Newsletter No. 256
August 2019

Contents:

To find out more about this photo - read on!

Copy date for the next Newsletter is Tuesday 1 October

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For enquiries about field and geoconservation meetings please contact the Field Secretary.
To submit items for the Newsletter please contact the Newsletter Editor.
For all other business and enquiries please contact the Honorary Secretary.
For further information see our website: bcgs.info, Twitter: @BCGeoSoc and Facebook.

Future Programme

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

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

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

Saturday 17 August *(Field Meeting):* Postponed to Saturday 16 November *(see below).*

Friday 13 - Monday 16 September *(Field Meeting):* BCGS trip to Dorset. Led by the Dorset Geological Society. Organised spaces on this visit have now been filled. Any further members wishing to attend will need to make their own arrangements and let the field secretary know.

Monday 16 September *(Indoor Meeting):* 'How and why Earth's land ice cover is changing'. Speaker: Dr Nicholas Barrand (Lecturer in Geosciences, University of Birmingham). The talk will explore the impact of these changes on global sea levels and downstream systems, utilising airborne and satellite remote sensing tools.

Saturday 5 October *(Geoconservation Day):* Saltwells Local Nature Reserve. Meet at the Nature Reserve car park (Grid ref: SJ 934 868) on Saltwells Lane at 10.30. 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 packed lunch or hot food can be acquired from the Saltwells Inn adjacent to the car park. Finish at 2.30.

Monday 21 October *(Indoor Meeting):* 'A Geological Grand Tour of the Solar System'. Speaker: Andrew Lound. A tour of the solar system taking us on a journey from the sun to the far outreaches of the solar system, along the way visiting planets, moons, asteroids and comets. Illustrated with the very latest images and supplemented by music.

Saturday 2 November *(Geoconservation Day):* Details TBC.

Saturday 16 November *(Field Meeting):* An Introduction to Castle Hill. Led by Ian Beech (Wren's Nest Nature Reserve). Meet at 10.00 in the Wren's Nest wardens' office, Fossil View, off Wren's Hill Road, Dudley, DY1 3SB. After tea/coffee, walk from the wardens' base to Castle Hill via Bluebell Wood. We will be visiting managed and unmanaged sites, looking at outcrops and logging areas with any findings. Many of the outcrops are similar to Wrens' Nest so we should be able to make a comparison along with a general introduction to the site.

Monday 18 November *(Indoor Meeting):* 'Minerals of the English Midlands'. Speaker: Roy Starkey. This talk explores the rich mineralogical heritage of the area, setting this into a regional, historical and economic context, and tracing the development of mineral exploitation from earliest times to the present day. Mineral specimens from the area are recognised as being significant on a global scale, and are to be found in all major mineral collections, both within the UK and abroad.

Saturday 7 December *(Geoconservation Day):* Barrow Hill (TBC). Directed by the Barrow Hill LNR warden. Meet on Vicarage Lane off High Street, Pensnett (A4101), at the top end near to the nature reserve and St. Marks Church, at 10.30. The day will involve vegetation clearance in the East Quarry. Wear old clothing and stout boots or wellies. Please bring gloves and tools if you can, i.e. brushes, trowels, loppers, saws, rakes etc. Safety glasses and hard hats will be provided where necessary. Bring a packed lunch and hot drink. We will aim to finish around 2.30.

Monday 16 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.

Contributions needed from you!

We need a few of you to volunteer to do a short presentation - on any topic with geological connections; or perhaps bring some of your specimens for admiration, discussion and identification. Please contact Keith Elder if you can contribute to this event: meetingsecretary@bcgs.info

Saturday 18 January 2020 *(Geoconservation Day):* Wren's Nest (TBC). Directed by the Reserve wardens. Meet at 10.30 at the Warden's office, at the end of Fossil View (the road into the new housing estate, formerly Mons Hill College). Parking along Fossil View. The day will involve some scrub clearance and fossil hunting not far from the Warden's base. Bring gloves, stout footwear and packed lunch. Wardens will provide tools, hard hats if necessary and a hot drink. Finish around 2.30.

Monday 20 January *(Indoor Meeting):* 'Jurassic Brain Teasers'. Speaker: Stephan Lautenschlager (Lecturer in Palaeobiology, University of Birmingham). Fossils represent physical evidence for the existence of extinct organisms and have vast potential for the study of ancient life. However, the majority of fossils are preserved in the form of hard-tissues (e.g. bones and teeth), while soft-tissues, such as muscles and internal organs, have withered away. Using modern computer technology and digital visualisation techniques, it is now possible to reconstruct some of these soft-tissues in fossils. The anatomy of the brain is of particular interest, as it can reveal information about extinct animals' behaviours and how they might have sensed the environment around them.

Saturday 8 February *(Geoconservation Day):* Saltwells Local Nature Reserve (TBC). Meet at the Nature Reserve car park (Grid ref: SJ 934 868) on Saltwells Lane at 10.30. 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 packed lunch or hot food can be acquired from the Saltwells Inn adjacent to the car park. Finish at 2.30.

