



Newsletter No. 241

February 2017

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Copy date for the
next Newsletter is
Saturday 1 April

**Linda Tonkin,
Honorary Secretary,**4 Heath Farm Road, Codsall,
Wolverhampton, WV8 1HT.

☎ 01902 846074

secretary@bcgs.info**Andy Harrison,
Field Secretary,**

☎ 01384 379 320

Mob: 07973 330706

fieldsecretary@bcgs.info**Julie Schroder,
Newsletter Editor,**42 Billesley Lane, Moseley,
Birmingham, B13 9QS.

☎ 0121 449 2407

newsletter@bcgs.info

For enquiries about field and geoconservation meetings please contact the Field Secretary.

To submit items for the Newsletter please contact the Newsletter Editor.

For all other business and enquiries please contact the Honorary Secretary.For further information see our website: bcgs.info and Twitter account: [@BCGeoSoc](https://twitter.com/BCGeoSoc)

Future Programme

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

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

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

Saturday 18 February (Geoconservation day): Wren's Nest National Nature Reserve, directed by the reserve wardens. Meet at the Warden's house on the Mons Hill College ground for a 10.30 start. The day will involve scrub clearance followed by a fossil hunt a short distance 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 February (Indoor meeting): 'The Wren's Nest - The Jewel in Dudley's Crown'.
Speaker: Rob Broadbent, Friends of the Wren's Nest.

Saturday 4 March (Geoconservation day): Portway Hill, Rowley. Meet at St. Brades Close for a 10.30 start. Directions: from Birmingham New Road (A4123) turn left on to Tower Road if coming from Birmingham, right if coming from Wolverhampton. Just after Bury Hill park, turn left onto St. Brades Close. Wear old work clothes, waterproofs and stout footwear. Please bring gloves and spades, brushes and trowels for another session at this important site. Bring packed lunch. Finish at 2.30.

Monday 20 March (Indoor meeting, 7.00 for 7.30 start): AGM followed by **'Volcanics in Costa Rica'**. **Speaker: Andy Harrison.**

Saturday 22 April (Field meeting): Mortimer Forest, Herefordshire/Shropshire Border, led by Paul Olver of the Woolhope Naturalists Field Club. Meet at 9.30 at the Forestry Commission car park at High Vinnals: GR 474 732 (south side of Ludlow - Wigmore road 3.5 miles from Ludlow). OS Landranger Map No. 137 (Church Stretton & Ludlow). Aim: to study the various Middle and Upper Silurian strata exposed within the well-known Mortimer Forest Trail west of Ludlow. These were laid ►

down in a clear, warm, shallow sea stretching across the W. Midlands between what is now Charnwood Forest and a deeper ocean basin to the west. This is now occupied by the thick, folded and highly cleaved successions of mid-Wales. Conditions encouraged diversity of inarticulates, and examples of trilobites, brachiopods, nautiloids and corals may be found. The sea later became shallower and muddier, and thus less conducive to coral reef formation. The later Silurian rocks reveal good examples of zonal graptolites, orthoconic nautiloids and selected brachiopods. Lunch at a pub in Wigmore (or bring packed lunch). The Ludlow Anticline can be viewed from the nearby castle mound. This is the location of the Ice Age Lake Wigmore whose boundaries can easily be picked out from the viewpoint. Finally, we will return to the Mortimer Trail to examine further Silurian exposures. A study guide for the day will be provided.

Monday 24 April (Indoor meeting): 'A Teacher's View of Glacial Geology'. Speaker: David Pannett (Shropshire Geological Society).

Saturday 20 May (Field meeting): Return to the Brymbo Fossil Forest, Wrexham, led by Gary Brown (Brymbo Heritage Group). Meet at the new Brymbo Heritage Centre (www.brymboheritage.co.uk) for 10.00 (approx. GR: SJ 295 536). Directions: ***Please read these carefully and look at the Brymbo website. SatNav and digimaps may not have caught up with recent road developments.*** Take A483 for Wrexham, exit at J4 to go west on A525, signed Brymbo, Coedpoeth. Take second right towards Brymbo (1st right is just after the lights) on B5101 (Heritage Way). After approx. 1.5 miles take second exit at roundabout onto Pheonix Drive (B5101), then straight on at the next two roundabouts. At the fourth roundabout the Brymbo Heritage Centre is the first exit to the left. Brymbo Heritage Centre is located approx. 200 yards south of Brymbo Enterprise Centre postcode: LL11 5BT (Blast Road, Brymbo).

Things have moved on since our last visits in 2007 and 2009, to house this amazingly preserved fossil forest from the Late Carboniferous Coal Measures. With help from the Prince's Regeneration Trust a plan has been put in place for the iron works, colliery and the fossil forest, which now has its own visitor centre. The morning will mostly concern the fossil forest. Lunch at the neighbouring cafe or bring a packed lunch. Afternoon session from 1.15 will focus on the iron works and colliery and the plans for their restoration. Finish around 3.30.

Saturday 17 June (Field meeting): The newly refurbished Lapworth Museum, led by Jon Clatworthy (Museum director). Details TBC.

