



Newsletter No. 299

October 2026

Contents:

Future Programme	2
Other Societies and Events	4
Editorial	7
Geoconservation & Field Meeting Reports	
Bewdley Museum and Town Centre	7
Erratics Trail 2, The Louis Barrow Trail	12
A Greenlandic Saga - Part 1	16
Mike's Musings No. 65	
Follow that dyke: Part 2 - Cleveland	17

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To find out more, read on!

Copy date for the
next Newsletter is
Tuesday 1 December



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For enquiries about field and geoconservation meetings please contact the Field Secretary. Please notify Andy Harrison in advance if you will be attending these events. To submit items for the Newsletter please contact the Newsletter Editor. For all other business and enquiries please contact the Honorary Secretary. For more information see our website: bcgs.info, YouTube, and Facebook.		

Future Programme

**Indoor meetings are held in the Lamp Tavern, 116 High St, Dudley, DY1 1QT
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.

Sunday 11 October (Field Meeting): Smestow Valley and Erratics at Wightwick Manor and the Mount Hotel. Led by Andy Harrison and Julie Schroder. *(This trip will be an approximate re-run of the BCGS field trip which took place on 14 February. Organised primarily for the Warwickshire Geological Conservation Group, this trip is now a BCGS/WGCG joint event.)* Meet at Smestow Valley Local Nature Reserve, Meadow View Terrace, Wolverhampton WV6 8NX (Grid ref: SO 891 999), 10.15 for a 10.30 start. **See the links to Google maps on our website.** In the morning we will walk around Smestow Valley, examining its geology in the context of the local landscape. Wear suitable outdoor clothing for the weather conditions. Finish this session around 12.30. Either bring a packed lunch or you can purchase lunch locally.

The afternoon session **starts at 1.30** in the car park at Wightwick Manor, Wightwick Bank, Wolverhampton, WV6 8EE, Grid Ref: SO 868982. (NB: The post code is misleading: the grid ref. shows the car entrance from the Bridgnorth Road, A454.) See the link to a Google map on our website. Meet by the ticket office in the car park where we will be admitted (without charge) as a group. **Please bring NT membership cards if you have them and please be there on time!** We will visit the recently cleaned array of glacial erratic boulders, and other glacial erratics around the property, and learn something of their geological and social history. Drive on to the Mount Hotel, Mount Rd, Tettenhall Wood, Wolverhampton WV6 8HL. Grid ref: SO 874989 (see the link to a Google map on our website). Meet in the hotel car park at 2.45 – 3.00 (depending on exit time from Wightwick Manor). Here we have permission from the hotel to visit the erratics from Charles Benjamin Mander's late 19th century 'bouldery'. We will examine their varied geology and learn about their connection with the Wightwick Manor erratics. Finish 3.30 – 4.00.

Monday 19 October (Indoor Meeting): 'The Ediacaran Biota of Charnwood Forest: the behind the scenes story'. Speaker: Dr. Mike Howe (Chief Curator and Head of the National Geological Repository at the British Geological Survey). There are several speakers talking on the results of the work and the implications for the origins of multicellular organisms, but I believe that the original discovery of the fossils around 1849 and their subsequent erroneous discrediting, plus the pivotal role played by a local society – Section C, LLPS (Leicester Literary & Philosophical Society) – in reinvigorating Ediacaran research in the UK, makes an equally interesting story.

Monday 16 November (Indoor Meeting): 'Bringing Forward the Past: Black Country Geology, Past, Present and Future - Part 2'. Speaker: Graham Worton (BCGS Chair and Keeper of Geology for Dudley). This talk will complete Graham's fascinating insight into the Geology of the Black Country. Part 1 was delivered to the Society on 19 January under the title: 'Geological Knowledge and the Geology of the Black Country up to 1900'. If you missed it, or want to refresh your memory before Part 2, it is available on our YouTube channel here: <https://www.youtube.com/watch?v=76Pi2HbQU-c>

Monday 14 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. Please contact Mark: honsec@bcgs.info if you can offer a short talk for this event. Bring along any interesting geological specimens you would like to show us, or which you would like to be identified – there may be someone in our midst who can help!

Wren's Nest Mid-week Geoconservation Days

The following dates on Tuesdays and Wednesdays in November and December have been sent to Andy by Wren's Nest Senior Warden Ian Beech. These are sessions when BCGS members are invited to take part in geoconservation work at the Wren's Nest. This is a new venture to try and get around the problem of warden availability at the weekends. Please just turn up if you are available at any of these times.

Tuesdays 3, 17, 24 November and Wednesdays 4, 18, 25 November

Tuesday 1 December and Wednesday 2 December: (Geoconservation Days): Wren's Nest. Directed by the reserve wardens. Meet at 9.30 at the wardens' office, at the end of Fossil View (*the road into the new housing estate, site of the former Mons Hill College*). (GR: SO 93699 92118). Park along Fossil View. The day will involve scrub clearance. Bring gloves, stout footwear and a packed lunch. Wardens will provide tools, hard hats if necessary and a hot drink. Finish around 2.30.

Saturday 16 January 2027 (Geoconservation Day): Shire Oak Nature Reserve, Walsall. In collaboration with the Walsall Conservation Volunteers and reserve wardens. Meet at 10.00 at the Shire Oak Nature Reserve Car Park, off Shire Ridge. Nearest post code: WS9 9RL, grid ref: SK056 039, What3Words (<https://what3words.com>): reconnect.crackling.skills. The day will involve scrub removal to free up heathland and geological features. Wear old work clothes, waterproofs and stout footwear. Please bring gloves. Tools provided but do feel free to bring your own. Bring a packed lunch. Hot drinks will be provided. Finish 2.30 to 3.00.

Saturday 27 February (Geoconservation Day): Portway Hill, Rowley. In collaboration with the Friends of Portway Hill group and the B&BC Wildlife Trust. Meet at St Brades Close, off Tower Road at 10.00 (grid ref: SO 974 893, nearest PC: B69 1NH). Directions: from Birmingham New Road (A4123) turn left on to Tower Road if coming from Birmingham, right if coming from Wolverhampton. Just after Bury Hill Park, turn left on to St Brades Close. Wear old work clothes, waterproofs and stout footwear. Please bring gloves. Tools provided but do feel free to bring your own. Also bring a packed lunch, hot drinks provided. Finish around 14.30.

Saturday 13 March (Geoconservation Day): Moorcroft Wood. In collaboration with the Walsall Conservation Volunteers and reserve wardens. Details TBC.

Saturday 27 March (Geoconservation Day): Barr Beacon. In collaboration with the Walsall Conservation Volunteers and reserve wardens. Details TBC.

Other Societies and Events

Woolhope Naturalists' Field Club - Geology Section

Friday 16 October: 'The Knighton Geological Map – an update'. Speaker: Arthur Tingley.

Non-members are welcome and pay £7. More info. at: <https://www.woolhopeclub.org.uk/meetings>

Teme Valley Geological Society

Monday 26 October: 'Ledbury Railway Cutting and the Passage Beds'. Speaker: Rosie Watkins.

Monday 23 November: 'What are the real risks from Landfill?' Speaker: Dr. Robert Gregory.

