



# The Black Country Geological Society

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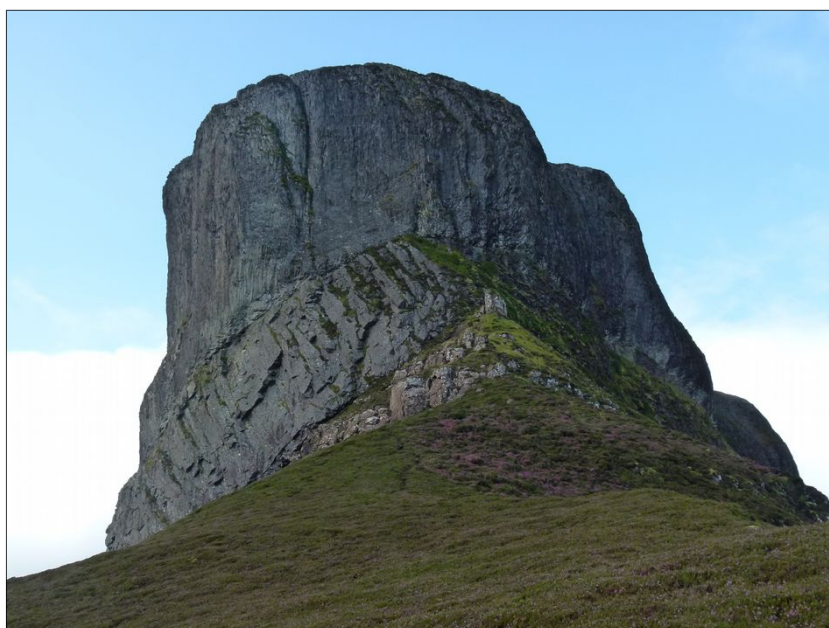
# Newsletter No. 234

## December 2015

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**Copy date for the  
next Newsletter is  
Monday 1 February**



**Linda Tonkin,  
Honorary Secretary,**  
4 Heath Farm Road, Codsall,  
Wolverhampton, WV8 1HT.  
☎ 01902 846074  
[secretary@bcgs.info](mailto:secretary@bcgs.info)

**Andy Harrison,  
Field Secretary,**  
☎ 01384 379 320  
Mob: 07973 330706  
[fieldsecretary@bcgs.info](mailto:fieldsecretary@bcgs.info)

**Julie Schroder,  
Newsletter Editor,**  
42 Billesley Lane, Moseley,  
Birmingham, B13 9QS.  
☎ 0121 449 2407  
[newsletter@bcgs.info](mailto: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](http://bcgs.info)

## 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 from January 2016.*

**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.**

**Monday 18 January (Indoor meeting): 'Gondwanaland, the Southern Supercontinent'. Speaker: Andy Harrison.**

**Saturday 30 January (Geoconservation day): Sedgley Beacon.** Scrub clearance, and removing saplings to maintain view of rock exposures. Meet at 10.00 at Sedgley Beacon car park entrance, grid ref: SO 923943, off Beacon Lane. Wear old work clothes, waterproofs and stout footwear. Please bring gloves and garden tools: loppers, secateurs, forks and spades if you have them. Also bring lunch. Finish at 14.30.

**Monday 15 February (Indoor meeting): 'The Debitage Dilemma - the Distribution of the Lithologies at Stonehenge'. Speaker: Dr Rob Ixer.**

**Saturday 20 February (Geoconservation day): Saltwells Nature Reserve.** Meet at 10.00 at the Nature Reserve car park on Saltwells Lane (Grid ref: SJ 934 868). Wear old work clothes, waterproofs and stout footwear or wellies. Please bring gloves and garden tools: loppers, secateurs, forks and spades if you have them. Either bring a packed lunch or hot food can be acquired from the Saltwells Inn adjacent to the car park. Finish at 14.30.