Monday 17 February *(Indoor Meeting):* 'The Impacts of Future Climate Change on Industrial Landscapes: recent work in The Derwent Valley Mills WHS and its relevance to the Black Country'. Speaker: Dr Andy J. Howard ('Landscape Research & Management', and Honorary Fellow, Dept. of Archaeology, University of Durham). The availability of coal, limestone and metal ores together with water for power, was critical to the development of the heavy industries that kindled the Industrial Revolution. Paradoxically, many of these advantageous characteristics, also create environments where geomorphological processes are most sensitive to future climatic and environmental change. This talk by Dr Andy Howard describes a 'landscape' approach developed to manage the built and other historic assets of the Derwent Valley Mills World Heritage Site along the River Derwent between Matlock Bath and Derby. As we move forward into the Anthropocene, the applicability of this study to other industrial landscapes such as that of the Black Country is considered.

Monday 16 March *(Indoor Meeting, 7.00 for 7.30 start):* AGM followed by a talk TBC.

Monday 20 April *(Indoor Meeting):* 'Silurian Rocks of the Dingle Peninsula'. Speaker: Ken Higgs, Emeritus Professor of Geology, University College Cork. Dudley and the Dingle Peninsula in Eire have much in common, sharing a common Silurian geology. Professor Ken Higgs was not only born in Dudley but has also undertaken an extensive study of the geology of the Dingle Peninsula recently published as the 'Geology of the Dingle Peninsula' by the Geological Survey of Ireland. His illustrated talk will describe the Dingle Peninsula's dramatic 485 million year history of environmental and climate change.

Procedures for Field Meetings

Insurance

The Society provides public liability insurance for field meetings but personal accident cover is the responsibility of the participant. Details can be obtained from the Secretary, and further helpful information can be found in the Code for Geological Field Work published by the GA and available on our website. Schools and other bodies should arrange their own insurance as a matter of course.

Health and Safety

If you are unsure about the risks involved or your ability to participate safely, you should contact the Field Secretary. Please take note of any risk assessments or safety briefing, and make sure that you have any safety equipment specified. The Society does not provide hard hats for use of members or visitors. It is your responsibility to provide your own safety equipment (eg. hard hats, hi-viz jackets, safety boots and goggles/glasses) and to use these when you feel it is necessary or when a site owner makes it a condition of entry. Hammering is not permitted unless specific permission has been sought and granted. Leaders provide their services on a purely voluntary basis and may not be professionally qualified.

Other Societies and Events

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

Woolhope Naturalists' Field Club - Geology Section

Wednesday 11 September: 'Bring out your Graptolites and Trilobites Day'. Led by Dr.Paul Olver. Venue: the Resource Centre, Friary Street, Hereford. Cost £1 for Woolhope Club Members; £3 for non-members from 10.00 to 12.00.

Friday 27 September: 'Snowdonia'. Speaker: Paul Gannon.

Meetings are held in the Woolhope Room, in the central library, Hereford. 6.30 for 7.00 until 9.00. Non-members of the Club pay £2. Visit: http://www.woolhopeclub.org.uk/Programme.html or contact Sue Olver on 01432 761693, email: susanolver@hotmail.com

Warwickshire Geological Conservation Group

Wednesday 28 August: Ufton Fields (SP378615) - a former quarry in the White Lias, finishing in the village to examine some of the building stones. Meet 6.00 at Reserve car park. A joint meeting with the Warwickshire Wildlife Trust. Led by Brian Ellis & Faye Irvine.

Wednesday 18 September: ' Jurassic Sedimentation in Yorkshire'. Speaker: Andy Howard (Yorks GS)

Venue for talks: St Francis Church Hall. 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.

East Midlands Geological Society

Saturday 14 September at 10.00: Bantycock opencast gypsum mine. Leader: Adam Garbutt (St Gobain – Formula). Meet at Bantycock Quarry, Staple Lane, New Balderton, Newark-on-Trent, NG24 3EP.

Non-members are welcome and should register with the secretary. Further info: www.emgs.org.uk or email: secretary@emgs.org.uk

Shropshire Geological Society

Wednesday 4 September at 2.00: A walk around The Wrekin. Leader: Andrew Jenkinson. Meet at the Ercall Wood car park, immediately south of the bridge over the M54 on the Forest Glen to Wellington road (SJ 646 103).

Booking to reserve a place and obtain joining instructions from Andrew Jenkinson; email: lletybach@btinternet.com; telephone: 01938 820 764. A nominal charge is levied for attendance by non-Members. Further info: www.shropshiregeology.org.uk/

Mid Wales Geology Club

Wednesday 21 August: 'Coloured stone use in neolithic monuments in northern Europe'. Speaker: Penelope Foreman.

Sunday 25 August field trip: Woolhope Dome, led by Dr Geoff Steel.

Wednesday 18 September: 'Introduction to the Geology of the Aegean Island Arc'. Speaker: Dr Chris Simpson.

Sunday 22 September field trip: Aberystwyth Coastline led by Dr Charlie Bendall.

