



Newsletter No. 271

February 2022

Contents:

Future Programme	2
BCGS field visit to Dingle Peninsula	4
Other Societies and Events	5
Editorial	7
Hebridean Gems Part 2:	
The Island of Tiree	8
The Abberley & Malvern Hills Geopark	11
Matt's Maps No. 6 - Cotwall End Valley	13
Birmingham's Erratic Boulders - Update	17
Mike's Musings No. 37:	
Does the 'Geological Column'	
need the Anthropocene?	19

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

To find out more about this photo - read on!



<p>Position vacant Honorary Secretary, secretary@bcgs.info</p>	<p>Andy Harrison, Field Secretary, ☎ 07973 330706 fieldsecretary@bcgs.info</p>	<p>Julie Schroder, Newsletter Editor, 42 Billesley Lane, Moseley, Birmingham, B13 9QS. ☎ 0121 449 2407 newsletter@bcgs.info</p>
<p>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 more information see our website: bcgs.info, YouTube, Twitter: @BCGeoSoc and Facebook.</p>		

Future Programme

Indoor meetings are normally 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. The same timing applies to online 'Zoom' meetings.

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

Monday 21 February (Zoom Meeting): 'The Rocks That Don't Belong'. Speaker: Dr. Martha Johnson, University of Highlands and Islands, Orkney. This talk will explore the geological basis for understanding the rock at the Ness of Brodgar, Orkney. All stone is rock but most rock is not stone. In the index or glossary of most geology texts there is no listing for stone. Conversely, in most archaeology texts, there is no listing for rock. 'The Rocks That Don't Belong' research project is investigating the non-structural, non-tool rocks recovered from the Late Neolithic site, the Ness of Brodgar, Orkney.

Sunday 6 March (Geoconservation Day): Saltwells National Nature Reserve. Meet at the Nature Reserve car park (grid ref: SO933869) on Saltwells Lane, 10.15 for a 10.30 start. Wear old work clothes, waterproofs and stout footwear or wellies. Please bring gloves and garden tools: hand brushes, trowels, loppers, secateurs, forks and spades if you have them. Either bring a packed lunch or hot food can be obtained from the Saltwells Inn adjacent to the car park. Finish at 2.30.

Monday 21 March (Indoor Meeting, 7.00 for 7.30 start): AGM, Buffet, and Talk: 'Recent developments and future programmes of the Black Country UNESCO Global Geopark'. Speaker: Graham Worton. This talk will describe the most recent aspects of the work that has been happening within the Black Country UNESCO Global Geopark, and the next priorities and programmes. Recent projects include the 'Purple Horizons' heathland creation across the northern border of the Geopark, various artworks, new Geotrails and interpretive signage. A number of events and initiatives planned for the near future will be introduced in this presentation - and **there will be samosas and other snacks, wine and soft drinks to celebrate our return to the Archives after 2 years!** We look forward to seeing our old friends again, and meeting our new members at last!

Saturday 23 April (Field Meeting): Brampton Bryan Park, Northwest Herefordshire, led by John Moseley. Meeting point and start time TBC, but likely to be 10.00 at Aardvark Books, The Bookery, Manor Farm, Brampton Bryan, Bucknell, Herefordshire, SY7 0DH, (grid ref: SO370722). We will drive to Brampton Bryan Park to view the landscape and relate it to the underlying geology, which includes Longmyndian sandstones and conglomerates, and Eltonian shales. The trip will also include the Upper Pedwardine, the Llandovery/Tremadocian unconformity, and the boulder bed and channelling at the Eltonian/Leintwardinian contact in Lingen. We will aim to finish around 4.00 to 4.30.

Monday 25 April (Indoor Meeting): 'All the world's a stage: Geodiversity - a natural setting for a natural world'. Speaker: Dr Jonathan Larwood, Natural England. This talk will look at Geodiversity as the foundation – a stage – for the natural world and a vital component of the diverse landscapes with which we're all familiar. The talk will explore the relationship between geodiversity, habitats and species, consider the importance of understanding that relationship and the mutual benefit that an integrated approach to managing geodiversity and biodiversity brings for nature recovery. A number of Black Country case studies will be referenced in the talk including the Wren's Nest and Saltwells National Nature Reserves.

Saturday 7 May (Field Meeting): Dudley Museum at the Archives and Wren's Nest National Nature Reserve, led by Graham Worton. Joint Field trip with the WGCG. Meet at 10.00 at the Archives building, Tipton Road, Dudley, DY1 4SQ, (grid ref: SO950912) for a tour of displays followed by a field visit to Wren's Nest NNR to look at recent works and to discuss future plans.

Wednesday 15 June (Evening Field Meeting): The Building Stones and Landscapes of Dudley Town Centre Geosite, led by Graham Worton. Meet at 6.30 outside the Old Dudley Museum in St James Road, Dudley, DY1 1AH, (grid ref: SO943903). An evening walk around the town centre to discover the geological and architectural heritage of the town. (Ample free parking is available after 6.00 on roads around the museum.) This is to be followed by a social in a town centre pub after the walk.

Wednesday 6 July (Evening Field Meeting): The Geology and Landscapes of Barr Beacon Local Nature Reserve Geosite, led by Graham Worton. Meet at 7.00 at the Beacon car park (grid ref: SP060967). An evening walk to examine the geology and its effects on the landscapes of the Barr Beacon area of Walsall. Graham will also explain the recent works and new interpretation installed as part of the 2022 'Purple Horizons Nature recovery project' with Natural England.

Thursday 4 August (Evening Field Meeting): The Geology, mining heritage and landscapes of Himley Hall and Baggeridge Country Park, led by Graham Worton. Meet at 6.30 at Himley Hall car park, DY3 4LA, (grid ref: SO889915). An evening walk to examine the geology and its effects on the landscape of the historic hall that was also the home to the last deep coal mine of the Black Country (Baggeridge Colliery).

Wednesday 7 September (Evening Field Meeting): The Geology of the Rowley Hills Geosite, Sandwell, led by Graham Worton. Meet at 6.30 in the lay-by roadside parking on Darby's Hill Road, B69 1SG, (grid ref: SO967892). This evening walk will take in the views, look at exposures of the famous 'Rowley Ragstone' at the Blue Rock Quarry Geosite, and some millennium Geoart installations.

BCGS field visit to the Dingle Peninsula, Ireland

26 – 30 September 2022

The BCGS is currently in the process of arranging a field visit to the Dingle Peninsula, due to take place from Monday 26 September to Friday 30 September. The visit will be led by Ken Higgs, Emeritus Professor of Geology at the University of Cork, who has extensive knowledge of the area, as those who attended his Zoom lecture on the topic given to the BCGS last year will know. The lecture can still be viewed on YouTube [here](#).

Our plan is to have an early start with a Ryanair flight from Birmingham to Cork on 26 September, followed by a leisurely coach ride to Dingle, checking in to the Dingle Harbour Lodge Hotel for a 4-night stay on a bed & breakfast basis (www.dingleharbourlodge.com). There will be free time to explore the delightful town of Dingle in the afternoon, then an introduction to the area and the itinerary by Ken in the early evening. There are a wide variety of options for evening meals in Dingle and individuals or small groups may take the opportunity to try out a number over our stay.



On Tuesday and Wednesday, we will have full days 'in the field', learning much about the structures and geological features of the area, which has the most diverse geology of all the peninsulas in SW Ireland, with rocks ranging in age from Ordovician to Carboniferous.



The final full day (Thursday) will offer the opportunity for more geology or the chance to opt for time spent at a number of more traditional tourist and cultural sites in the area. The group then leaves by coach to Cork after breakfast on Friday, for the return flight to Birmingham.