Talks take place in Martley Memorial Hall at 7.30 and some take place on Zoom. Non-members £3. For further information email: enquire@geo-village.org or visit: <https://geo-village.org/>

East Midlands Geological Society

Saturday 31 October: 'Polygons, palsas and pingos in the periglacial landscape of the East Midlands'. Speaker: Dr Colin Baker.

Saturday 14 November: 'From the bog to the sea: the Mull Dyke Swarm'. Speaker: Professor Joe Cartwright.

Lectures are from 6.15 to 7.15, and are normally held in the School of Geography Sir Clive Granger Building on the Nottingham University Park campus. Non-members are welcome at all of our lectures and attendance is free of charge. Please note that payment is now required for car parking in the Main University Visitors Car Park on Saturday evenings. Further info: www.emgs.org.uk

Shropshire Geological Society

Wednesday 14 October: 'The Chengjiang Lagerstätte'. Speaker: Prof David Siveter (University of Leicester).

Wednesday 11 November: 'Geology of the Himalayas'. Speaker: Prof Peter Treloar (Kingston University, London).

Wednesday 9 December: 'Quaternary Geology of Shropshire'. Speaker: Mike Streetly (Shropshire Geological Society).

Meetings are at 7.15, lived streamed on Zoom and held in person at The Methodist Centre, Lansdowne Road, Bayston Hill, Shrewsbury, SY3 0HZ. If you wish to attend please contact Albert Benghiat: 07710 421 581, email: SGS.chair@hotmail.com
Further information: <https://shropshiregeology.org.uk/>

North Staffordshire Group of the Geologists' Association

Thursday 12 November - Wolverston Cope Annual Lecture: 'How Geology Made The Potteries'. Speaker: Bernard Besly.

To book a field visit please contact NSGGA Field Secretary, Steve Alcock: steves261@aol.com
Lectures are held in WS0.06 in the William Smith Building at Keele University, typically at 7.30.
For more information: <https://nsgga.org/>

Lapworth Lecture

Monday 19 October from 5.30 to 6.30: 'When the ground moves (and we miss it): what satellites can (and can't) tell us about landslides'. Speaker: Dr Benedetta Dini (Assistant Professor at the University of Birmingham and a Researcher at the University of Milan-Bicocca).

Venue: Lecture Theatre WG12, Aston Webb Dome & Semi-Circle, University of Birmingham, Edgbaston, Birmingham, B15 2TT). There is no admission charge and all are welcome to attend. For more information: <https://www.birmingham.ac.uk/facilities/lapworth-museum/events> Online or in person.

Geologists' Association Festival of Geology

Saturday 7 November, 10.30 - 4.30: Burlington House, London W1J 0BG. Talks throughout the day: 'Impossible Fossils' by Prof. Phil Manning, 'Lunar Science' by Prof. Katherine Joy, 'The Secret Ingredient for a Habitable Planet' by Dr Lucía Pérez-Díaz; Exhibits by societies, universities and museums; Rockwatch activities for the younger generation.

Sunday 8 November, Field Trips around London: The Natural History Museum's Evolution Garden; City of London and Battersea Park. More details here: <https://geologistsassociation.org.uk/festival/>

Geological Society of London

Tuesday 13 October: 'Can Geology Save the World?' - Public Lecture. Speaker: Chris Jackson.

These lectures are free to attend by Zoom or in person at Burlington House, Piccadilly, London, W1J 0BG.
More information at: <https://www.geolsoc.org.uk/events-and-venue-hire/public-lectures/>

Mid Wales Geology Club

Wednesday 21 October: 'Eclogite, how one rock shapes our planet'. Speaker: Tony Thorp.

Further information: Web: <http://midwalesgeology.org.uk> lectures start at 7.15 and are a hybrid of in-person meetings at Plas Dolerw, Newtown, SY16 2EH and via Zoom. Those wishing to join a meeting remotely should contact the secretary, Chris Simpson, at christopher_s@btinternet.com

Open University Geological Society, West Midlands

Saturday 7 November: Practical Mineralogy Day School.

Alan Richardson leads the sessions at the Lickey Hills Country Park Visitors' Centre (B45 8ER). Non-members are welcome. A charge is made for each event. This covers workbooks, published course guides and the use of all the necessary testing equipment. For full details of these Day Schools, please visit the West Midlands page of the Open University Geological Society: <https://ougs.org/westmidlands/>

Manchester Geological Association

Saturday 17 October from 11.45: The Broadhurst Lectures

12.30: 'The influence of the geology and landscape of Northern England on prehistoric and Roman societies'. Speaker: Ian Jackson.

1.30: 'Glacial Erratics'. Speaker: Les Knight

20 min. break then:

'Forensic Geophysics: searching for the hidden'. Speaker: Dr Jamie Pringle.

Saturday 21 November – There will be three presentations:

Dr Guy Paxman will talk about his work on the sub-ice surface in Antarctica

Dr David McNamara from Liverpool University will speak on his work with hydrothermal

alteration of mid ocean ridge basalts and about CO₂ storage and ocean floor tectonics.

Professor Mark Bateman will give a talk with the title 'Yorkshire, land of ice and water'

The Venue is The Department of Earth and Environmental Sciences at The University of Manchester, located in the Williamson Building, 176 Oxford Road, Manchester – opposite The Manchester Museum. Please contact us at info@manchestergeology.org.uk to book on to these events.

Warwickshire Geological Conservation Group

Sunday 11 October from 10.30 to 4.00: Day Field Meeting: Smestow Valley, Wightwick Manor and the Mount Hotel. Led by Andrew Harrison and Julie Schroder.

Thursday 15 October from 7.15 to 9.00: 'Mines, manganese and mistakes'. Speaker: Alison Barraclough (President of the Geologists' Association).

Thursday 19 November from 7.15 to 9.00: 'Geology of Stonehenge'. Speaker: Peter Worsley.

For more information visit: <https://www.wgcg.co.uk/> or email: WarwickshireGCG@gmail.com.

Editorial

The October Newsletter has been somewhat delayed due to the absence of the 'editorial team' (John and me!) on a New Scientist Discovery tour exploring the caves of Slovenia. More of this, hopefully in a later edition.

In this issue we bring news of our experimental new venture to enable geoconservation work to take place during the week, and you will see that there is a refreshing new link with Walsall, with two new sites for geoconservation work. Details are in our programme above. Please support these sessions if you can. The larger the workforce, the more we can achieve in our quest to preserve what we can of the many fantastic geological sites in the Black Country.

The 2026-2027 talks programme got off to a lively start with a talk by Andrew Scott and colleagues on advanced scanning techniques which could potentially be used for detailed 3D mapping of the limestone caves and much more. In October, Mike Howe from the BGS will present some unusual insights into the history of the Charnwood Ediacaran biota, then in November Graham will conclude his unmissable in-depth history of Black Country geology.

December brings our usual seasonal Members' Evening - please contact Mark if you would like to give a short presentation on anything geological, or bring interesting specimens for identification or just to exhibit to the assembled company. In the meantime, enjoy the Newsletter and apart from supporting our own events, have a look at all the wide range of activities provided by other societies. ■

Julie Schroder

Geoconservation and Field Meeting Reports

Saturday 25 July: Field Visit to Bewdley Museum and Town Centre. Led by Liz Cowley (Bewdley Museum Collections and Interpretations Officer) and Andrew Harrison (BCGS).