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 web sites.

Mid Wales Geology Club

Wednesday 15 February: 'Building History: materials and styles of buildings of Mid Wales'. Guest Speaker: Edward Parry.

Wednesday 15 March: 'Importance of Geology in Government Policy: a marine perspective'. Guest Speaker: Prof. Paul Leonard.

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

Lapworth Lectures

Monday 13 February: 'Subduction/tsunami generation'. Speaker: Dr Rebecca Bell (Imperial College London).

Monday 27 February: 'The geology of Shetland'. Speaker: Professor Rob Strachan (University of Portsmouth).

Monday 13 March: 'History of the Moon'. Speaker: Dr Katherine Joy (University of Manchester).

Lectures at 5.00 in lecture theatre WG5, Aston Webb (R4), University of Birmingham. All are welcome to attend and there is no admission charge. For further information phone: 0121 414 7294. email: lapworth@contacts.bham.ac.uk web: <http://www.lapworth.bham.ac.uk/events/lectures.shtml>

North Staffordshire Group of the Geologists' Association

Thursday 9 February: 'Digital Geological Mapping'. Speaker: Leanne Hughes (BGS, and Vice-President of the Geologists' Association).

Thursday 9 March at 19.00: AGM & 'Geoengineering'. Speaker: Dr Ian Stimpson (Chair's Address).

Thursday 30 March: 'Geological perspectives on the 'world's largest' conventional explosion at Fauld Mine, Staffordshire'. Speaker: Dr Noel Worley.

Non-members pay £2 to cover temporary membership giving them insurance cover. A field fee of £2 per head is normally charged for members and non-members to cover the leader's expenses. For field trip enquiries: Steve Alcock, Longfields, Park Lane, Cheddleton, Leek, Staffs, ST13 7JS. Tel: 01538 360431 or 07711 501028. Email: steves261@aol.com Further info: www.esci.keele.ac.uk/nsgga/

Teme Valley Geological Society

Monday 20 February: 'From rocks to robots to intelligent rocks: monitoring giant sediment avalanches in the oceans'. Speaker: Dr Esther Sumner (Southampton).

Monday 20 March: 'Quaternary Conservation in England'. Speaker: Dr Eleanor Brown.

Events are held in Martley Memorial Hall. Contact John Nicklin on 01886 888318. For more details visit: <http://www.geo-village.eu/> Non-members £3.

East Midlands Geological Society

Saturday 11 February: 'Hydrogeology of the Peak District'. Speaker: Vanessa Banks (BGS).

Saturday 11 March: 'Swimming Plesiosaurs and flying dinosaurs – vertebrate palaeontology at Wollaton Hall'. Speaker: Dr Adam Smith (Nottingham Natural History Museum).

Non-members are welcome. Meetings are usually at 6.00 in the Geography Dept. of Nottingham Uni, in the Sir Clive Granger Building. Further info: www.emgs.org.uk or email: secretary@emgs.org.uk

Warwickshire Geological Conservation Group

Wednesday 15 February: 'The Earth after Us'. Speaker Jan Zalasciewicz (Leicester University). To be held at the Senior Citizen's Centre, Abbey End, Kenilworth, CV8 1QJ.

Wednesday 15 March: 'The Corsi Collection of decorative stones: where science meets the arts'. Speaker: Dr. Monica Price (Oxford University Museum of Natural History). Venue: See box below.

Doors open at 7.00 for coffee before a 7.30 start at St Francis Church Hall, 110 Warwick Road, Kenilworth CV8 1HL. For more details visit: <http://www.wgcg.co.uk/> or email: WarwickshireGCG@gmail.com. There is a charge of £2.00 for non-members.

Shropshire Geological Society

Wednesday 8 February: A geophysical topic related to borehole logging and video surveys (exact title tba). Guest speaker: Kim Beesley.

Wednesday 8 March: A topic related to igneous processes (exact title tba). Guest speaker: Paul Olver, Committee Member of the Geologists' Association.

Generally held in the Conference Room of the Shropshire Wildlife Trust HQ, 193 Abbey Foregate, Shrewsbury, SY2 6AH commencing at 7.00 for 7.30. A nominal charge is levied for attendance by non-members. Further info at: www.shropshiregeology.org.uk/

Manchester Geological Association

Wednesday 8 March at 18.30: 'Faulty Communications: Seismic Hazard in Istanbul'. Speaker Prof. Iain Stewart, Plymouth University. Joint meeting with Manchester Geographical Association. The meeting will be held in the Manchester Metropolitan University Brooks Building, Bonsall Street, M15 6GX, Building 17 on the campus map. Please note that, although the event is free, online booking is necessary for this meeting.

Contact Jane Michael: email indoors@mangeolassoc.org.uk For further information about meetings go to: <http://www.mangeolassoc.org.uk/> Visitors are always welcome.