Further information: Tony Thorp tel. 01686 624820 and 622517 tonydolfor@gmail.com
Web: http://midwalesgeology.org.uk Talks at 7.30 at Plas Dolerw, Milford Road, Newtown.

Manchester Geological Association

Saturday 17 August: Mam Tor Castleton, Geology and Landslide. Leader: Chris Arkwright. Joint with OUGS.

Sunday 22 September: Broadhurst Memorial Field Trip - The Geology of Samuel Oldknow's Mill. Leader: Jane Michael.

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

North Staffordshire Group of the Geologists' Association

Thursday 5 September at 6.00: (Rearranged date). Duckmanton Cutting, Derbyshire. Leader: Paul Guion.

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

The Geologists' Association Annual Conference 2019
Geological Resources in the North West - Past, Present & Future

Friday 18 - Sunday 20 October at University of Manchester and Manchester Museum

Provisional Outline Programme

Friday 18 October: Arrival & Registration. Plus a visit to Manchester Museum's Minerals & Palaeontology section.

Saturday 19 October: Talks and Posters at Manchester University campus followed by evening Conference Dinner.

Oliver Wakefield:	Geology of the North West
Rob Hunt:	Nuclear Waste Disposal, Wylfa Newydd: Ground Investigation
Tim Astrop:	Brymbo Fossil Forest: Interface of Public & Palaeontology
Catherine Hirst:	Geothermal energy prospects of the Cheshire Basin
Roy Starkey:	Minerals of the Peak District
Vanessa Banks:	Hydrogeology of the North West
Mike Bowman:	Petroleum Geology of the North West
Andrew Fielding:	Exploitation of North West Salt resources
Cynthia Burek:	Geoconservation in NW England: Saltscape HLF Project

Sunday 20th October: Field Trips

Jennifer Rhodes, Manchester GA:	Building Stones of Manchester
Philip Firth, Liverpool Geol Soc:	Williamson Tunnels Tour
Peter del Strother, GeoLancashire:	Lower Carboniferous and Ribblesdale Cement Works, Clitheroe
Ian Stimpson, NSGGA:	Apedale Geotrail and Heritage Centre, with optional underground coal mine tour

For further information and registration visit: www.geologistsassociation.org.uk
or email: conference@geologistsassociation.org.uk

Hosted by the geological groups of Lancashire, Liverpool, Manchester, North Staffordshire & North Wales.

Abberley and Malvern Hills Geopark - Geofest

The 2019 Abberley and Malvern Hills Geofest is running from 25 May to 1 September with the usual variety of events and exhibitions. See below for a brief summary of some geologically themed events.

Every Wednesday until 28 August 10.00-5.00: Celebrating Geology Today - Family Fun Days at Lapworth Museum of Geology, University of Birmingham. Free.

Thursday 15 & Monday 19 August, 10.30-12.30 and **1.30-3.30: Geology Craft Days at Worcester Cathedral.** See some real fossils and be inspired to make some great crafts. Free.

For booking details & the full programme go to: http://geopark.org.uk/pub/2019/05/geofest-2019-2/

Editorial

The summer holiday season is a relatively quiet time for the Society, and this is reflected in this issue of the Newsletter in numbers of contributors, if not in length. We thank Mike for his regular 'Musing' and Andy for his detailed reports from two excellent field trips, but beyond that we have had no local news.

Andy and Keith have been working hard on the future programme as you will have noted above. Though some of the geoconservation sessions are not yet confirmed, please get all the dates in your diaries. Some of our events, sadly, are still rather poorly attended by our members. The Society can only thrive with your support.

On a positive note, we have the Dorset trip to look forward to in September, and a varied programme of events in the autumn. In the meantime, please think about sending us some geology-related news of your own; holiday experiences, photos of samples to identify, and other queries, and especially anything remotely geology-related from our local Black Country area.

I will set the ball rolling with a photographic item from our recent holiday in Iceland - hardly local, but certainly geological! (*See below.)* ■

Julie Schroder

Iceland's changing landscape - caught on camera

Iceland owes its existence to the mid-Atlantic ridge, and its oldest exposed land is around 15 - 16 million years old. It is a growing and rapidly changing island shaped by plate tectonics, fire and ice.

John (BCGS webmaster) and I have long been fascinated by this amazing country since our first visit in 1972. We can honestly say that this holiday changed our lives. Though musicians by profession, our life-long interest in geology was born at that moment. We have recently returned from our 8th visit to Iceland, and it just gets better and better (apart from the extortionate cost of living!)