Historical Background

Warm and generally sunny conditions accompanied our July visit to Bewdley with around 10 members meeting Liz Cowley at the museum entrance at 10.30. Here, Liz introduced the town and the museum's origins, heritage and what is on display. ►

Bewdley's geographic setting and the local geology have heavily influenced its history and development. Located within the Severn Valley, and straddling the River Severn, the town sits at around 20m Above Ordnance Datum (m AOD). The local landscape rises to the east, towards the outskirts of Kidderminster, and to the west, towards Bark Hill and Hales Park, at approximately 80m AOD. The River Severn flows roughly north to south through the town, the main part of which sits on the western bank. Load Street, (derived from lode – an old English word for ferry), acts as the main street through the town and over the river. Due to its width, Load Street acts as a marketplace.

Dating back to prehistoric times, the local area started out as an early farming (Bronze Age) settlement. Its position on the River Severn, meant it soon became a major trading post and was able to accumulate wealth from producing pewter, brass, charcoal and rope. At the top of Load Street sits St Anne's Church and many of the shops and buildings lining the street were built between 1745 and 1748. The arrival of the Staffordshire and Worcestershire Canal (1772) followed by the Severn Valley Railway (1862), put an end to the River Severn as a major trade route. Today the river is generally used for more recreational purposes and is well known for the flood risk it poses to the town. Bewdley formed a significant strategic role during the Second World War and its wealth meant that over the years many rich and well-known figures of their time, have lived there. These include MP Stanley Baldwin, Conservative Prime Minister from 1908 to 1937.



Bewdley Museum in the Guildhall, Load Street

The Museum

The museum itself is housed within the new Guildhall, on Load Street, close to St Anne's Church. After becoming dilapidated the old Guildhall was demolished. The new Guildhall stands on what was originally a local grocer's shop with a series of storerooms at the back that were demolished in 1802. This made way for a butcher's shambles with the town jails behind. The Guildhall, designed by John Simpson of Shrewsbury, was completed in 1808 and served as the headquarters of Bewdley Borough Council until 1974, before becoming a meeting place for Bewdley Town Council.



'The Shambles' now part of the Museum

During the 18th century, the Shambles provided a home to Bewdley's fire station and was later used as a storage depot by Bewdley Borough Council. After the formation of the Bewdley Museum Trust in 1969, the Shambles underwent restoration works and opened as Bewdley Museum in 1972. Founder Stephen Quayle, stated that the aims of the museum were:

"to show people, who have only known Bewdley as a sleepy backwater, what a busy and important centre it was. It will become the focal point of the town and we hope it will attract visitors and stimulate trade." ►

The museum's collections display the town's social and industrial history and archaeology, geology and fine art. Our tour started with the Bewdley Story display, which explores the town's fascinating history and the people who live there. The former Shambles has been made into various exhibition spaces that include a 'Magic of Middle Earth Exhibition' display (temporary), information and samples promoting the Abberley and Malvern Hills Geopark, original 18th century fire engines and at the far end the town's jails which show some old police equipment and stories of crime and punishment in the 19th Century.

Founded in 2001, the Abberley and Malvern Hills Geopark (AMHG) extends from Bridgnorth through Worcestershire and Herefordshire to Gloucester. The Geopark spans 700 million years of Earth history coupled with dramatic landscapes and a wealth of ecological, historical, and cultural gems. Winding its way from Bridgnorth to Gloucester, a 109 mile Geotrail (The Geopark Way), allows the explorer to see what the Geopark has to offer. A forum of voluntary organisations, including Bewdley Museum, run the Geopark and annually, from May to September, they hold the AMHG Geofest, which includes various events to attract visitors and promote Earth Science. More information can be found on the Geopark website: <http://geopark.org.uk/pub/>

Adjacent to the jail, is a walled herb garden complete with a World War II air raid shelter, built in 1940 to protect local post office employees. Beyond the herb garden is a 250-year-old brass foundry where visitors can see the processes, equipment and working conditions endured by those involved in producing brass. As with the pewter and charcoal production, the raw materials for the brass (copper and tin), came from the Wyre Forest located on the high ground to the west of the town. For the final part of our museum tour, we were shown the 'rope walk' and given a demonstration of how rope was made to supply various local industries.



Bewdley Bridge, made of Carboniferous Highley Sandstone, and a red Triassic Sandstone

Bewdley Town Geology Trail

We stopped for lunch at the museum café or in the herb garden under warm sunny skies. The afternoon session was a walking tour around Bewdley Town Centre looking at various features and buildings stones. Several leaflets and booklets, produced by the Herefordshire and Worcestershire Earth Heritage Trust and the Abberley and Malvern Hills Geopark (see reference list), provide a building stone, geology and heritage trail around the town. The route we took generally followed what is described in these documents.

We started at the entrance to the Guildhall and Museum with an overview of the local geology and geography. Located within the Abberley and Malvern Hills Geopark, Bewdley sits on the south-eastern edge of the Wyre Forest Coalfield. The home county of Worcestershire covers ten geological periods spanning the Precambrian to Jurassic and Quaternary with only the Cretaceous and Tertiary missing. A ribbon of superficial alluvium follows the River Sever through Bewdley. Underlying the alluvium are river terrace deposits which form terraces and breaks in slope occupied by the town buildings. Underlying the central and eastern parts of the town and forming the high ground towards Kidderminster, are Permo-Triassic sandstone and conglomerate strata belonging to the Bridgnorth Sandstone Formation and the Chester Formation (formerly known as the Kidderminster Formation). ►

Underlying the high ground to the west are Coal Measures strata forming the Wyre Forest Coal Field. These belong to the Carboniferous Pennine Coal Measures Group. The Bewdley Fault, running roughly north to south through the town, separates the older Carboniferous strata from the younger Permo-Triassic rocks.

Externally, the Guildhall Building is faced with a greenish-brown cross-bedded sandstone, the Highley Sandstone, which belongs to the Halesowen Formation and is Upper Carboniferous (c 345 Ma), in age. The stone originates from Stanley Quarry at Highley (approximately 6 miles up the river) and was transported here by barge. The quarry was worked from around 1804 until it was replaced with a coal mine in the 1860s/70s and the Severn Valley Railway took over. Highley Sandstone can be seen in many buildings and structures within Bewdley and along the River Severn from Bridgnorth to Worcester.

The Guildhall entrance is paved with Carboniferous limestone cobbles, of unknown origins, which are edged with darker dolerite (or microgabbro) cobbles sourced from the Clee Hills. The same dolerite can be seen as paving and kerbs elsewhere around Bewdley Town Centre.



*Bewdley, looking along Load Street
to St Anne's Church*

Our next stop was Bewdley Bridge leading out of the town centre. The current bridge is the third such structure over the River Severn at this location, the earliest being a stone bridge, which in 1447 was destroyed during the Wars of the Roses. A second bridge, built slightly downstream, lasted for 100 years before being washed away by floodwater in 1795. The current bridge was designed and built by Thomas Telford and opened in 1800. It acted as a strategic defensive position during the Second World War with a former toll house on the north-east corner that acted as a machine gun post. The toll house was demolished in 1960 due to cracking from heavy traffic and flood damage.