Open University Geological Society, West Midlands

Saturday 18 February: 'Igneous Lab'. Contact the leader, Alan Richardson as.richardson@virgin.net

Sunday 5 March: 'Metamorphic Lab'. Contact the leader, Alan Richardson as.richardson@virgin.net

Sunday 2 April: 'A Transect of Warwickshire Part Two: The Mesozoic'. Led by Paul Stevenson and Martyn Bradley. Contact Sandra Morgan sandra.morgan.13@gmail.com

Editorial

Focus on Geoconservation

Geoconservation has dominated my recent postbox in the shape of three geoconservation reports from Andy (p.9) plus his article for the 'Geoscientist' (p.7) and a tribute to BCGS founder member Alan Cutler (p.8). Alan was awarded an MBE in the Queen's New Year's Honours list for long-term service in the field of geological conservation throughout the Black Country.

I'd like to thank Andy for these contributions for the Newsletter. Putting them all together in this issue shines the spotlight on our Society's proud and on-going commitment to geoconservation, and the central place it holds in our activities. It's time also to thank the team of volunteers who turn out to undertake this work - whatever the weather! It is a very satisfying feeling to uncover a rock exposure - sometimes after decades of neglect - then clean it up to reveal a rock section which may be able to teach us volumes about the world around us and beneath our feet. I hope these articles will inspire more of you to come and try your hand at geoconservation work at one of our forthcoming sessions - the Wren's Nest on 18 February, or to continue our work at Portway Hill on 4 March.

I'll take this opportunity to remind you that you can find out more about our geoconservation activities in Andy's Newsletter reports. They are collected together as a blog on this page of our website: <http://bcgs.info/pub/the-society/geoconservation-posts/>

I have also been asked to remind those of you who haven't already paid that it's subscription time. Details are in the December Newsletter, (No. 240) and are summarised at the bottom of p.16 (below).

Finally, on behalf of the Committee I would like to thank Peter Twigg (Vice-Chairman) and Linda Tonkin (Honorary Secretary) for their dedicated work on behalf of the Society. Sadly, they will both be standing down at the AGM. Both these vacancies need to be filled and we would welcome any volunteers willing to join the committee to fill these posts. To volunteer, or for further information, please contact Linda: secretary@bcgs.info ■

Julie Schroder

The Benefits and Merits of Geoconservation Work

The following article by our Field Secretary, Andy Harrison, was published last November in 'Geoscientist' (the Fellowship Magazine of the Geological Society of London). Andy's article featured in the 'Soapbox' column, where Society Fellows have the opportunity to raise geological issues of personal interest.

This seems like an excellent introduction to the 'Focus on Geoconservation' theme in this issue of the BCGS Newsletter. Thanks to Andy and all those who have worked hard to promote geoconservation since the Society was formed in 1975, we can congratulate ourselves that geoconservation is still very much alive and kicking in the Black Country. Ed.

Recent 'Soapbox' features have referred to the importance of 'hands on geology'. With this in mind I would like to sing the virtues of geoconservation work, which I organise as field secretary for the Black Country Geological Society. 'Geoconservation' provides protection and enhancement for features that cannot be replicated if lost or destroyed. It is a good way of discovering local geology up close, and can also benefit personal health and well-being.

Geoconservation involves on-going vegetation clearance, site maintenance and access improvements to geological features. Combined with interpretation boards and leaflets, it helps to communicate the subject of geology to the general public - providing an extremely valuable teaching, education and research resource that illustrates the processes which formed various geological features. Linking such features between sites helps to illustrate the geological evolution of an area or landscape over time.



Andy talking to BCGS members in the Snake Pit, Wren's Nest, 40th anniversary field trip, 2015

Sadly, 'geoconservation' is often overlooked in favour of 'conservation'. Dr Ian Stimpson (Senior Lecturer at Keele University and Chair of GeoconservationUK, Staffordshire), points out that: 'Nature is both biotic and abiotic... geoconservation is as important as conservation'. Crucially, both protect and enhance sites of geological, historical and ecological importance, making them available to current and future generations. They form part of our heritage, contributing to our 'sense of place' and cultural identity.

GeoconservationUK is a national body that recognises and promotes sites of geological importance, known in England as 'Local Geological Sites' (LGS). In Scotland such sites are known as 'Local Geodiversity Sites' (LGS), and in Wales, 'Regionally Important Geodiversity Sites' (RIGS). These are designated based on scientific, historical, aesthetic and educational qualities. The Wren's Nest and Saltwells Nature Reserves are two examples of LGS's within the Black Country.

World-renowned for its geological association with the Silurian Period, the Wren's Nest gained its national designation in 1956. According to Rob Earnshaw (Warden), geoconservation gives Dudley an 'international geological profile', 'engenders local pride in the area' and it engages the local community, particularly children, through activities like fossil hunting. This has resulted in increased visitor numbers, geotourism and wealth generation. It has also reduced antisocial behaviour such as fly-tipping and vandalism - all of which helps to cut labour costs. ►

Saltwells Local Nature Reserve, designated a geological SSSI in 1981, is important for its association with the Carboniferous and Silurian Periods. According to Alan Preece (Senior Warden), geoconservation is 'helping people to see beyond what is currently there', revealing hidden historical land uses such as mining, quarrying, transport and manufacturing, and associated stories. At Saltwells, this includes 'overgrown railway tracks and apple trees sprouting from miners' lunchtime snacks'. Geoconservation work can also result in the generation of important grassland, wildflower meadows and other habitats which, in turn, can help to benefit rare flora and fauna. ■

Andy Harrison



Apple tree (on the right of the photo) on the rim of Doulton's Clay Pit at the Saltwells LNR.