We cannot be too sure of the exact price yet, but the cost of B&B accommodation for the 4 nights is €240 per person in a twin/double room (about £200), or €280 in a single room (£234). The flight is likely to be under £100. We are currently waiting for a quote for the cost of transfers and excursions, and should have the information within the next week.

At this stage, we are asking for expressions of interest, so we can draw up a list. Places are limited and will be allocated on a 'first-come, first served basis'. Priority will be given to BCGS Members.

To whet your appetites, the photos above show ripple marks, and trace fossils abundantly visible in the Silurian rocks at Clogher beach. See the front cover photo for a full view of this idyllic beach.

NB. There may also be an opportunity to extend the stay by **visiting Valentia Island**, staying an extra 3 nights and returning on Monday 3 October. We await further information about this option.

**Please express your interest by Tuesday 1 March to:
Alan Clewlow, email: treasurer@bcgs.info**

Other Societies and Events

Woolhope Naturalists' Field Club - Geology Section

Friday 11 February: 'Pills, Politics and Protest: George Belas Greenough (1778-1865) and his geological map of 1820'. Speaker: Prof. Hugh Torrens.

Friday 11 March: 'Plate Tectonics at 50: Not written in stone'. Speaker: Dr. Keith James.

Meetings are held in the Hereford Town Hall Council Chamber 5.00-7.30. Non-members of the Club pay £2. Visit: <https://www.woolhopeclub.org.uk/meetings> or contact Sue Olver on 01432 761693, email: susanolver@hotmail.com

North Staffordshire Group of the Geologists' Association

Thursday 10 February: '3D geological outcrop modelling and visualisation'. Speaker: Brian Burnham (Aberdeen).

Thursday 10 March: AGM at 7.00 followed by Lecture at 7.30. 'Some of the more unusual landforms in Western Australia'. Speaker: Stephen Addison (NSGGA Chair).

Talks are at 7.30 via Zoom. All welcome, free to attend - request a link at <http://nsgga.org/contact> For enquiries: Steve Alcock, Longfields, Park Lane, Cheddleton, Leek, Staffs, ST13 7JS. Tel: 01538 360431 or 07711 501028. Email: steves261@aol.com More info: <https://nsgga.org/>

Herdman Society, University of Liverpool

Saturday 12 February: Herdman Symposium 2022: 'Impacts of Geoscience', 10.00 - 5.00. A virtual symposium bringing together researchers, students, industry partners and geoscience enthusiasts. To register go to: <https://linktr.ee/HerdmanSymposium2022>

Warwickshire Geological Conservation Group

Wednesday 16 February: 'The Kilchrist Caldera, Skye'. Speaker: Simon Drake. Hybrid meeting at KMC and via [Zoom](#).

Wednesday 16 March: 'Wine, Whisky and Beer - the role of geology'. Speaker: Alex Maltman. Hybrid meeting held at KMC & via [Zoom](#).

Venue for talks: Kenilworth Methodist Church. There is a charge of £2.00 for non-members. For more details visit: <http://www.wgcg.co.uk/> or email: WarwickshireGCG@gmail.com. Meetings start at 7.30 with tea/coffee and biscuits available beforehand from 7.00.

Manchester Geological Association

Wednesday 16 March: 'Mires, meteors and mass extinctions: what does coal tell us about deep time climates?'. Speaker: Dr Rhodri Jerrett, University of Manchester.

Events are likely to take place via Zoom. Visitors are always welcome. For more information: <http://www.mangeolassoc.org.uk/> or contact lectures@mangeolassoc.org.uk

Mid Wales Geology Club

Wednesday 16 February: 'Iceland Geology with Recent Developments'. Speaker: Chris Darmon.

Wednesday 16 March: 'Boxstones: The Search for Miocene Suffolk'. Speaker: Tim Holt-Wilson.

Further information: Tony Thorp tel. 01686 624820 and 622517 tonydolfor@gmail.com
Web: <http://midwalesgeology.org.uk> lectures start at 7.15 via Zoom.

Shropshire Geological Society

Book Now! Darwin Festival, Shrewsbury 7 - 13 February 2022

SGS are hosting 2 events: 9 & 12 February. <https://darwin.originalshrewsbury.co.uk>

Wednesday 9 February: 'Darwin and the Geology of the Galapagos'. Speaker: David Norman, Cambridge University.

Wednesday 9 March: 'Redrawing the Geological Map of South Wales'. Speaker: John Cope, National Museum of Wales.

Lectures are being held using Zoom and commence at 7.15 for 7.30. Further info: <http://www.shropshiregeology.org.uk/SGS/SGSEvents.htm>

East Midlands Geological Society

Saturday 12 February: 'Yorkshire's (...and the East Midlands'...) Ancient Storms'. Speaker: Dr Andy Howard.

Saturday 12 March: 'Landforms of the Yorkshire Dales'. Speaker: Dr Tony Waltham.

Meetings will be held in the Geography Department of Nottingham University at 6.00. Non-members are welcome and should register with the secretary. Further info: www.emgs.org.uk or email: secretary@emgs.org.uk

Teme Valley Geological Society

Monday 28 February: 'Tectonics and magmatic structures in the West Midlands.' Speaker: Dr Carl Stevenson, Birmingham University.

Monday 28 March: 'The Herefordshire Lagerstätte: a remarkable window into Silurian marine life'. Speaker: Prof. Derek Siveter, University Museum of Natural History, Oxford.

Talks are held at 7.30 in the Martley Memorial Hall, on the B4197 by the Sports Ground, Martley. Non-members £3. For field trip details and further information contact John Nicklin on 01886 888318 or visit: <https://geo-village.eu/> These talks may also be available by Zoom as well as in person.

The Etches Collection

Friday 25 February, 7.00: The Flying Reptiles of the Jurassic Coast. The Etches Collection - Museum of Jurassic Marine Life have produced a series of online lectures exploring various aspects of planet Earth. Tickets cost £6.50. [Click to book.](#)

Editorial

This issue brings a variety of topics, from Mike's adventures in far-away Tírēe, to news from our neighbouring Abberley & Malvern Hills Geopark; then, closer to home, the geological secrets of Cotwall End are revealed in the latest instalment of 'Matt's Maps', and the Birmingham Glacial Erratics project moves closer to the Black Country with some finds in the Illey valley, just within Dudley MBC! We conclude with 'Mike's Musing' with some thought provoking observations on the 'Anthropocene'.

At our AGM meeting on 21 March, Graham will give us more news of the Geopark - and we'll celebrate our return to the Archives with the postponed 'Christmas' buffet - with plenty of time to chat! Field trips fixed so far include a day out to Herefordshire, plus some local evening walks with Graham. These will explore more local geosites, following from last year's series of 3 local evening geowalks.

Perhaps most exciting on our programme, is a 4 day field visit to the Dingle Peninsula at the end of September, with a possible 3 day extension. (*See box on p. 4*)

Sadly, Keith Elder is having to step down as Meetings Secretary from April due to other commitments. We are very grateful to Keith for bringing us a varied programme of indoor meetings for nearly 4 years, and for his skill in hosting our live and on-line meetings. This has all been much appreciated.

Although we have a lot to look forward to in our programme, the truth is that BCGS is struggling to survive. Please read the box featuring the iconic 1914 image of Lord Kitchener (*p.8*). We need more of you to participate in running the Society. Please volunteer if you have a little time to spare.

I look forward to seeing many of you on 21 March at our first real indoor meeting for over two years, but before that is our second geoconservation session: Saltwells on 6 March (*see above*). Everyone's welcome, with an extra special welcome to our new members. Come along and join in, get up close and personal to our special geological sites, enjoy each other's company, and the satisfaction of making a difference. Geoconservation is fun! ■

Julie Schroder

BCGS Committee: on-going vacancy for **Honorary Secretary** and for a **Meetings Secretary** from April!