**Saturday 12 March (Geoconservation day): Barr Beacon, Pinfold Quarry.** Meet at 10.30 at the entrance on B4154 Beacon Road, opposite Bridle Lane (the southern entrance to Barr Beacon), grid ref: SP 060967. Wear old work clothes, waterproofs and stout footwear. Please bring gloves and garden tools: loppers, secateurs, forks and spades if you have them. Also bring lunch. Finish at 14.30. *(Postponed from November 2015).*

**Monday 14 March (Indoor meeting, 7.00 for 7.30 start): AGM followed by 'The Minerals of North Wales'. Speaker: Tom Cotterell.**

**Monday 18 April (Indoor meeting): 'Microfossils of the Wren's Nest'. Speaker: James Inman.**

**Saturday 23 April (Field meeting): Cannock, led by Ian Stimpson, NSGGA. (Details tbc.)**

**Saturday 14 May (Field meeting): Oxford University Museum of Natural History, led by Paul Smith, Curator. (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.

### East Midlands Geological Society

**Saturday 16 January at 6pm: 'Early Palaeogene Lava Fields of the Inner Hebrides - are they just monotonous piles of basalt?'**. Speaker Dr. Ian T. Williamson (formerly British Geological Survey & Natural England).

Non-members are welcome. Meetings will be held in the Geography Department of Nottingham University, which is in the Sir Clive Granger Building. Further info at: [www.emgs.org.uk](http://www.emgs.org.uk) or email: [secretary@emgs.org.uk](mailto:secretary@emgs.org.uk)

### Manchester Geological Association

**Wednesday 2 March (start time tbc): 'Past Eruptions and Future Risks - should we be concerned about Iceland's volcanoes?'**. Speaker: Professor Fiona Tweed, Staffordshire University. Joint Meeting with the Geographical Association.

Most MGA Meetings are held in the Williamson Building, Oxford Road, opposite The Manchester Museum. For further information about meetings go to: <http://www.mangeolassoc.org.uk/> or email [lectures@mangeolassoc.org.uk](mailto:lectures@mangeolassoc.org.uk) Visitors are always welcome.

### Mid Wales Geology Club

**Thursday 21 January: AGM followed by a short talk - 'The Tyrone Ophiolite: ancient ocean floor on land and in Northern Ireland'**. Speaker: Dr Geoff Steel.

**Thursday 18 February: 'Quartz and other forms of silica'**. Speaker: Bill Bagley.

Further information: Tony Thorp (Ed. newsletter & Hon. Sec): Tel. 01686 624820 and 622517 [tonydolfor@gmail.com](mailto:tonydolfor@gmail.com) Web site: <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 18 January: 'Blood cells and collagen fibres preserved in dinosaur bone?'**. Speaker: Dr Susannah Maidment, Imperial College, London.

**Monday 1 February: 'Dating fossiliferous Precambrian rocks of Charnwood: success, trials and tribulations with zircon U-Pb isotope techniques'**. Speaker: Steve Noble, NERC Isotope Geoscience Laboratory, London.

**Monday 15 February: 'Geology of the 5/22-1 exploration well, Rockall Trough, offshore NW Ireland: the role of break-up magmatism on trap development'**. Speaker: Professor Christopher Aiden-Lee Jackson, Imperial College, London.

**Monday 29 February: Title tbc.** Speaker: Professor Emily Rayfield, University of Bristol.

**Monday 14 March: 'The ophiolite enigma resolved?'**. Speaker: Professor John Dewey, University of Oxford.

Lectures at 5.00 in lecture theatre WG5, Aston Webb Block A, 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](mailto:lapworth@contacts.bham.ac.uk) or visit: <http://www.lapworth.bham.ac.uk/events/lectures.shtml>

### Woolhope Naturalists' Field Club - Geology Section

**Friday 11 December: 'From the Depths: how speleothems (calcareous cave deposits) reveal past environments and climates'**. Speaker: Professor Ian Fairchild, Birmingham University. **New venue and starting time:** Upstairs Meeting Room, Hereford Leisure Centre, HR4 9UD, at 6.45.

**Friday 15 January: 'Drilling for Oil and Gas'**. Speaker: Cliff Spooner previously with Stag Geological Services Ltd.

All indoor events are held in the Woolhope Room, Hereford Library starting at 5.30 unless otherwise specified. Guests are welcome, but must take day membership of the Club: £2.00. Further information: Sue Hay on 01432 357138, email [svh.gabbros@btinternet.com](mailto:svh.gabbros@btinternet.com) or visit their web site: [www.woolhopeclub.org.uk/Geology\\_Section/default.htm](http://www.woolhopeclub.org.uk/Geology_Section/default.htm)

### Teme Valley Geological Society

**Monday 8 February: 'From the Depths: How Cave Deposits tell us about Past Environments and Climates'**. Speaker: Prof. Ian Fairchild.

