing such names, or making up mnemonic associations to help get you through exams with a connected series of rocks or minerals (see Musing No. 5, Newsletter No. 239, October 2016). ►

Nepheline - Wikimedia Commons

We saw how a few rock names allude to some character, property or mineralogical content of the rock in question. Some associations in the mineral world are fairly obvious: neither **magnetite** nor **graphite** need any explanation; **anhydrite** refers to the lack of water in the anhydrous form of gypsum; **halite** describes the salty nature of this mineral (from the Greek **'hals'** = salt); **cryolite** is less obvious in that it refers to the freezing nature of the only place where a meaningful deposit of this stuff was exploited - Greenland. **Malachite** derives from the Greek **'molokhe'**, in reference to the green leaves of the mallow plant and **serpentine** gets its name from a supposed resemblance to snakeskin.

This last mentioned mineral is one of several common minerals which avoid the usual '-ite' ending. Such names often derive from western European languages - Old German or French. **Aegirine** (a type of augite) and **almandine** (a type of garnet) are named after a Norse sea-god and a place, but are also often known equally as aegirite and almandite. Likewise **nepheline** is also often given as nephelite, but has a more classical association, from the Greek **'nephele'** meaning 'cloud', for the (appropriately) nebulous reason that fragments of this mineral turn cloudy when immersed in nitric acid! **Tourmaline** has even more exotic associations with Tamil and Sinhalese words for **cornelian**, with which it was presumably confused in ancient times.

Nephrite from Wyoming
Wikimedia Commons

Although having a similar prefix to nepheline, **nephrite** (a variety of jade) has medical associations, from the Greek for kidney (**'nephros'**), as it was purportedly a cure for kidney-stones. Its Spanish counterpart **'piedrade ijada'** (meaning 'stone of the flank') supposedly offered a cure for colic, as well as giving us the mineral name **jade**. If your medical complaint was to do with the blood, the mineral you needed was **h(a)ematite** (from the Greek **'haima'** for blood).

Back on the trail of a particular quality of the mineral providing us with a name, there are a good number which obviously relate to some aspect of their chemical composition. Thus from calcium we have the mineral **calcite**, and in similar vein (pun completely intended!) **barytes** (barium), **fluorite** (fluorine), **magnesite** (magnesium), **cuprite** (copper), **zircon** (zirconium) and **argentite** (silver). This should not be confused with **argentine**, which is a variety of calcite - as well as a country whose national stone is **rhodochrosite.** This, like **rhodonite,** gets its name from the Greek word for pink (**'rhodon'**).

Conversely, it is the mineral **beryl** (from which it was first obtained) that gives its name to the element **beryllium**. The etymology of beryl is more obscure – possibly related, via Sanskrit, to a Dravidian place name Velur (the modern town of Belur), or more delightfully from the German word **'brille'** for spectacles, as the earliest spectacle lenses may have been made from beryl! Another Sanskrit word **'upala'**, originally applied to any precious stone, eventually led to the mineraloid substance we know today as **opal**.

As we have already seen, Classical Greek is a common source of mineral names. Further examples refer to their colour e.g. white, **'leukos'** in the feldspathoid **leucite**, dark blue, **'kuanos'** in **kyanite** and yellow, **'kitrinos'** in **citrine.** One name even features two colours: gold, **'khrusos'** coupled with green, **'prasinon'** in **chrysoprase** (the gold indicating 'precious', rather than the colour itself). ►

As with rocks, some names have been given to a group of minerals ('bucket-names' I call them, although this term seems to have entered the 'computerspeak' vocabulary with a different usage). These may then be used in a general or loose fashion, or more prescriptively, and they appear to come from a variety of sources. Thus the **feldspars** have their origin in German **'feld'** (field) and **'spar'** (easily cleaved crystal). The word **felspar**, incidentally, is a misunderstanding (and, according to many sources, a misuse: although it was good enough for 'Rutley's Mineralogy'!), derived from the German word for rock, **'fels'**.

The **micas** owe their name to the Latin word for a grain or crumb, with **'micare'** meaning 'to glitter'; easy to see where the inspiration lies there! From a mixture of Greek (**'amphi'** = 'on both sides' and **ballein** = 'to throw') and via Latin **'amphibolus'**, we get the term **amphibole**, referring to the varied structures found in this group of minerals. The name of the closely allied group, the **pyroxenes**, comes directly from the Greek **'pyro'** ('fire') and **'xenos'** ('stranger'), by the curious train of thought whereby it was once believed that they were not present in rocks of a 'fiery' origin (i.e. igneous).

Two less common 'bucket-names' are the **garnet** and **spinel** groups. **Garnet** comes either from the same Latin stem as granite (**'granum'** = grain) or from **'granatus'**, referring to the colour of the fleshy seeds of the pomegranate. This is not a bad analogy for the variety **pyrope**, from the Greek **'pur'** and **'ops'** meaning 'fiery eyed', but of less relevance to most other varieties. My favourite variety of garnet, the greenish **grossular**, quaintly gets its name from **'grossularia'**, the Latin for gooseberry, which just also happens to be my favourite fruit.

Grossular from Pakistan
Wikimedia Commons

Spinel comes from an Italian word, **'spina'**, in its diminutive form **'spinella'**, meaning 'little thorn', an allusion to the pointed nature of spinel crystals, although this is hardly unique and could equally be applied to a host of other minerals. This demonstrates the role of imagination in many mineral names!

Finally, it is probably fitting that the name of our most widespread mineral, **quartz**, should have a suitably varied origin. The Polish **'twardy'**, Serbo-Croat **'tvrd'** and Czech **'tvrdy'** seem to have informed the Middle High German **'twarc'**, all meaning 'hard'. This leads to the German **'quarz'** or **'zwarc'**, referring more specifically to 'rock-crystal', the modern name for a particularly pure form of quartz. Curiously, in this respect, the ancient Greeks referred to quartz as **'krustallos'**, from **'kruos'** (meaning 'icy-cold') as they believed that rock-crystal was a form of supercooled ice.

However, another German tongue-twister, used by the mining fraternity, **'quer-kluft-ertz'** (meaning 'cross-vein-ore') may have ended up as **quartz** via the abbreviated form **'quer-ertz'**. This sounds rather more plausible to me, and wouldn't be the only mining expression that has passed down into common modern vocabulary - which might be a suitable final thought on which to end. ■

Crystals of spinel & chondrodite from China
Wikimedia Commons

I have to acknowledge the wonderful world of the Internet for most of the material in this and my previous article on rock names, without which the search for all these etymologies would no doubt have been very much harder to come by.

Mike Allen