Acknowledgements:

This article was first published in 'Geoscientist' (Volume 26 No. 10), November 2016. It is reproduced here by kind permission of the Geoscientist Editor.

Alan Cutler MBE



On behalf of BCGS members the Committee would like to congratulate former BCGS Chairman and Vice-Chairman Alan Cutler on receiving an MBE for voluntary services to geoconservation in the 2017 New Year's Honours List. A BCGS founding member, Alan was Chairman for 25 years until March 2000 before handing the role over to Graham and acting as Vice-Chairman until March 2013. As noted in BCGS Newsletter 140, April 2000, Alan had three objectives in mind when the Society was founded in 1975, including:

- to revive, in some form, the old Dudley & Midlands Geological Society, founded in 1842 and long since defunct.
- to run a viable modern geological society with a lively programme of lectures and field meetings.
- to be a recording and conservation body for the West Midlands.

Working for English Nature, now Natural England, Alan was present at Attingham Park, Shrewsbury on 18 April 1991, when the organisation was launched, replacing the former Nature Conservancy Council. For many years Alan actively worked with GeoConservationUK (formerly UKRIGS) and has also acted as Museums Services advisor to the Dudley Museum and Art Gallery. He is a member of the Geological Society of London: History of Geology Group (HOGG). ►

With more than 40 years of geoconservation under his belt Alan has been involved with publicising local sites of geological importance, such as Wren's Nest National Nature Reserve, Saltwells Local Nature Reserve, the Rowley Hills, Norton Covert, Barr Beacon and Barrow Hill. Early on he was instrumental in getting the BCGS involved with conservation work at these sites and in conjunction with the Society has produced several geological leaflets, which can be downloaded from our website: <http://bcgs.info/pub/local-geology/geological-leaflets-and-guides/>

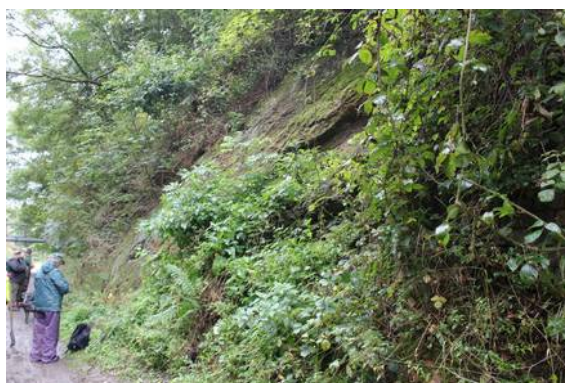
Now enjoying retirement, Alan is also currently a member of the Management Team for the Black Country's Global Geopark bid. ■

Andy Harrison

Geoconservation: October - December 2016

Saturday 1 October 2016: Brewin's Cutting, Saltwells LNR

It was and remained a wet and windy day when we met in the car park of the Saltwells Nature Reserve at 10.00. Tom Weaver from Dudley Council led the day's clearance work at the Brewin's Canal Section, below Brewin's Bridge, adjacent to the Dudley No.2 Canal. The clearance work involved removing vegetation and a lot of soil from the exposure to the east of the bridge to improve the view of the underlying outcrop. We did not do any clearance work to the west of the bridge where the same outcrop and a dolerite intrusion currently remain hidden behind thick vegetation.



Brewin's Cutting, Saltwells before clearance...

This exposure shows two markedly inclined beds of sedimentary strata dipping towards the east. These include Middle Carboniferous Pennine Lower Coal Measures (formerly Westphalian C) overlying Late Silurian (Pridoli) strata. The Carboniferous strata comprise reddish-brown and greenish-grey mudstones/shales including coal pockets and sandstone, with a layer of clasts within a finer matrix towards the base. The Silurian strata comprise greenish-brown mudstones belonging to the Raglan Mudstone Group (formerly the Red Downtownian), which in turn overlie the Temeside Mudstone Formation (formerly the Temeside Shales). The contact between the Carboniferous and Silurian strata represents 100 million years of missing geological history, including Devonian and Lower Carboniferous strata. The Carboniferous and Silurian beds dip at slightly different angles, making this contact an angular disconformity.