7.30 at the Pupil Referral Unit opposite Maylite Trading Estate on B4197, just south round the corner from the village hall. £3 non-members. For more details visit: <http://www.geo-village.eu/> or contact Janet Maxwell-Stewart, 01886 821061

### Warwickshire Geological Conservation Group

**Wednesday 20 January: 'Exceptionally preserved Cambrian fossils of the Chengjiang Lagerstatte, China: the flowering of early animal life'**. Speaker: Prof. David Siveter (Leicester).

**Wednesday 17 February: 'Minerals, Magmas & Man'**. Speaker Dr Paul Olver, Hereford & Worcester EHT.

Doors open at 7.00 for coffee before a 7.30 start at St Francis Church Hall, Warwick Road, Kenilworth CV8 1HL. For more details visit: <http://www.wgcg.co.uk/> or contact Ian Fenwick [swift@ianfenwick.f2s.com](mailto:swift@ianfenwick.f2s.com) or 01926 512531. There is a charge of £2.00 for non-members.

## Shropshire Geological Society

**Wednesday 13 January: 'William Smith's legacy'.** Speaker: Professor Hugh Torrens, Keele University.

**Wednesday 10 February: 'Ordovician Cephalopods'.** Speaker: Dr Dave Evans, Natural England.

Held in the Conference Room of the Shropshire Wildlife Trust HQ in Abbey Foregate, opposite the Abbey and adjacent to the large public car park with free evening parking, commencing at 7.00 for 7.30. A nominal charge is levied for attendance by non-members. Further info at: [www.shropshiregeology.org.uk/](http://www.shropshiregeology.org.uk/)

## Open University Geological Society, West Midlands

**Saturday 27 February: Day of Lectures. Registration from 9.30, first lecture 10.30.** Dome Lecture Theatre, Department of Earth Sciences, University of Birmingham.

There will be a range of topics including volcanism, sinkholes and mining.

Speakers include: **Dr Seb Watt** (Birmingham University), **Dr Vanessa Banks** British Geological Survey  
**Dr Clare Warren** (Open University), **Dr Sarah Gordon** (Director at Sataria)

Booking essential - contact David Green [davepgreen@btinternet.com](mailto:davepgreen@btinternet.com) OUGS Members free, Non-members £5. Bring a packed lunch.

## Open University Geological Society, East Midlands

**Saturday 12 December: Day of Talks - Geology and Space. Registration and coffee from 10.00, first lecture starts at 10.45.** British Geological Survey Conference Centre, Keyworth, Nottingham.

Programme (provisional):

**'Marsquakes: preparing for a teachable moment in 2016'.** Paul Denton, British Geological Survey.

**'Deformation from Space: Watching the Earth Quake'.** Ruth Amey, University of Leeds.

**'The Carbonate-Silicate Cycle on Habitable Exoplanets: Implications for Long-term Habitability'.** Dr Andrew Rushby, University of East Anglia.

**Title tbc (remote sensing of natural hazards).** Dr Matthew Blackett, Coventry University.

**'Martian meteorites: the first regolith breccia (NWA 8114)'.** Jane Macarthur, University of Leicester.

**'Pluto and Charon revealed as geological bodies by the New Horizons mission'.** Prof. David Rothery, Open University.

Cost: £8 per person (including buffet lunch). Please register by 10 December. For further details contact Don Cameron [dgca@bgs.ac.uk](mailto:dgca@bgs.ac.uk)

## The Oxford Colloquium

**Saturday 5 March 10.00-17.00.** Doors open at 9.30.

**'The origin and evolution of Homo sapiens'.** Professor Chris Stringer, Natural History Museum.

**'The origin, residence and migration of carbon-rich fluids in the crust'.** Professor Christopher Ballentine, University of Oxford.

**'The use of forensic geoscience to reveal buried ancient landscapes'.** Professor John Underhill, Heriot-Watt University.