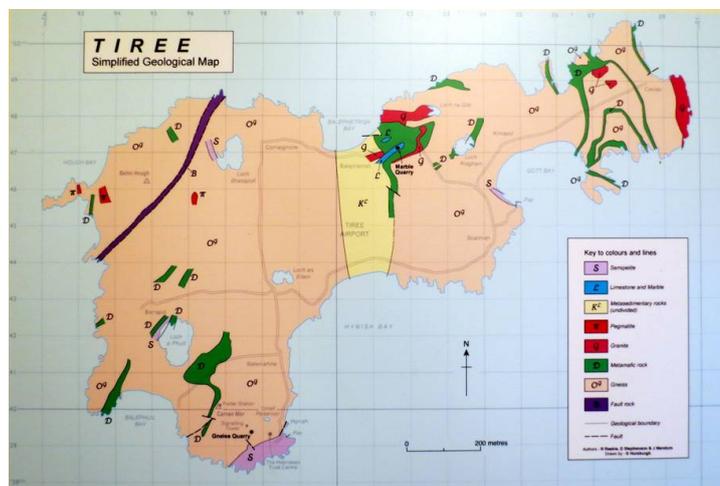
This has been a very successful Society since its formation in 1975, but we're reaching a critical point with fewer and fewer people working harder to hold things together. Without new people to fill vacant roles, we will quite simply run out of steam. The Committee meets about 4 times a year to discuss all matters concerning the Society, and particularly to forge together our programme of events. The Society can only thrive with the efforts put in by the Committee behind the scenes. The Secretary's post has been vacant for 2 years, and we've muddled along, but this can't go on! Now we also need a new Meetings Secretary (*see Editorial*). If you can help, or would like more information about the work entailed, please don't be shy to put your name forward! Please use this email address: secretary@bcgs.info (temporarily managed by the Webmaster, John Schroder).



Hebridean Gems Part 2: The Island of Tiree

The first part of Mike's 'Coll and Tiree' double-bill is in the last issue: No. 270, December 2021. Ed.

If you were asked to identify the sunniest place in Britain I don't imagine that Tiree would be your first thought, but in terms of 'number of sunlight hours per year' this Hebridean paradise can indeed claim to be just that (though not all sources would agree). Whatever the facts, I wasn't disappointed on my visit, but it must be added that it is also one of the windiest places too! Tiree means 'land of corn', a nod to the fact that the climate is sufficiently benign to support two harvests a year and the land distinctly more fertile than Coll. This was no doubt of greater significance to the missionaries who settled here early in the 6th century and perhaps those who preceded them. Another obvious contrast between the islands is the much greater evidence of an ancient human past on Tiree, with standing stones and duns galore, ruined brochs, crannogs and stone circles. I was quite fortunate to catch an enlightening public lecture on the rock art of Tiree during my few days visit.



Geological Map of Tiree (displayed in the Hynish Museum)

The road infrastructure is more comprehensive (only part of the north coast is excluded) and there are several small 'townships', but, as on Coll, only one hotel, in Kirkapol, serves the island. The particularly flat central part of the island (known as The Reef) has lent itself to the construction of an aerodrome. Elsewhere, several small rocky hills enliven the scenery, culminating in the dizzy heights of Ben Hynish (141m) and Beinn Hough (119m), both of which I summited without the aid of subsidiary oxygen. The ►

ferry from Oban lands you on the south-east side of Gott Bay, which is occupied by the full sweep of Tràigh Mhór, by far the largest of many fine sandy 'tràighs' around the island, all offering excellent beachcombing opportunities.



Tràigh Bhi seen from the road up to the 'Golf Ball' on the summit of Ben Hynish

The overall structure of this pair of islands is described in the BGS handbook as a 'monoclinial synform', which to me implies that the overall 'way-up' isn't firmly established (could it be entirely inverted?). Tiree lies on the steep limb of this structure, Coll mostly on the gently inclined limb; but this will remain a somewhat esoteric point to the casual visitor as sedimentary way-up structures are not preserved.



Pegmatite - Gneiss outcrop on An Cnap, near Vaul

As already stated in part 1, Tiree is almost entirely composed of Lewisian basement rocks, which may sound rather dull and uninteresting, but they vary considerably. The older Lewisian rocks are associated with a world in which the first continents were growing purely by accretion, most probably above a subduction zone with associated arc volcanics. Younger Lewisian rocks (less than around 2 billion years old) include a proportion of remobilised continental crust in the form of granitic and coarse-grained pegmatitic intrusions, once blocks were being 're-cycled' in continental collisions.

The majority 'grey gneisses' are derived from igneous parents and consist of biotite-hornblende orthogneiss. These have been migmatized in places, and also contain pyroxene in the western part of the island. Greater variety comes from smaller areas of paragneiss derived from sedimentary parents, especially in a broad belt across the centre of the island (The Reef). Elsewhere these paragneisses have distinctly separate identities: either basic (after basalt lavas or basic dykes?); granitic or siliceous (after sand-rich rocks?); or semipelitic (after mud-rich rocks?).

Additionally, there are small outcrops which are shown as separate lithologies on some maps, including pyroxenite and amphibolite. I came across the latter only as loose fragments, often revealing an interesting 'decussate texture' in which individual crystals lie in all orientations that are sometimes mistakenly described as being random. In fact, their criss-cross patterns are part of a "definite mechanical expedient for minimising internal stress" (as Alfred Harker eloquently describes things in his book: 'Metamorphism', 1970) - nature being inherently 'lazy' in terms of thermodynamic theory. ►



The main road approaching Hynish. Most of the buildings are part of the Skerryvore Lighthouse Museum

Perhaps the most interesting 'paragneiss' is the small mass of the famous 'Tiree Marble', derived from impure calcareous parents, which, because of their Archaean age (>2,500 million years), are more likely to have been 'chemical' rather than 'biological' in origin. They have resulted in a distinctive salmon-pinkish marble studded with greenish crystals, some of hornblende but more abundantly of diopside, an orthopyroxene of which two varieties have been described: dull-green sahlite and light-green coccolite. This marble, near Balephetrish, was first recorded in 1764 and was worked for a short period until the 1790's for use as an ornamental stone. Another quarry nearby provided stone (from a 'metamafic rock' within the Lewisian) for the repair of the island's original airport runways which became unstable due to uneven ground settlement.



*Pinkish 'Tiree Marble' in all its glory...
a block at the edge of the quarry*



*That strange garnet (reddish-mauve)
- magnetite (grey) rock*

Another odd rock with an even more limited presence may be examined just above the north-western shores of Loch a' Phuill, in the south-west corner of the island near Barrapol. Described as a 'magnetite-garnet-schist', this was discovered in 1922 by officers of the geological survey. It occupies a 13-foot wide band of rock in conformity with the foliation of the surrounding gneiss, traceable for about 150 yards before giving way to superficial deposits. With the aid of a magnet, this deposit was easy to identify: the magnetite is most concentrated in the centre of the body, but mixed with garnets and quartz on the outer margins. Oddly enough, bands of magnetite have only been discovered within the Lewisian of Tiree and Iona, the latter also being associated with its own small deposit of Lewisian marble. Could Iona be 'a chip off the ancient Tiree block'?