One of our main objectives this year was to re-visit Thórsmörk, and particularly the places where we could see the new landscapes created by the 2010 eruptions which brought chaos to Europe. I say 'eruptions' advisedly, because the sub-glacial phreatomagmatic eruption of Eyjafjallajökull in April 2010 was not where it all started, as we shall see. ►

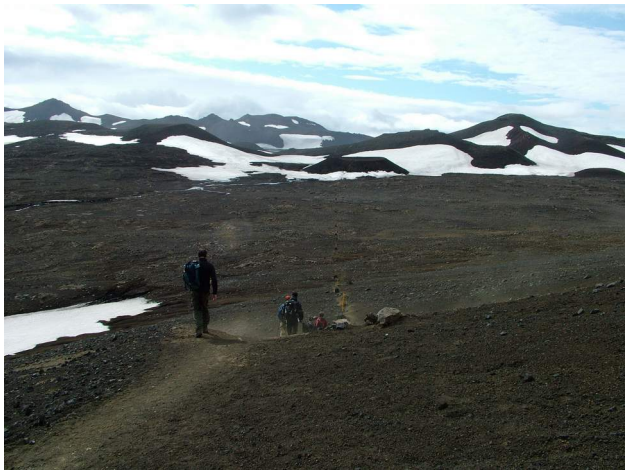
Thórsmörk, is a beautiful wooded valley in southern Iceland lying to the north of Eyjafjallajökull and west of the much larger Mýrdalsjökull, the glacier which shrouds the sleeping giant volcano, Katla. Between the two glaciers lies Fimmvörðuháls, a pass which leads from Thórsmörk to Skógar on the south coast.

Close to the summit of this pass is the place where the action started on 20 March 2010 with a fissure eruption which produced two new volcanoes. These are spatter cones subsequently named 'Magni' and 'Moði', and the new lava field is called 'Goðahraun' - very appropriate names. In Norse mythology Magni and Moði were the sons of the hammer-wielding god Thór. Thórsmörk means 'Thor's forest', Goðahraun means 'lava of the gods', and the whole area is called Goðaland, 'land of the gods'. The new lava covers around 1.3 square kilometres and is the chunky, 'aa' variety ('apalhraun' in Icelandic).

John and I had walked the Fimmvörðuháls pass in 2007, before the eruption and again this year. The photos below show before and after. ►

2007. A waterfall near Morinsheidi plateau from Fimmvörðuháls

2019. The waterfall dropping behind a pocket of snow and forging a new route alongside the lava.



2007. The summit plateau. (L to R distance = L to centre on next photo)

2019. The summit plateau with the new 'Goðahraun' lava field blocking the old route. 2010 Magni crater to the right.

Soon after the action subsided on the Fimmvörðuháls pass, Eyjafjallajökull blew its top in spectacular fashion on 14 April 2010. The ash cloud which drifted south is well-known to us all, but less well-known are the jökulhlaups (glacier outburst floods) which were equally threatening to the local people. The biggest of these headed northwards, largely following the path of Gígjökull ('crater glacier') which formerly flowed down towards Thórsmörk, terminating in a picturesque glacial lake. The mud, ash, rock debris and flood water devastated the area.

1972. Gígjökull and Lónið lake, Thórsmörk.

Our first visit to Gígjökull was in 1972, and most recently this year. The photos tell the story, and we have included one from Wikimedia commons dated 2008, to add evidence of man-made climate change adding to the natural forces which are constantly changing the landscape of this wonderfully turbulent country.

2008. Gígjökull and Lónið lake 2 years before the eruption. Note dramatic reduction of glacier. Wikimedia Commons

The dirt-covered remnant of the glacier below the waterfall is now detached and will gradually rot away. The lake has gone, and its bed is buried under thousands of tons of debris. ■

Julie Schroder

2019. Gígjökull after the Eyjafjallajökull eruption.

Field Meeting Reports

Saturday 15 June: Lydney Cliff SSSI and Mallards Pike Lake, Gloucestershire. Led by John Moseley (Gloucestershire Geology Trust).

Lydney Cliff

Lydney Cliff

Cool, cloudy and wet conditions greeted our visit to Lydney Cliff on the Bristol Channel. We met John Moseley at the eastern end of Harbour Road, Lydney Docks at 10.30 prior to walking to the cliffs. Our first stop was a red-brown and greenish-grey mudstone exposure, the Raglan Mudstone of Pridoli age that sits at the very top of the Silurian. This stratum was deposited in an intertidal setting with rivers flowing into it. This is not too dissimilar from what we can see happening today in the adjacent Bristol Channel, except that the Raglan Mudstone was deposited on a much grander scale along a more extensive coastline. Overlying the Raglan Mudstone is a greyish-white and dark purplish-red fossil soil, or calcrete, formed from vertically migrating calcium carbonate-rich fluids through the soil profile. Should migrating fluids be rich in magnesium carbonate, they form fossil soils called dolocrete as opposed to calcrete.

Lydney Cliff, Raglan Mudstone and Calcrete

With the tide out, we took a soggy walk along the edge of the Bristol Channel, looking at the cliff exposures. Underlying the calcrete and mudstone are contorted brown micaceous sandstones containing fish scales. These sandstones belong to the underlying Downton Sandstone Formation, also Silurian in age. The strata within the Lydney Cliff exposures are faulted and tilted north-south on a vast anticlinal limb hinting at tectonic forces working over geological time. Cyclic repetitions (cyclothems) within these strata indicate fluctuating climate changes over similar long time periods.