**'The rise of the terrestrial ecosystem: insights from the Carboniferous'.** Professor Sarah Davies, University of Leicester.

**'Latitudinal biodiversity patterns in Deep Time'.** Professor Paul Upchurch, UCL.

**'Volcanology and the role of the Citizen Scientist'.** Professor Hazel Rymer, Open University.

Tickets for the Oxford Colloquium cost £20. More information and tickets go to:  
<http://www.ogg.uk.com/#!/the-oxford-colloquium-2016/c8qx>



## Editorial

Our 40th anniversary year has seen a varied programme of events and activities for the Society but ends with the shocking news that Dudley Metropolitan Borough Council intends to close the Dudley Museum and Art Gallery. The history of our Society is inextricably linked with our museum, and it is unthinkable that the geological treasures which it houses could be dispersed, moth-balled or worse. The Museum's vast collection has inspired generations of professional and amateur geologists, children, and numerous people from all walks of life. There have been a number of campaigns and petitions to save the Museum. Here is a link to one which is still running: <https://you.38degrees.org.uk/petitions/save-dudley-museum-art-gallery> Please sign if you haven't already done so - and spread the word to everyone you know! For some background information on the Council decision, go to either of these news reports:

[http://www.stourbridgenews.co.uk/news/13883110.Goodnight\\_at\\_Dudley\\_Museum\\_Council\\_unveils\\_plan\\_to\\_close\\_borough\\_art\\_gallery\\_to\\_help\\_save\\_costs/](http://www.stourbridgenews.co.uk/news/13883110.Goodnight_at_Dudley_Museum_Council_unveils_plan_to_close_borough_art_gallery_to_help_save_costs/)

<http://www.expressandstar.com/news/2015/10/21/museum-to-close-275-jobs-to-go-and-council-tax-to-rise-in-savage-dudley-council-cuts/>

On a more positive note, this anniversary year has seen the launch of our photo archive, which already houses a considerable collection. Most recently we are grateful to Bernard Duggan for sending us some old photos of Doultton's Clay Pit. We give one example on p.14 and you can see the others and the entire archive on our website here: [http://bcgs.info/pub/?page\\_id=797](http://bcgs.info/pub/?page_id=797)

Please note that we are asking for your help to catalogue our records when they have been moved to their new home at Dudley Archive (see below).

Annual subscriptions are due on 1 January, and it is now possible for members to pay by standing order. Details are on p.14 and we would greatly appreciate your co-operation in using this facility if possible.

We wish all our readers a Happy Christmas, and we look forward to seeing you in the New Year. ■

### Archiving BCGS Records

#### We need your help!

The BCGS records are currently housed at Himley Hall. The Dudley Archivist has seen them and agreed that they can be transferred to the Dudley Archive, and members of the committee have been tidying them up ready for transfer. After it has been moved, we would appreciate some extra help to catalogue the material. If you can spare a little time to assist with this task, please contact our secretary, Linda Tonkin at: [secretary@bcgs.info](mailto:secretary@bcgs.info)

## Bloodstone, Sweat and Tears: some curious rocks from the Hebrides

Together with some illustrious company from the Black Country Geological Society, a friend and I recently visited the 'Small Isles' of Scotland. Not renowned for my sea-legs (and wondering why I had ever suggested the idea in the first place), we pitched up at Mallaig marina at the end of what everyone in Scotland seemed to agree had been the worst summer anyone could remember. We climbed aboard the yacht 'Destiny' to a welcoming cuppa on our home for the next six days. We were duly 'shown the ropes' (literally!), but with no further need to worry about our well being. As things turned out, conditions were conducive to an anticlockwise tour of these islands, following a brief visit to Knoydart. ►



*Coroghan Mor*



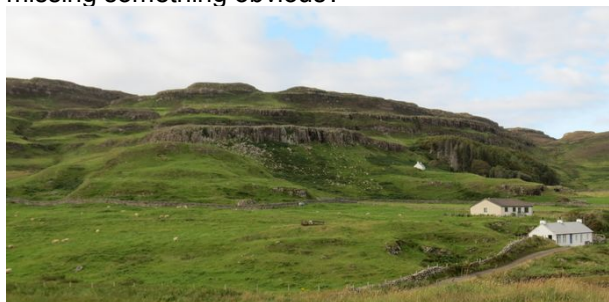
*Columnar lavas in a fallen block at Coroghan Mor*

After Knoydart, the first port of call was the harbour on the lovely little isle of Canna, the 'softest' of the three isles on which we set foot. (I count Sanday and Canna as a single isle, as linked as they are by a tidal causeway.