Perhaps the most alluring locations on Tiree are its many fine sandy beaches. These are often accompanied by stretches strewn with a colourful array of pebbles ideal for testing one's skill at identifying the many lithologies present - both local and 'foreign'. On a larger scale, one such 'foreigner' presents itself in the form of a giant erratic block referred to as the 'Ringing Stone', inconveniently located as far from any road as is possible on Tiree, midway between Balephetrish and Vaul Bays on the north coast of the island, and not even served by a recognisable track. It must, however, attract many a visitor as it holds more than just geological interest. The stone itself, a 20-tonne block of otherwise unremarkable pale grey granodiorite (believed to come from Rùm), emits a metallic sound when struck and is adorned by 53 'cup marks' dating from the Iron Age. It sits on a platform of bedrock and loose cobbles marking one of the island's several raised beaches. ►



*The 'Ringing Stone', an erratic block of ?Rùm
granodiorite (and ancient Briton for scale)*



Other side of the 'Ringing Stone' showing some of the 53 Iron Age 'cup marks' (15cm biro for scale)

One cannot come to Tiree and ignore the place of Hynish in the story of lighthouse construction. Visible in clear weather from the summit of Ben Hynish is the light on Skerryvore, a treacherous reef some 11 miles out into the full force of the Atlantic breakers, constructed over six hard years from granite quarried on the Ross of Mull, then transported to Tiree to be carefully shaped into inter-locking blocks which could then be shipped out and assembled on site. A museum describes the whole amazing story, as well as presenting the geology of Tiree in some detail.

Once again, there are no doubt many non-geological reasons for visiting Tiree, but don't ignore the wonderful, if challenging, geology altogether! ■

Mike Allen

What does 2022 hold in store for the Abberley & Malvern Hills Geopark?

BCGS has long-standing connections with The Abberley & Malvern Hills Geopark and the Herefordshire and Worcestershire Earth Heritage Trust. Both organisations work hard to to protect and promote the geology in and around the two counties, and we are pleased to bring you a taste of what's going on in our neighbouring Geopark from Geopark Forum member Peter Oliver, who was also a founder member of BCGS in 1975. Ed.

The Abberley & Malvern Hills Geopark covers nearly 800 square miles and it takes in parts of the five counties of Gloucestershire, Herefordshire, Shropshire, Staffordshire and Worcestershire. You will find outstanding geology that spans 700 million years of our Earth's history. This, coupled with dramatic landscapes and a wealth of ecological, historical, and cultural gems, makes this Geopark a unique destination.

There are lots of **self guided walks** for you to try out. They are available most of the year at venues such as Severn Valley Country Park, Arley Arboretum, Worcester Cathedral, Hartlebury Castle, Wyre Forest and National Trust at Croome and Dudmaston. They cover natural and man-made landscapes, wildlife, geology and history.

There are also self-guided trails in the general landscape across the Geopark; and printed leaflets for these can be obtained from various outlets or downloaded from the A&MH Geopark [website](#). Have a look at 'Explore Geology and Landscape - Walking Trails' for more details. Some of the walks are in town centres like Bridgnorth, Bewdley and Hereford and some are out in the countryside such as the Malvern Hills, the Froome Valley and May Hill. And there is the Severn Valley Railway train ride trail - from the luxury of your carriage seat.



Arley Castle remains in local sandstone

Many walks across the Geopark landscape are incorporated in the **Geopark Way** - a 109 mile walking trail from Bridgnorth to Gloucester. It covers some spectacular scenery such as the valleys of the Rivers Severn and Teme, the Forest of Wyre, the Abberley Hills, the Suckley Hills, the Malvern Hills, and the Ledbury Hills. The Geopark Way booklet is available at lots of outlets and can be ordered via the ►



Huntley Geology Reserve

A&MH Geopark website and from the [Herefordshire and Worcestershire EHT](#). Also there is a set of apps produced by BrooksDesigns that relate to the Abberley & Malvern Hills Geopark and the Geopark Way. The trail is divided into 17 sections to provide walks that can be comfortably achieved in a day. An app has been produced for each section.

Another way of seeing the geology of the Geopark is by using the **Les Morris Memorial Trail** - a driving trail which looks at the vast store of our natural heritage tucked away in stone built walls. The leaflet can be picked up at various centres and is also free to download from the A&MH Geopark website.

Other trails that look at the stones used in towns and heritage structures are available to explore. Some impressive **building stones** trails to consider are Worcester Cathedral, Worcester city centre, Hereford Cathedral, Gloucester, Bewdley town and Museum, Hartlebury Castle, Abberley village churches and Great Malvern. There is more information under 'Explore Geology and Landscape - Walking Trails'.

There are many places throughout the Geopark that are open to the public with free easy access. Inspiring **scenery, wildlife, rocks and heritage** can be found at places such as Comer Woods at Dudmaston, Severn Valley Country Park at Alveley and Highley, the Malvern Hills with the famous Iron Age British Camp, the valley of the River Wye around Ross on Wye and just outside the Forest of Dean, the Bromyard Downs and the nearby rivers Teme and Frome, and walks along the gorge-like River Severn between Bridgnorth and Stourport.

There are many **smaller towns and villages** worth a visit - Cleobury Mortimer and the nearby Clee Hills, Tenbury Wells, Ledbury, Stourport on Severn with its wonderful canal history, Tewkesbury with its abbey, Upton on Severn, Fownhope and Woolhope in the hills known as the Woolhope Dome. Then there's Newent and the nearby River Leadon, Upper Arley with its arboretum, Goodrich and its impressive castle, and Abberley with its ancient church.



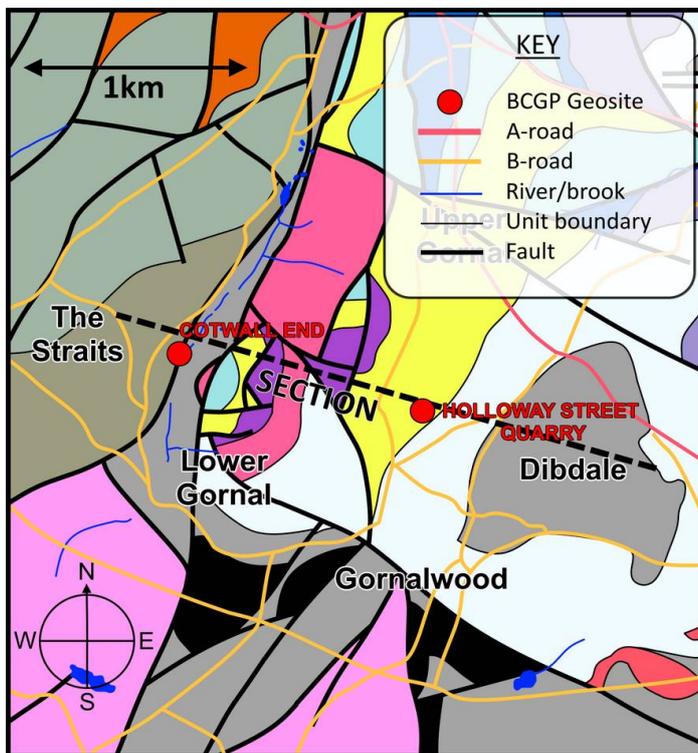
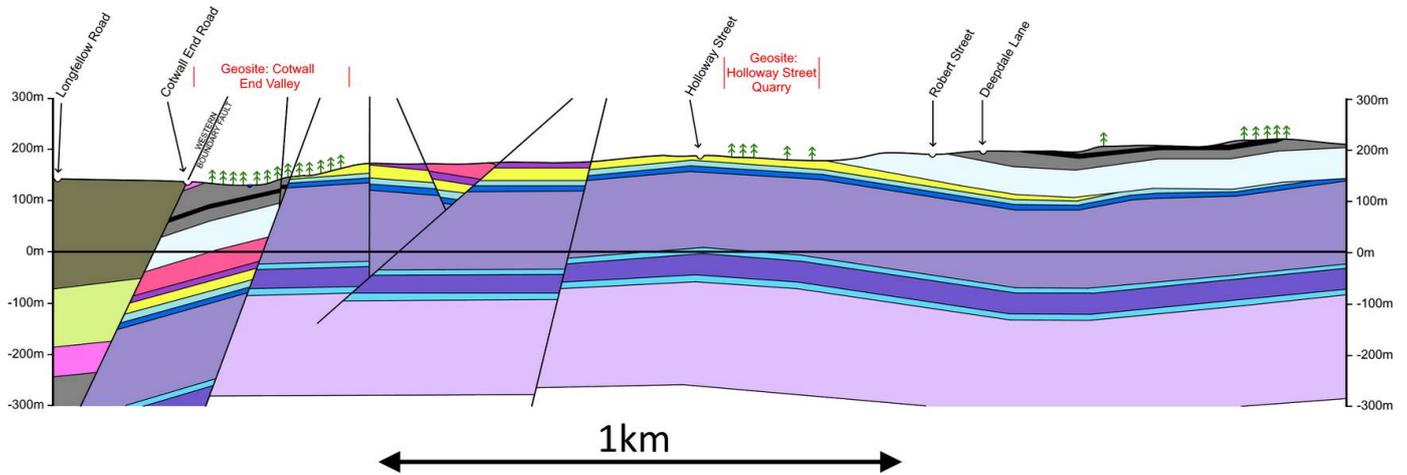
Alveley sandstone - River Severn