Mallards Pike Lake

The morning rain stopped, and conditions began to improve as we walked back to our cars for our lunch and a drive to our afternoon stop. About 7km north-west of Lydney, Mallards Pike Lake is a woodland park with paths cutting through it surrounding a man-made lake. These are a legacy of historical mineral extraction and mineral railways. Today, walkers and cyclists have replaced the heavy machinery that once exploited this area.

We followed a track into the woods and stopped at an exposure of thinly and thickly bedded deep brown sandstone beds with a shallow dip (approximately 10°). Closer examination revealed plant impressions and black plant fragments. These beds belong to the Trenchard Group Sandstones that ►

form part of the Westphalian D, Upper unproductive Coal Measures. These form the edge of the Forest of Dean Coalfield. This exposure represents an extension of the sandstone strata we encountered at Soudley during our field visit in 2018. Continuing along the track we passed over a hidden unconformity and stopped at a quarry containing steeply dipping dolomitic limestone belonging to the Carboniferous Main Limestone. Dolomitic rhombs of magnesium carbonate give this rock a sandy texture which make it sparkle in the right light. We also encountered this stratum during our 2018 Soudley visit. The Main Limestone forms the edge to the Forest of Dean basin that dips steeply in the east where it encounters the Malvern Axis, and less steeply in the west. Sections across the Forest of Dean show the Coal Measures syncline sitting unconformably within the eastern half of the Forest of Dean basin.

As we walked, conditions continued to improve and the sun came out. We finished around 4.00 with tea in the Mallards Pike Lake visitor café.

I would like to thank John for another enjoyable, if very wet field visit, and look forward to our next visit to that part of the world.

Sunday 28 July: Nottingham's Sandstone Caves. Led by Dr Tony Waltham (Geophotos).

Members may remember Tony giving a very informative talk to the Society on cave development at home and abroad in November 2017. A keen caver, engineering geologist and lecturer, Tony has spent many years revealing the hidden world beneath Nottingham.

The Sandstone Caves

Tannery Cave, Nottingham

Old Nottingham City Centre sits on an elevated sandstone plateau with the River Trent to the south, flowing roughly east-west. Since Saxon times the city has grown and spread to form a much larger urban sprawl today.

We met Tony at the western end of Cliff Road, beneath a vast concrete flyover that runs adjacent to the Broadmarsh Shopping Centre, which was built in 1975. The flyover provided much welcome shelter from the rain that had accompanied all of us en route to Nottingham that morning. Here Tony provided a brief introduction to our visit and the caves. If the rain cleared, he also suggested that after the caves we could take a walk through the City Centre to the Park Tunnel and Castle Rock.

The names Cliff Road and Broadmarsh hint at clues for the surrounding landscape; Broadmarsh representing the expanse of low-lying ground to the south between the old City Centre and the River Trent, and Cliff Road defining the sandstone plateau edge cut originally by the River Trent, but which is now hidden beneath urban sprawl.

It is into the sandstone plateau that the caves have been cut. All man-made, hundreds are known about, many mapped and many unmapped. Dating back to Saxon times they lie beneath houses, shops, pubs, offices and factories all serving various purposes, some of which are unknown. Almost all the caves are privately owned and not open to the public. However, the show caves that are open to ►

the public are situated within the Lace Market Cliffs beneath Drury Hill, one of Nottingham's oldest streets. They lie beneath the Broadmarsh Shopping centre and only survived destruction after being designated an Ancient Monument.

Originally made as individual excavations, the caves were knocked through during the Second World War to make an air raid shelter, and today attract numerous visitors keen to look into Nottingham's hidden past. Included within is the Pillar Cave and Tannery dating back to Nottingham's Medieval past and Sam Hancock's cave with its cool temperatures making an ideal beer cellar. Historically, Nottingham families sunk wells to source freshwater, but neighbouring cess pits soon caused groundwater to become unpalatable and led to disease spreading.

A pebbly sandstone ceiling with clay clasts

Our meeting spot was next to to the show caves visitors' entrance. Like a carefully planned operation we had to be ready to enter the caves for 11.00 and dodge the paying visitors on our way through. We passed through impressively carved tunnels and chambers of yellow brown (buff) and purple cross-bedded sandstone. In places small pebble bands and clay flakes were visible. Past Tannery Cave, Tony led us through a metal gate and down a passage to the Western Caves, which are not open to the public. These caves appear to have been used as a stable and an ice house. The cave ceiling comprised a pebbly sandstone layer that also contained clay clasts. From the Western Caves we were led outside into 'Nottingham's Lost World', an overgrown triangle of land cut off following construction of the shopping centre. Walking through this area, we came to the Willoughby House Caves; three circular caves with central pillars, the use of which is uncertain (*see front cover photo*).

The stratum into which the caves are carved is the Chester Formation, previously known as the Nottingham Castle Sandstone Formation or Nottingham Castle Formation. Early Triassic in age this stratum sits towards the base of the Sherwood Sandstone Group with the Lenton Sandstone (Early Triassic) below and the pebbly Helsby Sandstone Formation (Middle Triassic) above. These rocks are equivalent to the former stratigraphic names: Lower Mottled Sandstone (Lenton Sandstone), Bunter Pebble Beds (Chester Formation) and Keuper Sandstone (Helsby Sandstone Formation).