The bridge's arches and abutments are constructed from Highley Sandstone, and the bulk of the bridge is built of reddish-brown Triassic Sandstone, believed to be Holt Stone from Ombersley. Both sandstones have been impacted by weathering and show cross-bedding which indicates deposition in a fluvial environment. The bridge balustrade (pillars and pedestals) comprises pinkish or red-whitish sandstone, which is either Hollington Sandstone sourced from Staffordshire or Pennant Sandstone from the Forest of Dean. Cobbles from the Triassic Chester Formation pave the riverside beneath the bridge.

Walking north along the western riverbank, our next locality was Severnside North, Dog Lane and the Quayside. Here, we saw evidence of riverbank reinstatement and reinforcement following flood erosion, using sandstone blocks from Cumbria and dolerite boulders from Clee Hill. Thinly laminated siltstone, or fine sandstone, typically used in Bewdley's streets, has been used for paving on the pavements here. ►



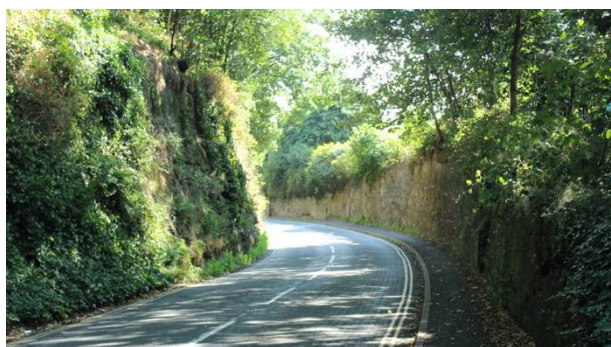
The River Severn with an old ford

Retracing our steps to Bewdley Bridge and crossing over to the east side, our next stops were the Railway Viaduct, the Holding Pens and Bewdley Railway Station. Within the viaduct structure and exposed within the holding pens (see front cover photo showing cross-bedding in Bridgnorth Sandstone at the Holding Pens) and at the Bewdley Station platforms is a soft reddish-brown sandstone belonging to the Permian (c280Ma) Bridgnorth Sandstone Formation (formerly known as the Bunter Sandstone). Bewdley Station and the viaduct date to 1862 when the Severn Valley railway opened and the holding pens are thought to have historically held livestock for a local butcher. Stone masons' tool marks can be seen on the sandstone blocks forming the viaduct. Sandstone exposures within the holding pens and the train station show sweeping cross-beds formed from barchan sand dunes that covered the area during the Permian.



*Cross-bedded Bridgnorth Sandstone
at Bewdley Station*

Heading back to Bewdley Bridge, we passed Beale's Corner, at the Stourport/Kidderminster road junction. Prior to the new flood defences being installed, this spot was prone to flooding during particularly wet winters and often appeared on the news. Crossing the river and continuing south along the western bank, our next stop was the junction of Severnside South and Lax Lane. Looking across the river, we could see an old ford and where, when the river was low, the underlying Permian bedrock is exposed. Here, we also saw river terraces where the current river has cut down into its floodplain. This was a good location to discuss the impact of the last (Devensian) Ice Age on the River Severn. It was forced to follow a new drainage pattern southwards as opposed to going north to the Dee Estuary.



Red Hill Road and the Triassic Chester Formation

Following Lax Lane and heading southwards out of Bewdley up Red Hill Road, we came to a road cutting near the entrance to Red Hill Farm. The cutting provided excellent conglomeratic exposures of the early Triassic Chester Formation, which provided the cobbles seen at Bewdley Bridge. It sequentially overlies the Bridgnorth Sandstone. Here, we discussed the origins of this stratum within the braided Budleighensis River System that flowed northwards from northern France to discharge on the Cheshire Plain. In places the outcrop shows

vertical displacement from minor downward cutting faults. Walking back into Bewdley along the High Street and past Lax Lane we followed a former river terrace of the Severn and saw more examples of the Triassic sandstone and dolerite paving which is common to Bewdley.

Our last stop was St Anne's Church at the top of Load Street. Dating to 1450, a wooden chapel originally stood on this site and saw continued use until the mid-18th century. A stone tower was added around 1695-1696 and the final chapel was replaced in 1745. The church is predominantly built from Highley Sandstone, weathering of which has given the sandstone a rough appearance. Many cornerstones (or quoins), have been replaced with a strong, unidentified sandstone. Framing the church windows and doorway is Jurassic (c. 195 Ma), oolitic limestone, possibly Bath stone which also forms a small wall facing the nave. Bath stone was commonly used for this purpose and as a facing stone for important buildings along the River Severn and can be seen in many towns and villages along the river's length. ►

Our walking tour finished at 4.00 and we made our way back to the museum. The weekend following our visit the Museum was due to hold its own event as part of the Geofest 2026. I would like to thank Liz Cowley for a very interesting and enlightening tour of the museum and hope this will encourage members to explore more of the Geopark. ■

Andy Harrison

References:

Further information on Bewdley geology and the Abberley and Malvern Hills Geopark can be found at:

- Abberley and Malvern Hills website:
<http://geopark.org.uk/pub/>
- Herefordshire and Worcestershire Earth Heritage Trust
Explore Leaflet, 'Bewdley Town Centre – Building Stones and Geology Trail', dated 2004.
- Herefordshire and Worcestershire Earth Heritage Trust,
Community Earth Heritage Champions project booklet, 'Bewdley', dated 2010.
- Herefordshire and Worcestershire Earth Heritage Trust Booklet, 'The Stone Built Heritage of Bewdley – A Thousand Years of Building with Stone', dated 2013.



St Anne's Church, Load Street

Wednesday 26 August (Field Visit): Erratics Project Trail 2 - 'The Louis Barrow Trail, Around Bournville and Cotteridge Park'. Led by Julie Schroder.

As it has fallen to me (Leader, Julie Schroder) to compile this report I shall use the first person where appropriate in the narrative. This trip was added to the BCGS schedule at short notice as our Field Secretary, Andy, has recently been having some difficulty finding leaders for field trips, and was unable to fix anything for August. I was already in the process of fixing this trip with Monmouth U3A geology group, so it was agreed to turn it into a joint trip with BCGS. We met the group leader, Jim Handley and the rest of the group from Monmouth at 10.45 in Cotteridge Park, and it was good to see a fair representation from BCGS in spite of the mid-week timing of this event. Cotteridge Park lies close to the Bournville Estate in south-west Birmingham. All participants were given a copy of the trail leaflet.

'The Shed' was our first stop with welcome refreshments, particularly for our friends from Monmouth after their long journey. The Shed is a volunteer-run facility and it is the hub for a wide-ranging programme of community activities. The Friends of Cotteridge Park have dramatically revitalised the park since it was threatened with closure in the 1990s.



The Shed in Cotteridge Park

After refreshments I set the scene for the day's exploration of the numerous erratic boulders on this trail: this is the 2nd in a series of 8 trails in and around South Birmingham and Bromsgrove which were created during the Lottery-funded erratics project from 2021 to 2023. I explained that we would be covering most of the trail starting from the car park, rather than the printed directions from Bournville train station. ►

Of all 8 trails, this one boasts the largest collection of erratics and has the best documentation about their origins and the history of their discovery and preservation. The story starts with the deposition of numerous erratic boulders in this area, some of enormous size, and their discovery during construction of the Cadbury chocolate factory in the late 19th and early 20th centuries. The newly founded University of Birmingham was an important centre for glacial research during this time, and it was fortunate that Cadbury's chief engineer, Louis Barrow had undertaken some geological study with the University's first professor of geology, Charles Lapworth. It was already known that most of the large boulders were welded tuff erratics from the Arenig mountains in Wales, around 80 miles to the north-west. It was also becoming widely accepted that these belonged to an earlier ice advance than the vast deposits of erratics from Scotland and the Lake District found around Wolverhampton, but no further south. A significant map of all the known erratics was compiled by Fred Martin in 1890 and illustrates this very clearly. A copy of this map was passed round. Louis Barrow recognised the significance of the Cadbury erratics and it is largely thanks to his initiative that so many were preserved. It is a measure of his influence that many still remain in their original display locations to this day.