The year will again see **GeoFest** during the months of June, July and August when plenty of activities and events are programmed for people of all ages. There will be activities for children at Severn Valley Country Park, Bewdley Museum, Hartlebury Castle and Cob House Countryside Park. On the geology front, highlights planned include craft days, rock and fossil hunts, dinosaur detective trails, guided walks, displays and specimen days. Look out for special events of drone surveying and free geology packs for children.

Exhibitions and displays covering art, history, natural sciences and much more are to be seen at the museums in Hereford, Worcester, Great Malvern, Bewdley, Gloucester and at the Lapworth Museum at the University of Birmingham, and also at Malvern Hills GeoCentre and at National Trust properties at Croome and Dudmaston. You can find out more about local history by visiting 'Explore the Past' at Worcestershire Archive and Archaeology Service at the Hive in Worcester. ■

Peter Oliver

Matt's Maps No. 6 - Cotwall End Valley

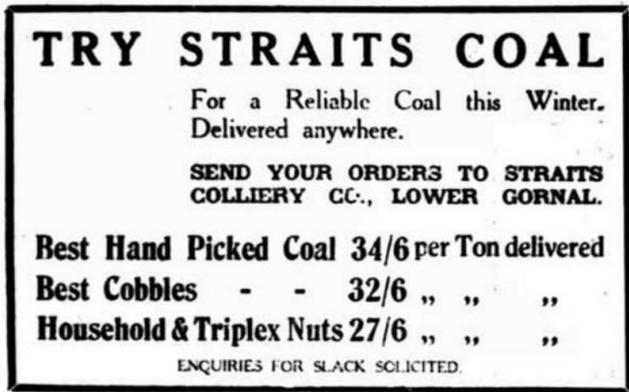
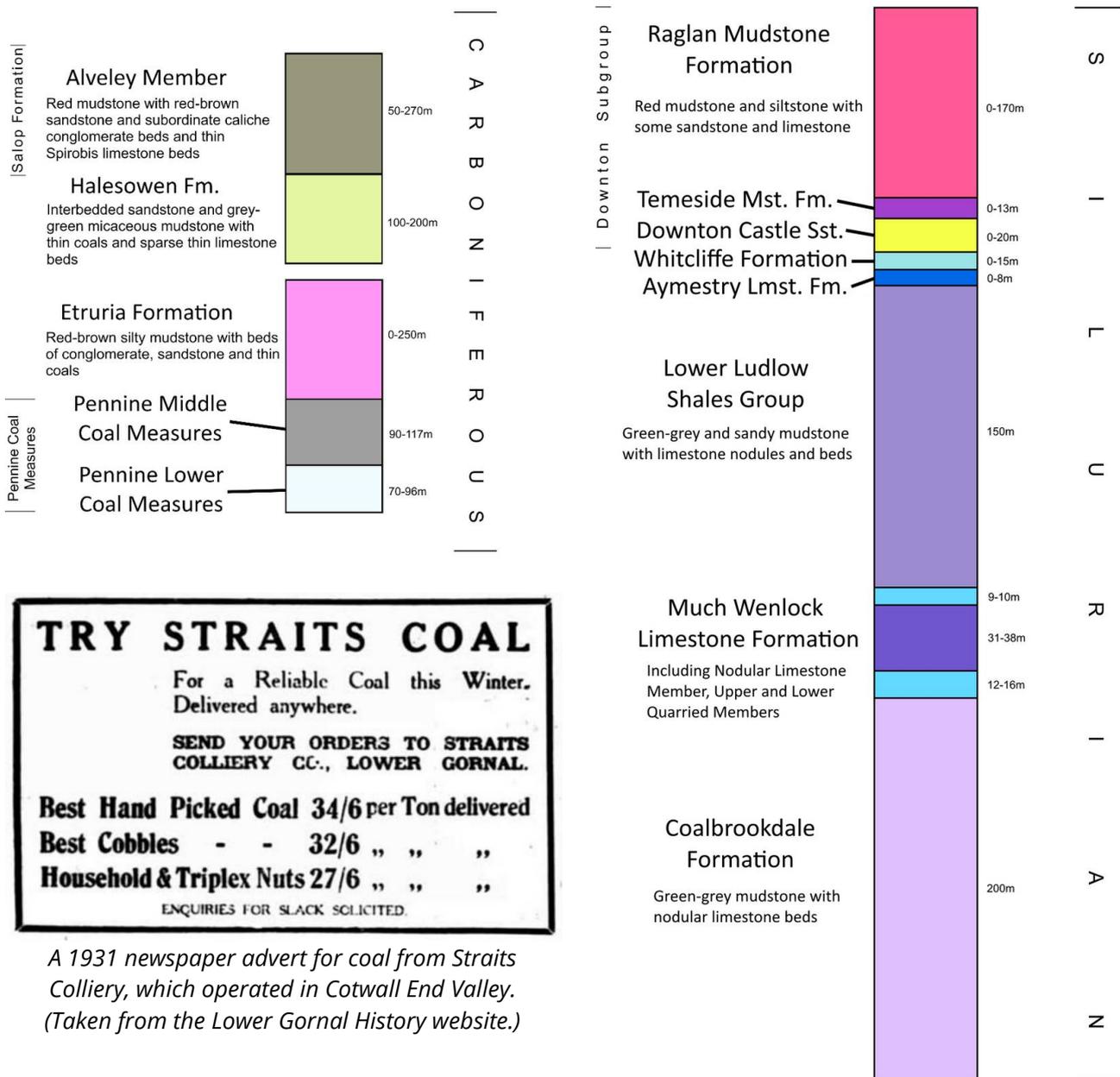


Keen-eyed readers may have experienced a sense of déjà vu scrolling through the images. Mercifully, we have not been transported back to 2021, but I am re-using the same map as was published in the previous newsletter to talk about the second Geosite covered by this section - the beautiful Cotwall End Local Nature Reserve.

As a nature reserve, Cotwall End is a beautiful set of well-maintained footpaths meandering through a wooded valley. At its northern end the reserve consists of open fields, making the park a charming and varied environment. Both historically and geologically, Cotwall End is a place of contrasts - once hosting both a stately home and major collieries. Geologically, it is a complex smattering of rock types and faults spanning through more than 100 million years of geological history.

Faulting is responsible for the overall landscape of this area. Two major faults - the regionally important Western Boundary fault, and the locally significant Shut End fault converge here, as do numerous other smaller faults.