The Chester Formation consists largely of very weak buff coloured poorly sorted medium to coarse cross-bedded sandstone with isolated layers of quartzite pebbles and mudstone flakes. The overlying Helsby Sandstone Formation rests unconformably over the Chester Formation and consists of weak to strong pebbly fine to medium cross-bedded sandstone with occasional greyish-white cobble sized clay inclusions. Deposited around 240 million years ago, these rocks represent flash flood sediments deposited within hot terrestrial arid desert basin environments that at the time sat at the heart of Pangaea. The combination of weak Chester Formation strata with a harder roof of Helsby Sandstone Formation makes an ideal combination for the carving of caves. ►

Park Tunnel

Retracing our footsteps, we returned to the show cave visitor entrance via a mock-up air raid shelter and a passage comprising the outer wall of the Broadmarsh centre on one side and the rear of the Tannery and Pillar caves on the other. Tony concluded our tour around 12.30 by which time the rain had stopped and conditions began to brighten up.

Park Tunnel and Castle Rock

After lunch we followed Tony's suggested route through the city centre to Tunnel Road and the 'Park Tunnel'. Tony had said to look out for a rather inconspicuous iron gate in a sandstone wall, which was rather underwhelming compared to what was on the other side. Through the gate the ground opened up into a deep (part brick, part sandstone) chasm, at the bottom of which was a quiet road. The Park Tunnel was cut through the Chester Formation and was constructed in 1855 to allow access between the Park Estate, to the south, and Nottingham City Centre. The tunnel walls provide an excellent close-up view of the structure, (such as current cross bedding), and nature of the Chester Formation. Unfortunately, the tunnel gradient was too great for the intended horse-drawn carriages, and therefore never fulfilled its original purpose.

Castle Rock

Carrying on south and eastwards from the tunnel we eventually came to Castle Rock, a steep-sided buttress separated by valleys on either side from the main escarpment that passes through Nottingham. Today, the Castle Museum, encased in scaffold and plastic sheeting during our visit, dominates the rock summit. However, historically the Normans built a castle here, hence the name. Formed of Chester Formation, the Castle Rock has its own collection of private man-made caves in its base. Concrete buttresses, plugged fissures and concealed rock anchors are testament to episodes of instability that have affected Castle Rock in the past. In 1939 and 1969, large jointed slabs of rock fell away from the cliffs on the southwest corner of the rock. The last event occurred on Christmas Day 1996 when water pressure from a burst pipe caused a retaining wall to fail. Luckily only the retaining wall and soil were destabilised from the Rock itself, which remained pretty much unscathed.

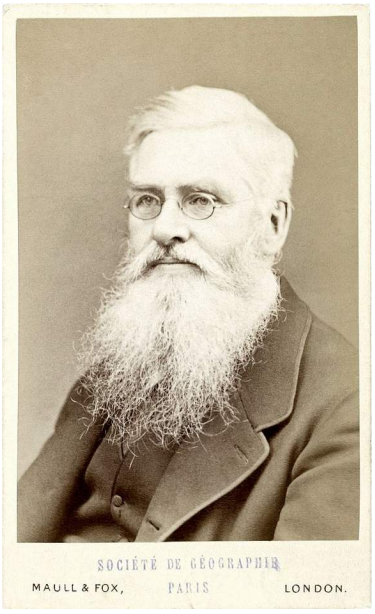
Further information about Nottingham's sandstone caves and local geological features can be found in:

- 'Sandstone Caves of Nottingham', by Tony Waltham, 2018. Publisher: East Midlands Geological Society.
- East Midlands Geological Society webpage (http://www.emgs.org.uk).

I would like to thank Tony for a very interesting and enjoyable day and hope those who attended enjoyed it too. *(It was a very interesting field trip, and I'd like to thank Andy as well, for leading the afternoon session. Ed.)* ■

Andy Harrison

Mike's Musings No. 22
In the name of the Father?



Alfred Russel Wallace, Wikimedia Commons

I recently happened upon an appreciation of Alfred Russel Wallace's life in a television programme (almost certainly a repeat!) in which the popular comedian Bill Bailey traced his footsteps around the Indonesian archipelago. Wallace, of course, is the man who still seems to stand in the shadow of Charles Darwin whenever the subject of evolution and the origin of species raises its head in popular culture. In more initiated circles, much has been done to elevate him to a position of equal standing with his more illustrious rival theorist; nor should we forget that both these men received an underwhelming reception when their ideas were first formally presented to the scientific world. Despite Darwin's dislike of the limelight, he could never seem to avoid it after his *'Origin of Species'* was published. Wallace's name, however, was almost forgotten for a long time before being rehabilitated in learned circles.

Other people have shared a similar fate of being forgotten, overlooked or unrecognised 'in their time', albeit under different circumstances or for different reasons. The names of Gregor Mendel, Ada Lovelace and Rosalind Franklin all spring to (my) mind, the last two paying the penalty for being 'the wrong gender' in times when, and places where, women weren't supposed to have brilliant minds! Mendel remained forgotten by virtue of the obscurity of his publication, and a failure of his circle to understand the significance of his work, for which the world was not yet prepared.