...and after

The contact between these two strata represents a major mountain building period, the Caledonian Orogeny, which was a result of the Avalonia/Baltica landmass colliding with Laurentia. This event caused the closing of the Iapetus Ocean and the formation of the Caledonian mountain chain. The chain formed part of a landmass, known as the Wales-Brabant Massif that stretched across Wales and central/southern England. It was on the northern edge of this landmass that the Black Country sat in mid to late Carboniferous times. ►

The Dudley No.2 Canal was constructed between 1792 and 1798, connecting the Dudley No.1 canal at Park Head Junction in the north-west with Halesowen in the south. The canal served the Netherton collieries where the Thick Coal fields were worked. At just over ten miles in length it was constructed to follow the local contours and passed through several tunnels along its route. Whilst skirting round Netherton Hill the route of the canal intersected a dolerite dyke which had to be cut through (where Brewin's Bridge now stands). Originally the cut was a tunnel, the Brewin's Tunnel. During its construction a mass grave containing numerous bodies was discovered. The discovery terrified the builders, who, believing that they had disturbed a Celtic burial, sort solace in a local pub. The grave later turned out to be a mass grave of cholera victims from the 16th century, who were subsequently relocated to the graveyard at Netherton Church.

Saturday 5 November 2016: Sedgley Beacon

It was a cold and windy day with sun and cloud for our day of geoconservation work, under the watchful eyes of Laura and Anna from the Birmingham and Black Country Wildlife Trust. We met at 10.00 at the car park off Beacon Lane. The day was spent clearing vegetation from the quarry at the northern end of Sedgley Beacon Hill, previously cleared in January. The quarry had become heavily overgrown since our last visit and our first job was to clear an access route to the only visible outcrop, perched towards the top of a steep slope. This done, we started to dig away soil from the base of the outcrop to create a bit of a platform to help make viewing easier. Laura and Anna kindly provided hot drinks and biscuits for lunch as well as tools for the clearance work.



Sedgley Beacon before clearance...

Today, Sedgley Beacon is much used by the locals for dog walking, mountain biking and running. Rising to approximately 237m (777 feet) above sea level the hill has been the site of a beacon for over 400 years with a tower in place since the 1700s. The current tower, some 50 feet high and 7 feet in diameter, was erected in 1846 by Lord Wrottesley, and is constructed of Gornal sandstone, known locally as the Gornal Grit. Several stories give a reason for the tower's construction: to mark the highest cultivated ground in England; as an astronomical observatory; or as a folly. Today the tower is a Grade II listed building and an iconic symbol for Sedgley and Coseley.

The Gornal Sandstone is generally described as a yellow-brown, fine-grained, micaceous, well-sorted, cross-bedded sandstone and dates to the Pridoli Epoch, which spans the end of the Silurian and the beginning of the Devonian periods. This sandstone belongs to the Downton Castle Sandstone Formation, which resulted from the fluvial deposition of sands and silts into coastal deltas during the onset of the Caledonian Orogeny, around 380Ma. It was deposited under shallow, warm, marine conditions, and forms quite a contrast to the earlier Silurian Aymestry Limestone (part of the Ludlow Series) which forms Sedgley Beacon Hill. ►



...and after

The stone for Sedgley Beacon Tower very likely came from the quarries of Upper Gornal and Ruiton where, up until the mid 1900s, it was extensively quarried as a building material for local churches, houses and windmills. Good exposures of these rocks can be found off Holloway Street in Lower Gornal. However, some of the exposures do require permission to visit.

Saturday 3 December 2016: Portway Hill Quarry, Rowley

It was another cold day with broken cloud, a light breeze and some light rain showers when we met at St. Brades Close at 10.30. Tom Hartland-Smith from the Birmingham and Black Country Wildlife Trust was standing in as our supervisor and once again volunteers from the Friends of Rowley Hills joined us for the day.

Continuing on from our visit in May, we worked at clearing spoil from the base of the main dolerite exposure. (*See front cover photo showing freshly exposed examples of spheroidal weathering.*) Friends Group members quickly whisked the spoil away to use for improving the footpaths crossing the reserve.



Portway Hill Quarry after clearance

On noticing that the plaque on the Wildlife Trust's interpretation cairn had been removed, we were informed that this was due to local kids vandalising it once again. We were also told that there was an ongoing problem with local youths riding motorbikes across the reserve. With continuing government cuts and issues with land ownership either side of the reserve, problems such as this are not going to go away anytime soon.

I would like to thank Tom Weaver, Laura, Anna and Tom Hartland-Smith for supervising at these three sites. Hopefully we will be back soon with more volunteers to keep up the fight against vegetation - and to shift more spoil! ■

Andy Harrison

'Building Birmingham' - trail project news

Since introducing the 'Building Birmingham' project in the December Newsletter (Issue 240 p.9) I'm pleased to report that the 'pdf' file of the 3rd and final trail has been completed by Ruth Siddall and is available on the BCGS website along with trails 1 and 2. In addition, our webmaster (John Schroder) has completed the web based version of Trail 2 for our website, and this can be accessed along with Trail 1. The web versions include maps and more photos. Trail 3 (web version) will follow in due course...