The group examining the boulders remaining from Louis Barrow's original display in Cotteridge Park

The group walked from the Shed up-hill to the south-east corner of the park. Here there is a display of the few large boulders which remain from Barrow's original collection. They were gathered from the park and nearby railway sidings over several years. I explained how a map of the original positions of the boulders and their display positions was compiled by Barrow and preserved in the archives of the Bournville Works Magazine (BWM), which was published monthly from 1902 - 1968. Barrow also had an explanatory panel installed on a plinth to make the boulders more meaningful to visitors. The plinth and panel have not survived but a modern metal plaque marks the spot with some more recent interpretation. Fortunately copies of Barrow's information panel still survive and a copy of Barrow's original boulder location map and the information panel were passed around the group. From 1908 to 1913 there are numerous items about the boulders in several issues of the BWM. These magazines were a very welcome resource for research during the Erratics Project.



Cotteridge Park boulder showing features typical of the welded tuff erratics from the Arenigs in Wales

The Cotteridge park erratics were carefully examined and found to display many of the diagnostic features of the Arenig ash erratics: the cavities left by inclusions that have eroded out; the hard, usually blue-grey matrix of the welded tuff; evidence of flow-banding from the pyroclastic flows which produced these rocks; occasional black streaks representing fragments of pumice squashed by subsequent deposits before they had time to solidify. Two further substantial boulders in a different part of the park were examined for their credentials as Arenig ash erratics. Striking features very visibly displayed some of the main diagnostic hallmarks of the Arenig erratics, and these were easily recognised by the group. ►

Moving away from Cotteridge Park towards Bournville village there was a chance to admire the quality of some of the houses in the Bournville estate. These are testimony to the determination of the Cadbury brothers, Richard and George, to provide better conditions for their workforce than the inner city standards which preceded the move to the suburbs. The name 'Bournville' was newly created for the new estate around the end of the 19th century.

As we approached the factory, we stopped at Cadbury park, formerly the 'Girls Recreation Ground' and an oasis of peace within the factory complex. Here there are two similarly shaped erratics of moderate size, one of which holds particular significance in the local erratic story. I explained how this particular boulder created controversy between the chief engineer and his former tutor, Professor Lapworth, and that their correspondence survives in the pages of the BWM around the year 1910.



The original 'Bournville Boulder' in Cadbury Park

The controversy referred to the fact that the boulder was found embedded in the underlying bedrock of Triassic marl and not contained within the glacial boulder clay like many of the other erratic finds from the factory site. Barrow felt that this was evidence that it belonged to a much earlier age than the Ice Age of the Quaternary Period. Lapworth was convinced that it belonged to the same story as the known Arenig ash erratics, but had been at the base of a glacier and become embedded in the underlying marl due to the pressure of overlying deposits. It is documented that this boulder was moved from the main factory building site to the ladies' recreation ground. In the correspondence it was named 'The Bournville Boulder', though of course it became one of many!



Minworth Greaves museum, Bournville (small erratic to the left of the door)

From Cadbury Park we made straight for the historic centre of Bournville Village where there are plenty of food outlets and benches around the Village Green for those with packed lunches.

After lunch we reconvened in the lovely grounds of the nearby Selly Manor Museum, where I explained the origins of the manor house and its companion, a 'cruck-framed' house known as Minworth Greaves. Both have their origins in the medieval period. They were saved from destruction by George Cadbury and reconstructed here in the early part of the 20th century. George also showed interest in the glacial erratics that were turning up in and around

Bournville and some small ones have been preserved in the grounds. There is a medium-sized Arenig ash boulder by the entrance to Minworth Greaves, but we knew of other smaller ones in the grounds which had become lost in the undergrowth. During the Project we were lucky to have the full co-operation of the museum manager, Daniel Callicott and a working party was assembled to find and re-locate the small erratics to a dedicated plot at the end of the garden. During our visit these generated some lively conversation in the group as we tried to distinguish the 'true' Arenig erratics from those which may be erratics, but possibly from a closer source. The collection has an information plaque ►

based upon the work of the Project, but made and installed by the team at the Museum. The museum is owned and managed by the Bournville Village Trust, and there is a charge, but prior permission was obtained for the group to visit the erratics in the grounds.

Retracing our steps through the Cadbury factory we lingered to take in more of the scale of the original Cadbury operation, and its growth into the modern era. It was sold many years ago to the American Kraft organisation, which later split into two companies and Cadbury is now a small part of Mondelēz International, a vast snack and confectionery enterprise based in Chicago.



Small erratic boulders recently put on display in the grounds of Selly Manor

We crossed the small Bourn Brook which played a significant part in the choice of site for the original factory, and admired the attractive historic buildings as we headed for the Bournville Station Boulders. These boulders mark the 'official' start of the trail, but for us they were the final stop. Here there are two very large boulders which played an intriguing part in the local erratic story.



Massive erratics on display near Bournville Station

I explained to the group that the one nearest the station was unearthed during widening of Bournville Lane in 1910. It was found in disturbed ground and seemed to be contained within the Triassic marl. This led to some further correspondence between Barrow and Lapworth about the age of the erratics. Lapworth visited the site and found a modern brick under the boulder! It turned out that it had been discovered 20 years earlier during a previous phase of road works. Richard Cadbury wanted it for his garden but this didn't happen and the boulder was re-buried. This discovery put an end to Barrow's theory, but in 1910 the boulder was given due respect and installed on the grassy bank beside Bournville Lane. Even more

intriguing is the suggestion in a later BWM report that some records in a sealed container were buried in the concrete beneath the boulder! A larger boulder, weighing an estimated 5 tons was found in the same year and installed beside the earlier one, where both remain to this day.

Members of the group spent some time looking at the now familiar features of the Arenig erratics, with the additional interest of clearly-defined striations on the larger boulder. These were on a smoother surface and implied that the boulder had been at the base of a glacier and was scratched as it moved along the bedrock.