On the northeastern boundary of the reserve is a natural spring known as the 'Sugarwell', which emerges from a fault plane dividing the ~420 million year old Silurian Raglan Mudstone and the (comparably youthful) ~310 million year old Coal Measures. Instant disappointment greets readers of the official leaflet guide for Cotwall End. We learn that that this spring was once renowned for its sweet flavour, but also that Dudley Council strongly advise you do not drink it. If any readers have bravely disregarded this advice then I'd be keen to hear from them. ►



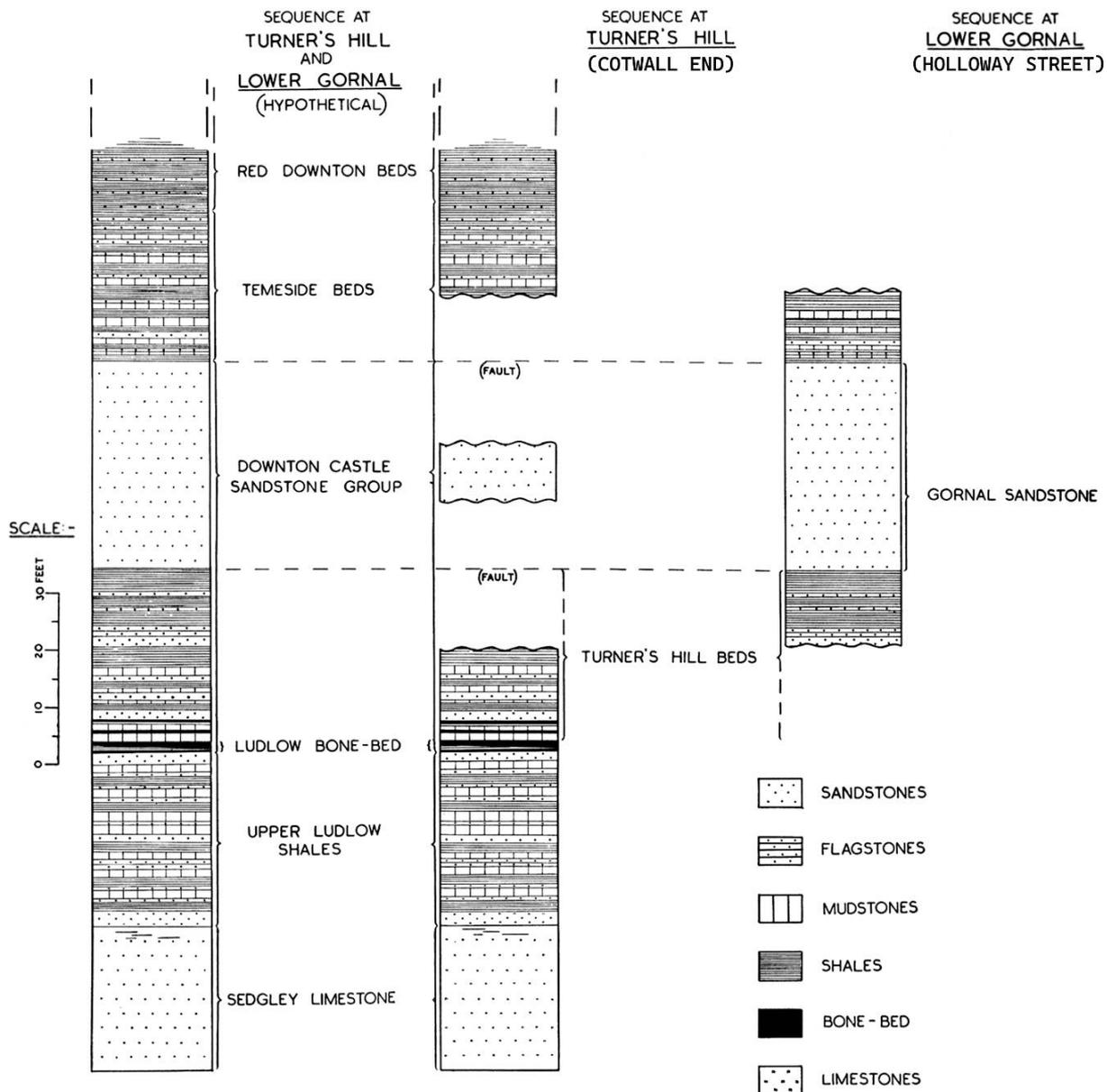
A 1931 newspaper advert for coal from Straits Colliery, which operated in Cotwall End Valley. (Taken from the Lower Gornal History website.)

The Sugarwell and other natural springs emerge from the faulted valley walls. They converge to form 'Bob's Brook', the small stream that trickles through the wooded valley. It gains its name from the shallow 'bob holes' dug throughout the valley. These were shallow vertical shafts that attempted to find coal seams lying just below the ground level of the valley. Bob holes worked shallow depths and precariously extracted rock in a bell-shape until all useful minerals had been removed. Rocks of the Carboniferous Coal Measures occupy the whole of the low ground at Cotwall End, and the most productive and economically important coal seams were easy to access here.

Despite this, contemporary news reports show that the first commercial pits were set up relatively late here compared to other areas of the South Staffordshire Coalfield. In 1878, a prospector successfully sank a shaft to the Thick Coal. This was the start of almost a century of coal mining at Cotwall End, where no fewer than 3 collieries operated. The last of these closed in 1951 and the Valley was declared a Local Nature Reserve in 1990. ►

Cotwall End rises steeply on its eastern boundary as you move towards the Silurian rocks in Lower Gornal that I discussed in the last newsletter. The Shut End fault lifts these older rocks stratigraphically above their Carboniferous neighbours. It exposes a fascinating set of rock units at Turner's Hill.

The relationship between the geology at Turner's Hill, Cotwall End Valley and Lower Gornal Quarries was a source of mystery to local geologists of the early 20th century. In both Cotwall End Valley and Lower Gornal, people had been exploiting the geology beneath their feet to make a living. In contrast, Turner's Hill was never quarried at scale, as can be seen by the survival of its woodland from 1881 all the way to the present day. A 1951 research paper by H. W. Ball set about resolving the local relationships of the major exposures around Gornal. ►



Stratigraphic column comparison of Turner's Hill (Cotwall End) and Lower Gornal, modified from figure in Ball (1951). Note that only a few rock unit names (left column) have survived BGS nomenclature changes over the past 70 years.

Gornal Sandstone, discussed in my last article, had up to that point been considered a particularly coarse member of the Carboniferous Coal Measures. It was the discovery of the 'Gornal Fish' *Hemicyclaspis murchisoni* (which was long-extinct by the time the coal forests appeared), alongside new outcrops being exposed by house-building in the aftermath of WW2, that forced a reconsideration of its true identity. In fact, we now know that Gornal Sandstone is much older, being formed in an estuary or shallow sea during the late Silurian. This revision shifted its age by 110 million years, roughly equivalent to the time elapsed between now and the zenith of the dinosaurs.

Gornal Sandstone also outcrops in Cotwall End at Turner's Hill, proving that these units too must be of Silurian age. Turner's Hill also hosts Silurian rocks slightly younger than the Gornal Sandstone, and some of these are particularly fascinating to those interested in the history of life.

At Turner's Hill we find an inconspicuous dark layer, only a few inches thick. This is a compact unit that is absolutely packed with fragmented fossil fish remains. Its name is the Ludlow Bone Bed, and its age was recently established using uranium and lead isotopes as 425 million years old. Very few fish are known from rocks older than the Ludlow Bone Bed, and the sudden increase in the abundance and diversity of fish swimming the Silurian seas at the time likely represents a substantial shift in either the local environment, or the global ecosystem. The Ludlow Bone Bed is also well exposed in other local Geosites, and will be the subject of future articles.