For quick reference here is the web address: <http://bcgs.info/pub/local-geology/building-stone-trails/>

It is at this point that we would greatly appreciate some input from you! We hope that some of you will visit Birmingham with your mobile phones and try out the trails with your gaze firmly fixed on the stones - forget about the shops and other attractions! We want to know about any errors or 'must include' additions which may have been overlooked. We also need to know of any problems that might be encountered by trail testing on a variety of different devices. Alternatively, if you would prefer paper copies of the trails, you can download and print the pdf files. Please send any comments, corrections, or suggestions to John or me at: newsletter@bcgs.info ►

Together, these trails provide a fairly comprehensive guide to the vast array of building stones used in Birmingham from the mid-nineteenth century to the present day. It quickly becomes apparent that British stone dominates the grand buildings of the 19th century civic centre, but the newer developments take us on a dizzying tour of ornamental stone from all around the world. From the 2.75 billion year old 'Verde Candeias' (Wetherspoon's, Broad Street) to the 'Tivoli Travertine' at 43 Temple Street (approx. 30 thousand years old) the trails also take us on a comprehensive journey through geological time.

If the trails seem a bit too long and complicated - then don't despair! The next stage will be to shorten and simplify the three trails, with the intention of producing printed trail guides suitable for the general public. ■

Julie Schroder

Who's a Pretty Boy, then? Is this really the ugliest fossil ever?



Bjuv Mining Museum

Regular readers will by now have gathered that I have a fondness for visiting Scandinavia (which would be heightened immeasurably if a North Sea car ferry were ever to reopen).

It was on one such trip that, not entirely by chance, I came across the Mining Museum of Bjuv in southern Sweden. It took a bit of finding from the sketchy information I had to go on, so was quite pleased to find anything at all!

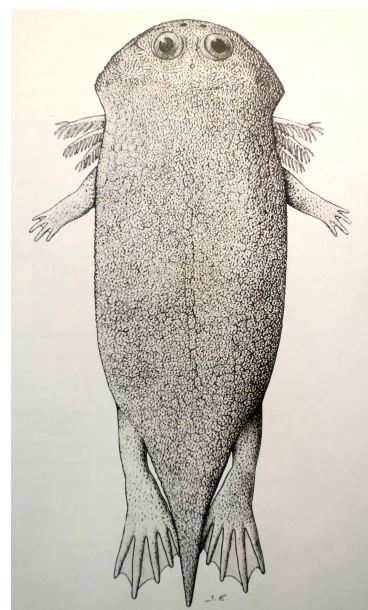
Bjuv is not a destination that would be on many people's 'to do' list, even though it is only some 20km from Elsinore Castle in Helsingborg, listed as the main visitor attraction on the Michelin tourist website for Bjuv. Shame on them... the mining museum gets no mention, but is surely of far greater interest to any rock-hound!

What surprised me was the discovery of a coalfield in Sweden, and what's more, a coalfield with a substantial history of exploitation. One

thinks of (mainland) Sweden as being mainly about the Caledonides, the Precambrian Shield and a few small Palaeozoic outliers celebrated in particular for their wealth of graptolite and trilobite fossils.

But here at Bjuv is a tiny outcrop, approximately 7 x 15km, of late Triassic 'Coal Measures' which look much like any of our British Carboniferous coal deposits. The coalfield was worked from the late 1800s well into the second half of the 20th century, and there are about two to three dozen mineshafts shown on an outline coalfield map displayed in the museum. The flora includes horsetails, ferns, cycads, seed ferns and conifers plus a smattering of plants of a far more obviously Mesozoic character such as the ginkgophytes and bennettitaleans.

However, it is a very different life-form that takes centre stage from this locality; a creature that has received a fairly ungracious press even ►



Gerrothorax.....in "person"!

amongst the scientists who described it in greatest detail, and who might have been expected to love it rather more! Enter then, the principal subject of this piece, a late-Triassic carnivorous amphibian rejoicing in the name 'Gerrothorax rhaeticus'. Now, amphibian fossils aren't that thick on the ground, but this metre long beast has also been recognised in Germany, Greenland and possibly Thailand. It is unusual in that adult specimens appear to demonstrate that it changed little during life from its youthful appearance (paedomorphic, if you like jargon), retaining external gills to enable it to breathe underwater much like the modern day axolotl, to which it is only distantly related.

It is indeed an odd-looking creature, or at least reconstructions of it are. But whether it deserves to be held as 'not even half decent looking' or indeed 'the ugliest animal that ever lived in Sweden'... well, I invite you to be the best judge. Beauty, after all, is in the eye of the beholder! ■

Mike Allen

Mike's Musings No. 7 - Geology and Colour Part 2

Continuing on from a discussion of the way that the quantum world affects the colours we see in minerals, (*Mike's Musings No. 6, Issue No. 240 p.17*) we now move on to examine further examples of colour in geology, including some other related properties of minerals, rocks and even fossils.

Some examples of Colour in Minerals

Corundum is essentially aluminium oxide (Al_2O_3), which is naturally colourless (another simple, strongly bonded compound like quartz). The more common variety, emery, is black due to inclusions of iron oxides. More interesting to some people's taste are the gem varieties. Ruby is red due to chromium replacing some of the aluminium atoms. In the case of another gemstone, beryl, which is a more complex aluminium beryllium silicate, the replacement of aluminium by chromium leads to a green colour, and gives us emeralds. Chromium is also the cause of the green colour of fuchsite, or 'chrome-mica', which again is a complex aluminosilicate. Clearly there is a little more going on than just an inherent property of the chromium atom.