There was plenty of 'erratic' conversation as we walked back to the car park, and I felt pleased to have had the opportunity to show the Monmouth U3A group and members of BCGS around Cadbury's glacial world. I hope the trip has whetted appetites to visit the Erratics Project website: erraticsproject.org - and perhaps for further exploration of the glacial boulder trails. ■

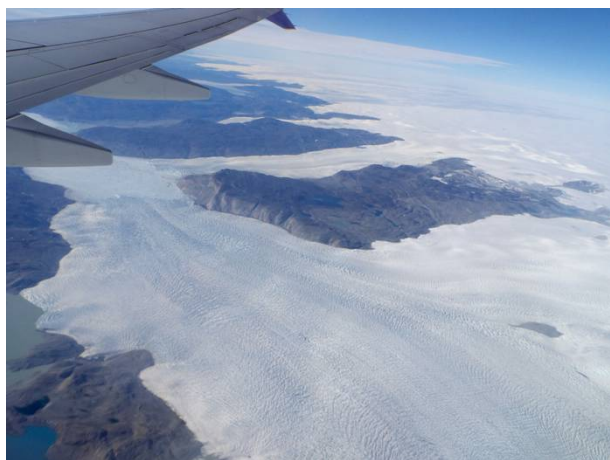
Julie Schroder

A Greenlandic Saga from Disko Bay to Prince Christian Sound - Part 1

Greenland, the world's largest island lies just some 4 hours flying time from the UK. Our route in July 2026 took us from Manchester to Reykjavik (Iceland) in 2 hours 10 minutes flying time, then Reykjavik to Nuuk (Greenland's capital) in another 1 hour 50 minutes.

Greenland is home to the second most extensive icecap on our planet and also contains some of its oldest rocks. With an area of 836,330 square miles, 80% of which is ice covered, it is an autonomous territory of Denmark with a population of only 56,000. It has none of the commercialism of Alaska but has just as many spectacular glaciers and ice-capped peaks offering an authentic visit to one of the world's greatest wildernesses.

Road communications are virtually non-existent and internal flights often limited by low cloud and sea mist so most journeys are made by sea. Commencing at Nuuk visitors normally sail north to Ilulissat, the gateway to Disko Bay (a UNESCO World Heritage Site) and then return south down the Davis Strait where there is the potential to visit further spectacular fjords. Here, moraine covered glaciers flow down to the ocean and wildlife, particularly seabirds, abound. All of this is to be covered in future instalments of this 'Greenlandic Saga'. Most vessels then transit Prince Christian Sound, some 60 miles in length and only 500m wide at its narrowest point, before entering the Denmark Strait and then heading for Reykjavik, one day's sailing away.



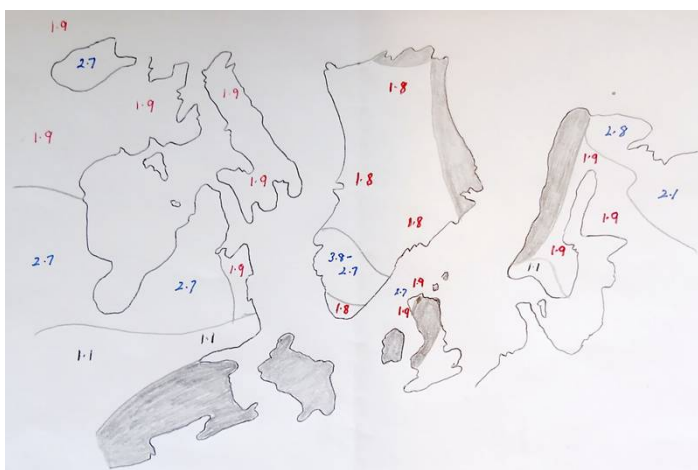
*Western Margin of Greenlandic Icecap as seen
from the approach to Nuuk*

The geological history of Greenland is a fascinating glimpse into the early crustal development of our planet. As many similarities exist between the rocks of southern Greenland and the Lewisian outcrops of NW Scotland, it is worth detailing a short summary of the early research into these Lewisian rocks which act as an analogue to the events in Greenland.

The original survey of 1907 by Peach and Horne recognised the complexity of the Lewisian outcrop often referred to by them as the 'Old Boy'. However it was the work by Sutton and Watson of Imperial College, London in the early 1950s which led to a better understanding of the history of these rocks when they established that a major metamorphic

event had occurred at approx 2800 million years ago. They named this the 'Scourian', and again at 1700 million years another event was termed 'Laxfordian', enabling some form of chronological order to be established. These metamorphic events are replicated in Southern Greenland where a stable block of very old supercrustal rocks termed 'Archaean' (equivalent to the Scourian), is surrounded to the north by the 'Nagssugtoqidian' mobile belt and to the south by the 'Ketilidian' mobile belt. Both these are equivalent in age to the Laxfordian event. This coincidence is only to be expected, as a comparison of the continental shelf margin between Greenland and NW Scotland shows that only a few hundred miles would have separated these two areas, originally located on the edge of the great Laurentian shield craton. They were subsequently to be separated by the opening of the Atlantic Ocean. ►

In an attempt to reconcile the various observed thermo-metamorphic events, the term 'chelogenic' or 'plate-forming' cycle was proposed by Professor J Sutton in the 1960s. It is an attempt to explain the development of the crust where gneiss and migmatites of diverse origin and subject to extreme pressure and temperature associated with 'granulite facies' metamorphism, slowly cooled from 3000 million years ago to form stable shield areas or cratons which are recognised today in North America, Fennoscandinavia, South Africa etc. Surrounding these stable blocks are more brittle zones where reworking and deformation involving metamorphism to a lower grade 'amphibolite facies' occurs. The Grenvillian orogenic events of much shorter duration than the Grenvillian Orogeny is recognised followed by shorter duration but increasing frequency.



Sketch of North Atlantic land masses c. 400 million years ago. Caledonides are shaded, ages are in billions of years

A diagrammatic reconstruction of the North Atlantic land masses circa 400 million years ago (above) shows very well the distribution of these techno-metamorphic episodes. The Caledonides are shown by the shaded areas and all other crustal blocks show approximate age in billions of years of the last isotopically significant thermal event in each unit.

The above is a rather simplified introduction into the geological history of Greenland. For much more detailed information a list of references is detailed below. The UNESCO World Heritage Site of Disko Bay, more commonly known as the birthplace of Icebergs, will be covered in the next instalment. ■

Mike Williams

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Mike's Musings No. 65

Follow that dyke: Part 2 – Cleveland

(For Part 1 - 'Armathwaite', refer to Newsletter 298, August 2026. Ed)

Resuming our pursuit of the dyke eastwards, which now begins to get referred to more commonly as the Cleveland Dyke, we find it reappears at outcrop some eight kilometres further east (although it has been recorded in coal mines in the interim) in Haggerleases Quarry, near 'The Slack' at Butterknowle. This area was heavily industrialised and claims to be the home of '*one of Britain's first commercial coal mines and earliest public railway... built in 1830 as a branch of the famous Stockton and Darlington Railway*'. The coal hereabouts was of good coking quality and the Gaunless valley preserves a few of the many 'beehive' coke ovens constructed across the county of Durham. ►

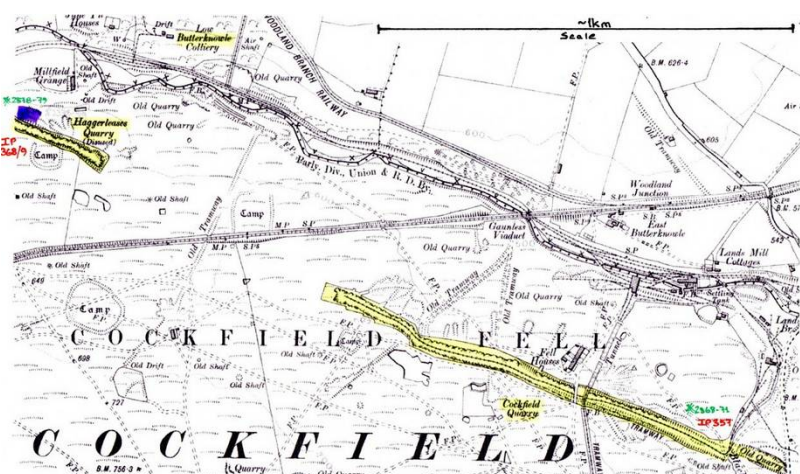


Fig.1. Line of the Cleveland Dyke workings at Butterknowle - Cockfield, Co. Durham



Fig.2. The main access into Haggerleases Quarry, a prickly affair these days!