A few people suffer the double tragedy of not being fully recognised because their promising lives were sadly cut short by the hand of fate (indeed, both Lovelace and Franklin were only in their late 30's when they died). In the field of geology there is at least one name that stands virtually forgotten despite several efforts, mainly in the geological literature, to raise awareness of his contribution to the subject. That name is Lewis Hunton.

Hunton first came to my notice from chancing upon a paper that appears in the Transactions of the Geological Society (volume 2, part 5, pp. 215-221, 1837) with the substantial title (not untypical for the time): *'Remarks on a Section of the Upper Lias and Marlstone of Yorkshire, showing the limited vertical range of the Species of Ammonites, and other Testacea, with their value as Geological Tests'* by Louis Hunton, Esq. Communicated by J. F. Royle, Esq. F.G.S. (Read 25 May 1836).

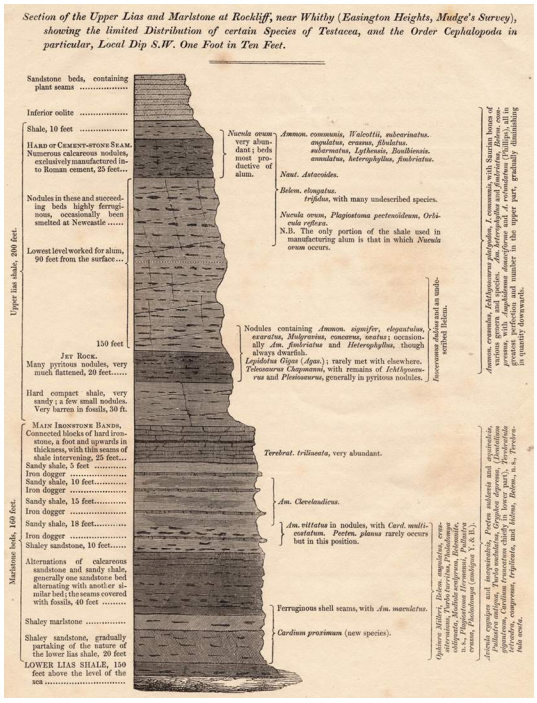
At that time the human context of this work remained unknown to me, and it was quite a number of years later that I learnt more about Hunton from reading 'The Floating Egg' by Roger Osborne (an entertaining and informative read, centred on Yorkshire's historical alum industry). Further 'on line' investigation, including a detailed paper by Torrens and Getty (Earth Sciences History, volume 3, part 1, pp. 58-68, 1984), established that Hunton's exact birth date remains uncertain. His baptism is recorded as 6 August 1814, so it is likely he was born in June or July of that year. Apparently it was Lewis himself who preferred to use the name Louis later in life, due to his fondness for France, where, ironically, he died of consumption (tuberculosis) in Nîmes, on 17th February 1838, aged just 23 (not 24 as is often stated). ►

Why, then, should the geological community remember Louis Hunton? He was born into a family that had been associated with the alum industry for at least two generations. His father rose to a position of some status working for the Loftus Alum Works, which were both the largest and most technologically advanced in Yorkshire at the time. One imagines that Louis grew up in comfortable circumstances, receiving a reasonable education which he put to sound use with a keen interest in both the geology and chemistry this industry involved; indeed his only other scientific publication concerned the chemical side of the process. From the few details that are known of his life, it appears that he wasn't actively employed in the business, and was able to enrol on various courses at both King's College and University College in London.

This provided him with the opportunity to rub shoulders with other members of the scholarly, including geological, communities. The latter included John Forbes Royle, some 16 years his senior, who was shortly to be appointed a professor at King's College. This may explain why it was Royle, and not Hunton himself, who presented his aforementioned paper. Hunton only appears to have gained Fellowship of the Geological Society in the wake of this presentation.