Cotwall End Valley encapsulates much of what makes the Black Country Geopark great - only a few square miles of land that are disproportionately packed with historical and geological richness. A story is made up of countless words combined in the right way. Cotwall End Valley demonstrates that even the most inconspicuous outcrop, when viewed from a new perspective, can shift our understanding of the Earth beneath our feet. ■

Reference and Further Reading

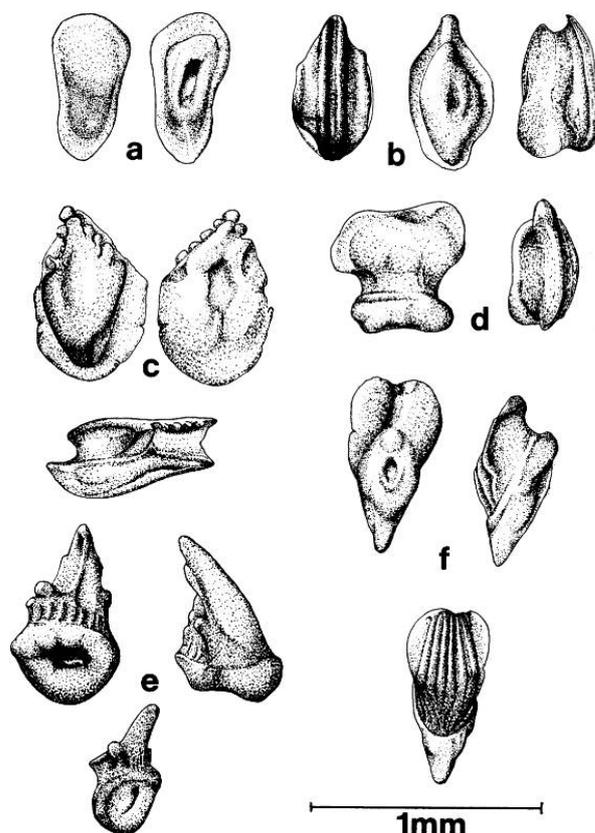
Lower Gornal history website page on collieries in Cotwall End Valley:

http://www.lowergornal.co.uk/i_mining_dingle.htm

Excellent website for finding old Ordnance Survey Maps: <https://www.oldmapsonline.org/>

Ball, H.W., 1951. The Silurian and Devonian rocks of Turner's Hill and Gornal, South Staffordshire. Proceedings of the Geologists' Association, 62(4), pp.225-IN1.

Turner, Susan. 'Siluro-Devonian thelodonts from the Welsh borderland.' Journal of the Geological Society 129, no. 6 (1973): 557-582.



Sketches of six fish scales from the Ludlow Bone Bed, image taken from Turner (1973). No complete skeletons have been recovered from the Ludlow Bone Bed, but individual scales (denticles) are extremely common.

Birmingham's Erratic Boulders: Heritage of the Ice Age

The erratics project has been making progress on many fronts since my last up-date - moving boulders, clearing around them and cleaning them, re-discovering hidden ones, finding 'new' erratics, planning route extensions, and in mid-January the launch of the project's website (erraticsproject.org), and all of this achieved with an ever-increasing number of wonderful volunteers.

Erratics on the move

There are several erratics in Woodgate Valley CP, but none were easily accessible. It just so happened that the main path network had recently been relaid making this an ideal place to create an accessible and inclusive trail. At the end of December BCC contractors duly moved four erratics to positions alongside the path, while others can be found (un-moved) just off the path. All the trails will have an explanatory leaflet with a map. The photo (right) shows the largest boulder in its new location with project manager, Val Turner. (You may remember the photo in the December issue, of Ian Fairchild and an inquisitive horse beside this boulder, while it was still half-buried in the nearby paddock). This is a particularly fine example of Arenig lithic tuff, the dominant erratic rock type in the Birmingham and Bromsgrove area.



Cleaning the Broadhidley Woods quartz boulder

Also on the move was a smaller boulder in Balaam's Wood, Frankley, from the banks of the River Rea to the footpath on the south bank, and the iconic Cannon Hill Park erratic - simply lifted from its muddy moat and replaced onto a firmer surface.

Clearance

In October I reported on the clearance session to uncover two huge erratics beside the old Northfield-Halesowen railway in Frankley. These are typical, extremely hard, Arenig boulders, but there are some notable

exceptions of erratics which do not conform. One such is a magnificent quartz boulder which has long been a closely guarded secret in Broadhidley Woods just south of Woodgate Valley CP. Local volunteer, Mike Lambert recently gathered together a team to clear vegetation and clean the boulder. BCGS member and volunteer, Alan Richardson applied the finishing touches with his portable pressure washer, revealing the intricate detail of the boulder, and this, in turn, raises many questions: Where did this boulder come from? When? What can we learn from its structure? Photographs (before cleaning) were taken by Dr. Andy Jones from the Lapworth Museum, to test its suitability for the construction of a 3D model. It is intended to do fresh photos now that it's been cleaned. You can see the preliminary 3D digital results [here](#). ►



After cleaning: Zoe Jackson (Volunteer Co-ordinator) and Alan Richardson

Erratic route extension into Dudley!

It has been known all along that there are erratics in and around the Illey Valley (to the south of Halesowen), but these have not so far been included in the scope of the Project's walking trails. This is about to change! A huge boulder (nearly 3 x 3m surface area) has recently come to our notice in the Illey Valley, plus other smaller ones, and so far we haven't found a way to include the Broadhidley Wood boulder into one of the trails. Thus, one of my main occupations for the last few weeks has been a lot of



Quartz boulder detail



Roland Kedge at the newly found giant erratic, Illey Valley

seriously muddy walking to try and plot a circular extension route from Woodgate Valley to incorporate the huge 'new' erratic and other new finds in the area, with the Broadhidley boulder as the grand finale.

In my research, I discovered that all the boulders we've found so far to the west of the M5 are within the jurisdiction of Dudley MBC! The proposed Illey extension trail will visit a boulder on Kitwell Lane on the boundary between Birmingham and Worcestershire, close to a 3 way junction including Dudley as well. The proposed Illey trail will rather neatly link all four project partners: H&WEHT (Worcestershire), BCGS (Dudley), Lapworth Museum and BOSF (Birmingham). These boulders all belong to the Arenig distribution from an earlier Ice advance than the mainly Devensian erratics found in the Black Country,

especially heading northwards towards Wolverhampton. This begs the question: can we find evidence of the dividing line between these ice advances?

Volunteers needed!

Dan Cashmore was unable to continue to fulfil the role of Volunteer Co-ordinator, and resigned at the end of December. Zoe Jackson was appointed to replace him in mid-January. Consequently recruitment of volunteers is a bit behind schedule, but back on course now.

Roland the Rockhound's



Erratic Boulder Hunt

We are constantly finding fascinating new avenues of exploration on all fronts - geological, clearance work, walking, cycling, history, anecdotes, and consequently the need for more volunteers to help us deliver this project within its very tight time frame. A substantial part of the project lies to the west and NW of Birmingham, and thus not too far from home for many of our members. There will soon be a big clearance session to reveal the full extent of the massive boulder which lies just to the south of Illey. Why not get involved? Visit the project website and have a look at the 'Volunteering Opportunities' Handbook (p.10 for contact details), or contact Zoe directly on: z.jackson@worc.ac.uk

I thank those of you who have already enrolled and look forward to welcoming more of you. We, BCGS, are partners in this project, and can really make a difference! ■

Julie Schroder (BCGS rep on the Erratics Project steering group)

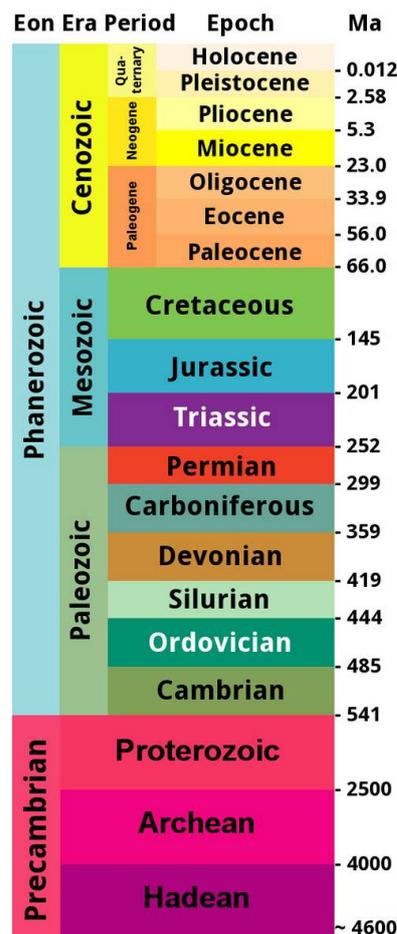
Mike's Musings No. 37

Does the 'Geological Column' need the Anthropocene?