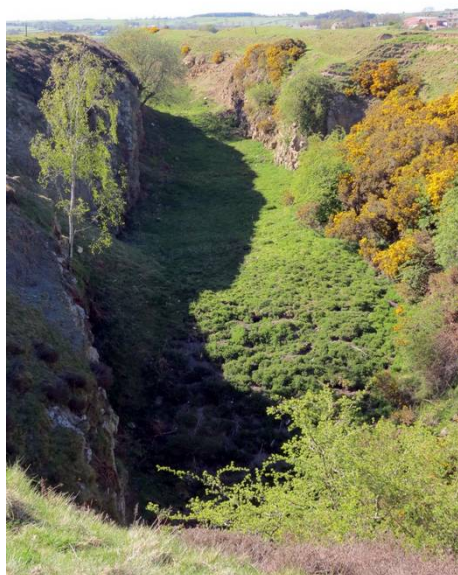


Fig.3. Haggerleases open cut seen from the opposite end to Fig.2

Between Butterknowle and Cockfield the line of the dyke resumes a WNW-ESE trend along a line of two deep cuts marking extensive exploitation as early as 1780 (Fig.1). This was one of the few reliable sources of much needed aggregate in the district. Haggerleases Quarry itself is barely accessible these days without either fighting through thick prickly vegetation (Fig.2) or by abseiling down into its void! (Fig.3). It only offered loose material from surrounding margins (on my visit). Adjacent workings (marked purple on Fig.1) expose the host Coal Measure shales and sandstones that have been partly heat-altered and disrupted by the intrusion (Fig.4). The eastern end of the longer cut at Cockfield is more accessible (Fig.5) but also only offered loose material, albeit in abundance. Old black and white photographs in the BGS Barnard Castle memoir (E32) show the highly irregular cooling joints and give an impression of just how complete extraction was. Little, if any, dyke rock remains on the walls of the cut.



Fig.5. Looking west along the Cockfield open cut

Large scale exploitation is further in evidence at the next outcrop at Bolam about six kilometres further ESE. Here, the dyke appears to ►



Fig.4. The edge of Haggerleases Quarry: heat-altered Coal Measure shale host rocks



Fig.6. The Cleveland Dyke in what remains of the excavations in Bolam Quarry

There then follows a hiatus of some twenty kilometres before intermittent outcrops are available around the outskirts of Middlesborough. The first such location in Coatham Beck, near Eaglescliffe (Fig.7), offered the familiar sight of loose dyke rock in the river bed, but no clear exposure. Hollows in woodland in Eaglescliffe itself mark the site of extensive old workings, with dyke rock having been used for edgings along the paths (Fig.8).



Fig.8. Cleveland Dyke edgings along the paths through Eaglescliffe Woods

as light was fading late in the evening when I eventually unlocked the key to access via the Industrial Estate itself. Nearby, Stainton Beck, a tributary of the above, flows behind the modern housing estate of Stainton, where the line of early C20th workings are revealed, marked by an information board about Stainton Quarry Nature Reserve (Fig.10). Here there were some scattered boulders of dyke rock to be seen. ►

have spread laterally for about 300 metres to create a local sill-like widening of the intrusion, described as a laccolith by the BGS. It also split into two leaves with a possible small offshoot (not proven), the Lough House dyke. These quarries were used for landfill and host a gas monitoring site, but one small quarry face exposing the dyke still survives (Fig.6). The line of the dyke beyond Bolam to Houghton-le-Side is more sinuous than usual, as well as being deflected by several small faults. A few pieces of loose dyke rock were present in the hedgerows, while geophysical exploration has indicated a shallow presence on an ESE line for about two kilometres beyond the village.



Fig.7. Loose blocks of dyke rock in Coatham Beck, near Eaglescliffe

Stainsby Beck, between the Teeside Industrial Estate and the A19 trunk road, proved to be an unexpected highlight, with, for once, an exposure of the dyke in the stream bed where least expected (Fig.9), after an unprepossessing approach past dumped cars and other rubbish. My image doesn't do this spot justice

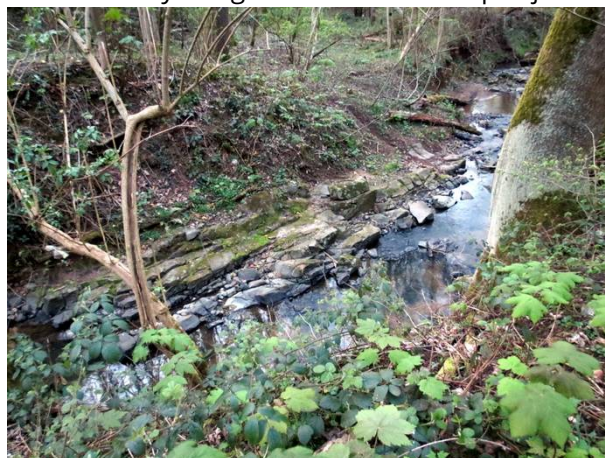


Fig.9. The Cleveland Dyke exposed in Stainsby Beck, Teeside



Fig.10. 'Whinstone' Quarry information board at Stainton Nature Reserve

The wooded Langbaugh Ridge (Fig.11) is another prominent former line of workings along which the old Nunthorpe Quarries (Fig.12), appeared to preserve the only in-situ evidence of the dyke. A little further east, beyond Great Ayton village, the escarpment which marks the edge of the North Yorkshire Moors, includes the well-known quarries in Cliff Ridge Wood. These provide more accessible relics of 'whinstone' (Fig.13), now hosted by shales of



Fig. 12. Dyke rock in Nunthorpe Quarries on the Langbaugh Ridge

Ayton Banks. This is a popular visitor spot on the Cleveland Way with picnic area and roadside parking barely able to cope with the demand on a sunny day! Here, the dyke appears in an unassuming muddy stream bed (Fig.15) amid the tumble of degraded Lias shales, which also produced several splendid ironstone concretions.

An equally unpromising old working just below the moorland road east of New Row was in the process of being cleared of trees which didn't make access any easier, but did reveal an unlikely and welcome in-situ exposure of the dyke (Fig.16). More old ►

The topography between Stainton and the next clear sighting of the dyke along the Langbaugh Ridge near Great Ayton includes two prominent summits which are possibly (or even probably?) along the line of the dyke, and if so support the small shift northward suggested on the BGS Stockton sheet (E33). This occurs as the surface host rock changes from Permo-Triassic (present since Houghton-le-Side) to the Jurassic of the North Yorkshire Moors, but this may be coincidental.



Fig.11. The wooded Langbaugh Ridge beyond the modern holiday park entrance, near Great Ayton

the Redcar Mudstone Formation (Lower Lias). Cliff Rigg Quarry was once owned by the City of Leeds Corporation and provided cobbles for many former city centre roads.