*Precambrian fuchsite quartzite
Wyoming, USA - Wikimedia Commons*

Returning to corundum, sapphire is blue due to iron and titanium replacing some of the aluminium. Other colours such as orange and yellow can also be found, mostly, again, down to varying the amounts and types of iron impurity. This leads on to the additional chemical factor where elements can exhibit different oxidation states, iron being either in the ferrous (FeO) or ferric (Fe_2O_3) state. In combination this creates a phenomenon called 'charge transfer', which can result in strong absorptions of white light. In the case of magnetite (Fe_3O_4) the absorption is complete, and the mineral appears black. This partly explains the prominence of green and blue amongst the minerals of copper, which also occurs in various oxidation states, usually cuprous (Cu_2O) or cupric (CuO). Malachite (green), azurite (blue) and turquoise (well, turquoise!) are obvious examples.

Two transition metals not yet dealt with are cobalt and vanadium. The main reason for this is that their minerals, whilst often highly coloured, are less well known. You are more likely to be familiar with the pigment cobalt blue (especially if you recall my article in Newsletter 236 that described the Modum ►

cobalt mine in Norway). With the possible exception of lazurite (pure lapis lazuli) cobalt blue is as blue as anything gets in the mineral world. Ironically, none of the cobalt minerals are in themselves blue in colour. The pigment is the aluminate of cobalt, whilst the minerals generally include other transition metals in their composition.

I could give many more specific examples of mineral colouration, but it is perhaps time to move on to some more general themes. Three further properties of minerals associated with colour are lustre, streak and dispersion.

Lustre, Streak and Dispersion

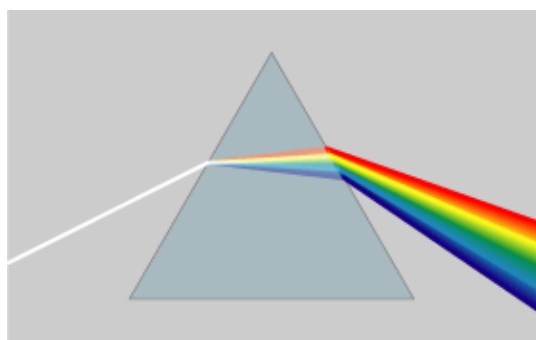
Lustre refers to the 'shininess' of a mineral, expressing its power to reflect light. This property is related to its electrical conductivity, which is greatest when an electron shell is only partly filled, allowing electrons freedom of movement (which is what electricity is all about). Shinier metals like silver, copper and aluminium are better conductors of electricity. All this, however, applies to larger surfaces of the metal. Powdered metals absorb most, or all, wavelengths of light and therefore appear grey or even black. This has one practical application widely observed in geology: namely that iron pyrites looks yellowish-gold when seen as typical crystals but is responsible for anoxic shale deposits appearing dark grey, due to finely disseminated pyrite (and not necessarily due to clay mineral content or to carbonaceous material). Other types of lustre, such as a silky lustre, often result from a physical property of minerals (silky due to a fibrous crystal habit). A dull lustre (if there is such a thing - it sounds like an oxymoron that I have just made up!) is due to surface roughness.



*Cobalt chloride hexahydrate,
Wikimedia Commons*

Geology students are all introduced to the **streak test** in mineralogy classes, and soon realise that only a few minerals have a distinctively coloured streak. This is down to the fact that whatever the cause of colour in the mineral, it is often a weak effect. (Few of the examples given so far produce really intense colouration.) When the mineral is in powdered form, as in the streak test, the colour effect is lost, so the streak appears white (or non-existent). Similarly, thin slices of a mineral lose much or all of their colour, but as we discovered in Frank Wells' recent talk for the Society, (*'Optical Mineralogy, 14 November 2016*) thin sectioning opens up a whole world of other optical effects resulting from the atomic structure alone.

One of these optical effects is **dispersion**. It results from a property known as refractive index, and more particularly the fact that light of different wavelengths gets refracted to differing degrees. This is what Newton discovered when he split white light using a glass prism, and obtained the rainbow effect,



Wikimedia Commons

having separated the different components of white light. Minerals with high dispersion split light to a greater degree and are observed to 'sparkle' as a result. The obvious candidate for a good sparkle is the lady's best friend: diamond. The manner of facetting a diamond affects the travel path of a ray of light passing through it, in particular the distance travelled. This and other factors such as transparency will contribute to this fiery effect, which is an important consideration in the value of a gemstone. It's not all down to size, nor is it just of academic interest! ►

Thermal Pools

Elsewhere in the natural world of mineral deposits we come across the vivid colours associated with thermal pools. This is largely a function of how the mineral calcite (colourless when pure) is affected by the introduction of various impurities, much as happens with quartz and other colourless minerals. In this case they are imparted by constituents within the thermal waters. Silica (or siliceous sinter) gives rise to the purest white travertine terraces. Sulphur (surprise, surprise) imparts a yellow-pink colour. Manganese is responsible for purplish tinges, antimony (and arsenic?) for orange colours. Greenish hues are definitely associated with the presence of arsenic (and probably also algae). Black/dark grey shades are down to carbon, or more surprisingly, sulphur. Less surprising is that iron gives a red-brown colour - the colour of rust - which provides a suitable segue for considering the colours to be found in sedimentary rock.