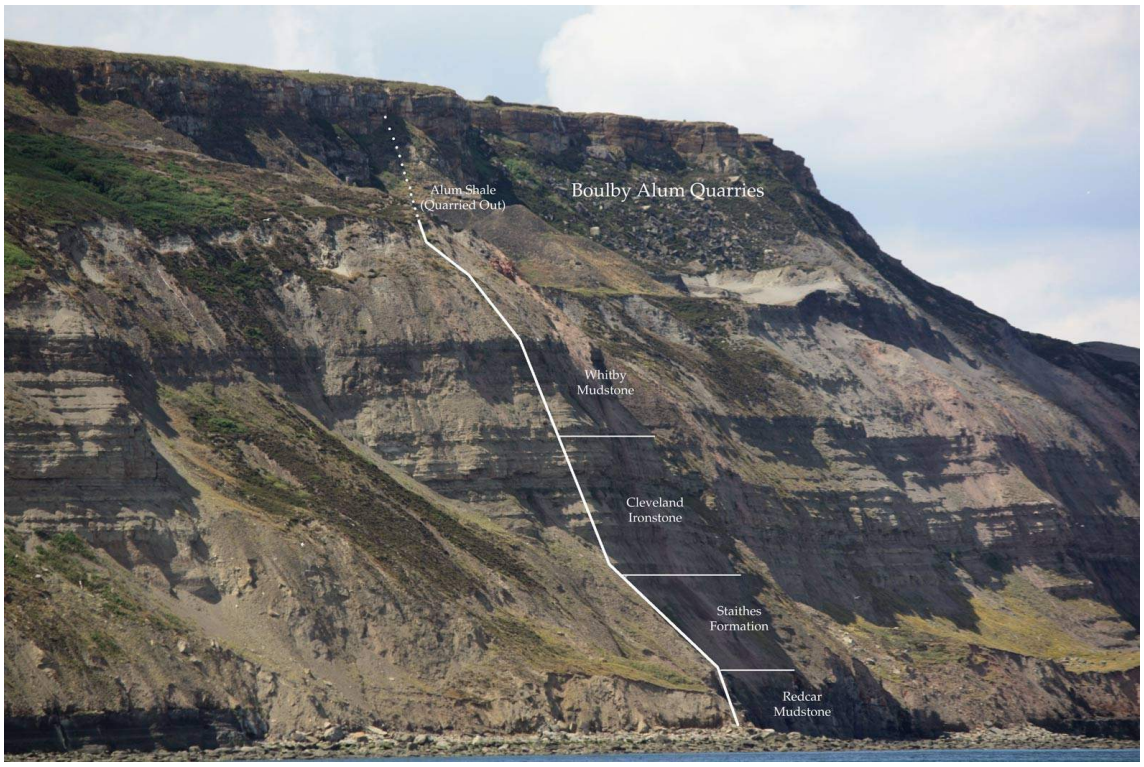
John Forbes Royle 1798-1858, Lithograph by G H Ford, Wkimedia

His one geological publication makes it clear that he had an intimate knowledge of the strata from which alum was produced. Whilst geology was still a somewhat infant subject at this time, an interest in the fossils contained in the Yorkshire cliffs was well established: no less a person than William 'Strata' Smith, the 'Father of English Geology', was active in the area from 1824, and others such as Rev. George Young and John Bird. What set Hunton apart from his contemporaries was his deep appreciation of Smith's simple principle – that 'strata may be recognised by their organised fossils'. By contrast, Bird and Young rejected this idea, preferring a more scriptural understanding of the world around them.



Geological section recorded by Hunton at Easington Heights for his paper of 1836.

Hunton recorded the fossils he found **in situ**, layer by layer in the cliffs at Loftus. In doing so, he realised, in particular, that many ammonites had very limited vertical ranges. He thus understood that certain species of ammonite gave way to another (anticipating the notion of evolution), and reasoned that this was because they were least equipped in life to cope with environmental change. The detailed (for its time) section that accompanies his paper also shows that some other fossils likewise demonstrate similar limited ranges, but were not as effective in delineating the varied strata as the ammonites. It is worth emphasising the importance Hunton attached to working only with fossils collected in situ. At the time it was quite common practice to collect loose material from the bottom of cliff and quarry sections, and 'guestimate' their stratigraphic position by reference to their matrix. Hunton would have none of this. He also worked on a much finer resolution, extending Smith's generalised principle to a more functional level. ►



Cliff section at Easington Heights where Hunton performed one of his surveys, viewed from Cowbar. Showing the modern lithostratigraphic division of strata. Wikimedia Commons

Another contemporary Yorkshireman, Scarborough born William Crawford Williamson, who was 2 years younger, did go as far as claiming priority for such insight, but his work is regarded by no less an authority than William Joscelyn Arkell (mid-20th century authority on the Jurassic) as less exacting or far reaching, but more 'a catalogue of fossils arranged according to their horizons'.

Of course, many of the species names Hunton used have been superceded, but the principle was what mattered. His paper was probably the very first attempt at what we now call 'biostratigraphy'. We also now recognise the concept of the *zone fossil*, a species with wide geographical extent, but very limited temporal range. It is a concept that has been applied to many other groups of fossil, not just ammonites for the Jurassic, but graptolites for much of the Lower Palaeozoic, etc.

This concept was carried forward by many workers, including slightly later work by both Alcide d'Orbigny and Albert Oppel (the 'Father of Zonal Stratigraphy') on the continent. Indeed, we seem to like the idea of the 'Father of this and that'. William Smith's place has already been mentioned. Gregor Mendel is seen as the 'Father of Genetics', Charles Babbage as the 'Father of Computing' and James Hutton as the over-arching 'Father of Geology'.

The fact that Hunton's great insight came at the young age of just 21 begs the question of what else he might have achieved had fate dealt him a kinder hand. He has had just a single fossil named after him: *Ammonites huntoni* (Simpson 1843). This is now recognised as an insecure (nomen dubium) species of *Tragophylloceras*, and has the ignominy of being a 'genus of little biostratigraphic value' making it singularly inappropriate as a memorial to Hunton.

Surely, then, we could at least celebrate the young man by elevating him to the lofty position of 'Father of Biostratigraphy'. ■

Mike Allen