The dyke appears again a short distance ESE in a small overgrown quarry along a minor road to Aireyholme Farm (Fig.14), before the steep and winding ascent to



Fig. 13. Cliff Rigg Quarry: a whinstone remnant and associated Lower Lias host shales, coloured by thermal metamorphism



Fig.14. A small excavation of the dyke on the lane to Aireyholme Farm continues eastwards as a prominent ridge

elusive, and my next find was another nine kilometres further east in a much overgrown old quarry, now privately occupied, at Wild Slack near Lealholm (Fig.18). There was plenty of tell-tale loose dyke rock lying around the perimeter to suggest the 'real thing' was not far away!



Fig.16. Open cut along the dyke near New Row, better exposed after woodland clearance

River Esk without revealing itself (odd since this is a topographic low spot; the dyke can here only be present at greater depth than usual) until it reappears on higher ground along more open cuts (reminiscent of Cockfield), on Arundel Hill (Fig.21), and near Sil Howe (Fig.22), all the way to the Whitby-Pickering road (A169) across Goathland Moor.

A totally misinformed article I found on-line described this area as 'Yorkshire's Grand Canyon', claiming that the local "seam of whinstone... extends in a remarkably straight line for about 450 miles to the ►

open cuts four kilometres further ESE, on Commondale Moor, preserve several mounds of weathered waste, with much evidence of 'well-rusted' dyke rock (Fig.17).

Old accounts mention, and BGS maps suggest, other sightings of the dyke on either side of Ainthorpe village. These have proved



Fig.15. A muddy stream bed on Ayton Banks, with evidence of the dyke

A similar story applies to much of the remainder of the dyke's presence across the North Yorkshire Moors. BGS maps show an almost continuous presence and other disused quarries are shown on O.S. maps, but not all are in dyke rock. The only outcrops I was able to pin down were a well known roadside exposure near Broom House Farm, west of Egton Bridge, which reveals a baked contact zone (Fig.19) and a small quarry, much overgrown, near South Side Farm (Fig.20).

The line of the dyke then traverses the valley of the



Fig.17. Waste including reddened dyke rock on Commondale Moor



Fig.18. New occupants of the 'whinstone' quarry at Wild Slack, near Lealholm

Isle of Skye, where it forms the Cuillin Hills... en route it is responsible for High Force waterfall on the River Tees, and the foundations of a stretch of Hadrian's Wall."Moreover, "it was formed 26 million years ago by a volcanic eruption close to what is now the Isle of Arran" and was "left behind by a complex earthquake"! No doubt this was compiled with the best intentions, but shows you shouldn't believe everything you read. There may well be (minor, I hope) errors in my own composition!

The remaining part of the known onshore

course of the dyke extends for another five kilometres, across open moorland and on through Newton House plantation. All that remains hereabouts to indicate the presence of anything igneous are occasional scatters of loose dyke rock in remnants of open cuts associated with past exploitation, now hidden within thick ranks of mature conifers (Fig.23). The final record is of an excavation on Blea Hill just beyond the eastern edge of the woodland, supported by a geophysical determination on the nearby footpath.



Fig.19. The contact zone (dyke on left!) in the roadside quarry near Broom House Farm

Taking stock once more, a generalised plot of

locations from Eggesburn eastwards reveals that the line of the dyke, as far as one can tell from outcrops limited in places by superficial deposits, is fairly linear, albeit interrupted by small-scale faulting. The sill-like expansion at Bolam seems to be a unique case of the intrusion spreading horizontally, perhaps reflecting a local perturbation in the stress field.



Fig.20. The small and unpromising roadside quarry near South Side Farm, near Egton Bridge

Accounts have remarked on the remarkably consistent thickness of the dyke, varying between just a few to around 30 metres between known outcrops. Likewise the chemistry and mineralogy of the dyke is reasonably consistent, sufficient to suggest that it all came from one main source, although there has been a suggestion that the Southern Scotland sector (across Galloway) may have had a separate, more local magma source beneath the Southern Uplands. ►



Fig.21. 'Yorkshire's Grand Canyon' on Arundel Hill, looking east



Fig.22. A gloomy, crepuscular view of 'Yorkshire's Grand Canyon' near Sil Howe, looking west

I have so far simply referred to 'dyke rock', but the geological literature refers variously to porphyritic dolerite, basaltic andesite, augite andesite or just plain andesite or basalt. Such variation is to be expected, and superficially the rock is visually consistent in appearance. There also seems to be agreement that the dyke is tholeiitic: that is, a rock more enriched in iron, formed in less oxidised conditions, in particular at mid-ocean ridges, and moreover formed from a partial melting of mantle material. This is consistent with being part of the Palaeogene magmatic province and its association with an opening of the Atlantic Ocean.

Large dyke swarms require extensive 'plumbing systems' to provide sufficient magma and 'driving force' to sustain them. The mechanics of dyke injection are not fully understood, but flow lineations within the Mull dyke swarm seem to suggest that the principal flow direction changes from vertical to horizontal around thirty kilometres from the source. This has resulted in a change of view of the overall dynamics involved. Originally it was believed that the whole volume of the dyke (estimated at about 85 cubic kilometres) was emplaced in one event over just a few days from a single, deep-seated magma source in the lower crust, as a series of en-echelon (? fault controlled) segments, explaining the local breaks along its course. More recently it has been suggested that emplacement was from a series of smaller, shallower, interconnected sources in the upper crust, fed from a common, larger, deeper source. This would allow for mixing of deep mafic and shallow felsic magmas, resulting in the intermediate composition we see in this body.

It is also worth remembering that we mainly see only the lower levels of the dyke; ground level at the time of intrusion would have been much higher, before nearly 60 million years of erosion took place. In the North Sea sector (and possibly elsewhere) crater like 'flare-structures' have been identified, representing shallower levels of the overall 'plumbing system' with lower confining pressures, where the intrusion almost reached the surface.

Clearly there is much more to be understood about the mechanics of this, and indeed all, igneous intrusions. ■

Mike Allen

Acknowledgements:

Fig.1: adapted from <https://teessidepsychogeography.wordpress.com/2013/03/18/the-cleveland-dyke/>
'The Cleveland Dyke – The Smell of Water'

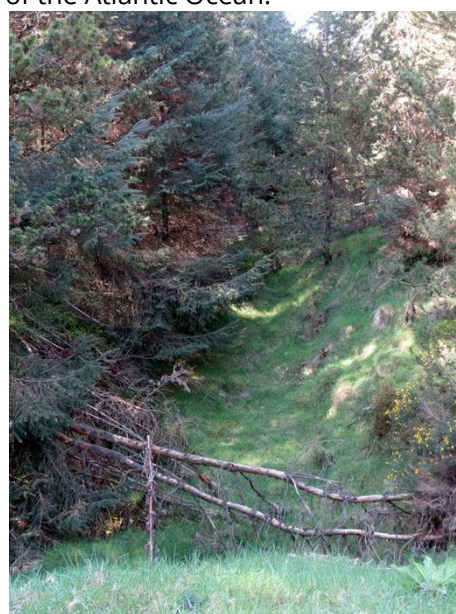


Fig.23. Almost lost in woodland, The Cleveland Dyke giving out in a shallow open cut near its final on-land presence in Newton House Plantation. 'Going with a whimper rather than a bang!'