Morning Glory Pool, Yellowstone National Park, Wikimedia Commons.

Colour in Sedimentary Rocks

Since 'sediments' and 'rocks' are merely collections of minerals, it follows that their colours are largely dependent on their mineral composition. A collection of 'sands' I have built up, shows that sedimentary rocks (other than black, white or grey) mostly represent only the red to yellow part of the visible spectrum. (My collection was inspired by those celebrated glass lighthouse souvenirs from the Isle of Wight containing different coloured sediments from Alum Bay.) Occasionally sedimentary colouration extends into the green range, but rarely, if ever, are sediments blue, indigo or violet. This shows the dominance of 'rust' (the impurity caused by the oxidation of iron), within most clay minerals and quartz, which make up the majority of sedimentary rocks. See Newsletter 240 p.18 for another sample from Mike's sand collection. Ed.



A sample of Mike's sand collection

Colour in Igneous and Metamorphic Rocks

Amongst igneous or metamorphic rocks, other 'rock-forming' minerals may be prevalent. Greenish sands derived from olivine, black sands from pyroxenes, and dull pinkish sands from garnet are not uncommon. Detrital feldspar often gives a pinkish tinge to arkosic sediments, derived from potash feldspars like microcline or orthoclase. Chlorite will lend a dull greenish tinge to a clay-rich greywacke. Impure marbles (and rarely is marble as white as in the celebrated stuff from Carrara) take on as diverse a range of colours as any rock type. The green and yellow-green banding of Iona and Connemara marble, due to forsterite (a variety of olivine) is well known, and darker green serpentinite marbles (with various trade names: 'verde'- this or that) widely adorn our high street shop-fronts.

Colour in Fossils

In the fossil realm, it has become quite fashionable to look for evidence of original colouration in many creatures from the past. Research is beginning to unlock some of the secrets of pigments and structural tricks employed, in particular, by feathered dinosaurs. Organic compounds known as melanins have been found preserved in structures called melanosomes, and have demonstrated that their shapes and packing density contributed to different colours and shades of colour seen in the living animal. This mixture of chemical and structural variation probably resulted in highly patterned skin, feather and shell patination, not just in vertebrates, but in insects, cephalopods and the like. It ►

seems equally likely that past animals also employed the tricks of luminescence much as marine creatures do today (which reminds me, I haven't even mentioned the dazzling display of colours amongst fluorescent and phosphorescent minerals, perhaps best left for another day).

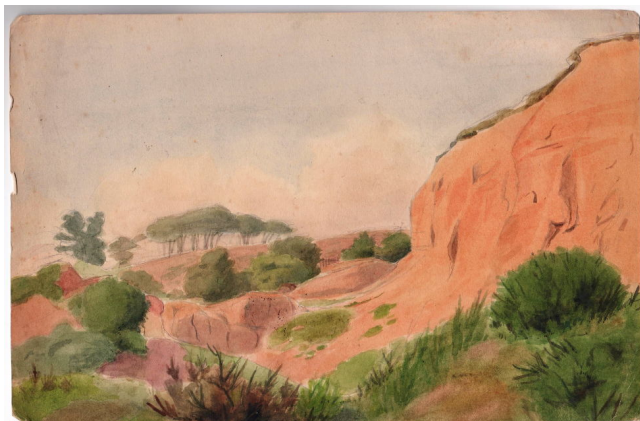
Finally, it needs to be pointed out that we all see colour differently. This goes back to the structure of the eye, and how our own genetic make-up affects the fine detail of our individual perception of the visual spectrum. However, in the vast majority of cases this shouldn't override the majority of what has been described, although we are all familiar with the well known problems of colour blindness (the red-green problem, for instance) which would obviously interfere with colour reception. ■

Mike Allen

Members' Forum

My grandfather, George Arthur Watkins, known as Arthur, was born on 25 April, 1885 at 357 Lodge Road, Aston. He went to King Edward VI School, Handsworth and then to Birmingham Art College where he met my grandmother, Clara Brett, daughter of the landlord of the Calthorpe Pub, Handsworth. They moved to Bannersgate in Sutton Coldfield in 1936.

Arthur worked for a number of years for Elkingtons in the Jewellery Quarter as a silversmith's designer. In later years he was self employed with a room in Vyse Street where he designed badges and mayoral chains among other things. He was a keen amateur artist and regularly went out with his sketching gear on his Velocette moped to places like Sutton Park and Barr Beacon, only 2 miles away. The Barr Beacon paintings were painted between about 1940 and 1960, most probably the mid 1950s but there is no date on them. They show the quarry faces before they became overgrown. ■



Gill Chant

We thank Gill for sending these lovely examples of 'geo-art' and wonder if anyone else has any hidden geo-artwork? Please let us know. We'd love to add more to our Members' Forum art gallery. Ed.

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