The 'geological column' serves to break down the 'deep-time' history of the Earth into a series of time frames (**eons, eras, periods, epochs and ages**) to facilitate our understanding of fundamental changes that have beset the planet through its long, and at times turbulent, **geochronological** past.

One of its more obvious features is the increasing brevity of these geochronological time frames as the present day is approached. 88.1% of 'geological time' is occupied by the Precambrian **eons**, whilst the three **eras** of the Phanerozoic eon (Palaeozoic, Mesozoic and Cenozoic) occupy just 6.4%, 4.1% and 1.4% respectively. The boundaries of these time frames are marked by, arguably, the most notable events in the geological record of life on this planet - the 'Cambrian Explosion', the end Permian and the end Cretaceous mass extinctions (widely reckoned to be the two most severe amongst the several mass extinction events recognised by geologists). Whether we are currently living through yet another mass extinction event is a matter of much debate, although, as we shall see, this is not the criterion on which calls for recognition of the Anthropocene are based.

Extending a similar argument for the shorter time frames (**periods, epochs and ages**) doesn't work (except for one or two rather selective examples) but one can detect a very generalised pattern of increasing brevity for some aspects of this subdivision of geological time, which reflects the increased discrimination (or resolution) possible for certain aspects of the physical world as we move closer to the present day. This might best be exemplified by the detailed resolution we have achieved for the Quaternary 'Ice Age' temperature record, as compared with our inability to resolve similar detailed fluctuations which presumably occurred during earlier glaciations.



Absolute or quantitative methods for applying dates to specific points on the 'geological column' now come in many forms. The most successful that can be applied across the full range of geological 'deep time' are based on radioactive isotopes with long half-lives. Those with shorter half-lives (notably Carbon-14) can give greater resolution, but only over the more recent past. Other methods are available, but these again are only suitable over much shorter time frames (such as dendrochronology and varve-chronology).

The 'geological column' as it stands is in fact a construct founded upon a mixture of events placed in relative order, to which absolute dating has then been superimposed as closely as possible, based on the availability of suitable materials for this purpose. Thus the well known K-Pg (formerly K-T) event, the mass extinction at the end of the Cretaceous period, is an event based on evidence from the fossil record. It isn't the fossils themselves, but suitable rocks (or certain minerals they contain) laid down at approximately the same time, which have been dated. ►

The most frequent criterion for demarcating one geological time frame from the next, whether it be between **eras, periods, epochs or ages**, seem to be biological events. This need not surprise us, as the 'geological column' first and foremost arose from a chain of unrelated events, placed in relative order, identified in the fossil record.

Larger time frame boundaries (**eras and periods**) are based on bigger events in the geological past, notably major extinction events and / or the appearance of organisms higher up the taxonomic hierarchy, for instance, the final demise of the dinosaurs followed by the widespread radiation of mammals before and after the end-Cretaceous mass extinction.

Smaller time frame boundaries (**epochs and ages**) are based on the appearance or disappearance of more particular organisms lower down the taxonomic hierarchy as well as other environmental criteria (which may be causal or related) such as igneous or tectonic events, short-lived climatic events (ice-ages, thermal optima, pluvials), and atmospheric or oceanic aberrations (carbon dioxide or oxygen variations).

So, what are we to make of the current call for a special geological time frame based around the activities of our own species? Geochronological criteria based on a single species would seem to be a case of special pleading. Undoubtedly the geological record has been influenced by living organisms in the past: perhaps the most profound biotic turnover arose from the oxygenation of Earth's atmosphere thanks to the so-called 'blue-green algae' (cyanobacteria), but such extreme influences are rare indeed. Nevertheless, it is difficult to argue against the proposition that humans have made a mark upon their environment; a mark which appears to be increasingly deleterious in its effect upon other species, not to mention the habitability of the planet for ourselves. The question really revolves around how best to recognise this in geological terms.



*Stromatolites (made by cyanobacteria) from the Precambrian of Montana, ~1.44 Ga
Photo Wikimedia Commons*

It is often remarked that we might currently be inducing another mass extinction event. If that is indeed the case, then in geological terms, we should logically mark the occasion once the event has been completed and a new point of recovery is recognised in the subsequent fossil record. In this respect, the notion of the Anthropocene might seem to be rather premature.

However, as remarked in my introduction, the proponents for the Anthropocene are not arguing for this new time unit on the basis of a mass extinction event. This, to me, alone seems curious, as it might indeed be precisely this influence that eventually shows up most dramatically in the future geological record. All the other traces of mankind will surely pale into relative insignificance.

But, moving on to the actual debate over the installation of the Anthropocene (Epoch, or Age?), I would firstly, on a purely philosophical level, question whether it is even 'our' place to erect a new geological time unit to the present, or whether the geological column should actually be constructed in retrospect, when it can be seen in further perspective. Perhaps the Anthropocene is getting a little ahead of itself. ►

Notwithstanding such an argument, it seems to me that the current discussion has been somewhat hijacked by our obsession with climate change. It was only a few decades ago when we were fretting over the possibility of Earth relapsing into another glacial spell within what was (and still is?) perceived to be the Quaternary Ice Age. It may be that rising carbon dioxide levels induced by human industrial and technological activity has postponed such a relapse. It may be that further increases will draw us out of this Ice Age altogether, and head the planet towards another climatic optimum. Either scenario seems plausible, hence my reservations about getting ahead of ourselves.

So what are we to make of the various suggestions that have been posited for the commencement of the Anthropocene. A good argument can be made for humans beginning to change the environment with the Neolithic 'revolution' that saw us settle down to large scale farming practices and forest clearances which have become ever more intense as the human population has grown. The Neolithic coincided with the advent of an inter-glacial warm spell, which presumably arose 'naturally', and for which there is no need to invoke a new, post-Holocene, time frame.



Not just a third world problem!
Photo Wikimedia Commons

Travelling around Africa and South America either side of the last millenium I was struck by the layer of debris humans were depositing in the form of countless numbers of drink cans (it would be unfair to place all the blame on Coca and Pepsi Cola!) and quietly wondered whether it was really possible that a stratum of such material might actually be recognisable in future stratigraphies. The argument for various similar signatures that humankind may leave behind, whether manufactured metal, plastic or chemical, or, more profoundly, by way of a radiometric marker, seem

to me to be quite plausible. However, I find it difficult to justify such a marker as anything more than just a marker; a momentary blip in the geological record much as we perceive, for instance, a marine band in the broader 'Coal Measure stratigraphy', or a bentonite band within a broader sedimentary sequence.

My overall feeling is that human-induced influences will be most profoundly felt by the biosphere. Human 'technological markers' will be far more transient, and will barely register in the grand scheme of things beyond a geologically 'instantaneous' marker horizon. A Holocene mass-extinction event (including ourselves!) may well become a reality (in which case a suitably elevated rank of new time frame - a new Period or even Era - will be most appropriate), but the need for the Anthropocene based on lesser criteria is built more on vanity than geological reality. ■

Mike Allen

Subscriptions 2022

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