Setting foot ashore, it didn't take long to walk the few hundred metres to Coroghan Mor, a crag surmounted by the ruins of a castle at the foot of Compass Hill. The crag could easily be mistaken for a volcanic vent, consisting of a confusing mix of multi-oriented columnar lavas and agglomerates. Some of the latter are actually more like ordinary conglomerates with the occasional volcanic clast included, but the overall high proportion of

coarse, angular agglomeratic material would suggest proximity to a vent, perhaps offshore, there being no vent recorded by the British Geological Survey.

The oddest feature, however, was to be seen by examining the columnar lavas more closely. Many of them revealed an inner texture that resembled a coarsely 'oolitic' (or 'pisolitic') appearance. I'm still not sure what to make of this. I have never noticed it amongst any other columnar basalts around the Hebrides or further afield. Is it due to intergrowths of different minerals such as the ophitic texture seen in some gabbros and dolerites, or a cooling texture like the larger columns themselves on a smaller scale; or perhaps I'm missing something obvious?



*Trap topography on the Isle of Canna*

as they demonstrate the development of high energy river systems during the volcanic period, and suggest that at least some of the lavas were erupted with significant time intervals.

Our next destination was Rùm, the largest, and most rugged of the Small



*The Sound of Canna from the boulder beach of Guirdil Bay (our yacht 'Destiny' in the distance)*



*Detail from columnar lava at Coroghan Mor*

Canna

and Sanday show off to perfection the 'trap topography' associated with a stacked series of lava flows. The term 'trap' is a corruption of the German 'treppen', a word for steps or staircase.

The occurrence of conglomerate beds is particularly noteworthy



*Conglomerate beds on Sanday*

door', so to speak. By means of a short hop across the Sound of Canna, we were deposited from a dinghy on the boulder beach of Guirdil Bay. This was not quite as straightforward as we hoped, for the tide was high and the beach rose steeply. Fortunately (for us) it was our skipper, Andrew Fennymore-White, who got the soaking as he exited the small craft in deeper water than intended, just as a large wave caught him unawares. Hauling us ashore, he enabled us to alight dry-shod, and deserves special thanks for this. ►



Guirdil Bay is one of the busier parts of Rùm! It has a mountain bothy and a path leading to it. It also lies at the foot of Bloodstone Hill which is the over-riding reason for my wishing to return to this place after almost 25 years. In that time I've read about the unusual product to be found in a thin seam just below the summit of the hill, which has been worked in the past. This is the celebrated 'bloodstone' of the title, which, along with Irish porcellanite, Arran pitchstone, Perthshire hornfels and Shetland riebeckite-felsite, provided our ancestors with some distinctive lithologies from which to manufacture an array of artefacts. Those made of bloodstone have been discovered on Skye, Sunart, Ardnamurchan and possibly as far away as Torridon.



*Guirdil Bay, bothy and Bloodstone Hill*



*Bloodstone from Guirdil beach*

Bloodstone is a particular variety of chalcedonic silica, usually some shade of green, characterised by spots of reddish-brown iron-oxide or jasper. (According to Heddle\*, larger blotches of this alteration produce a variety called 'heliotrope' while yellow spots produce a variety called 'plasma'). The material is described as infilling a vein up to 9 inches thick within the varied lava succession that forms the whole ridge, of which Bloodstone Hill is the northernmost bastion. The spots seen in the material we found amongst the pebbles on the beach consist of a concentrically zoned mineral, identified by Heddle as chalybite, which may represent the decomposition of tiny cubes of pyrite. Bloodstone grades into various forms of silica-

rich material, including agates and hornfels. The greenish hues are further identified as being produced by the mineral celadonite (= celdonite) which also occurs separately infilling vesicles in the lavas.

Having found what we came for, and knowing that we had the whole island to traverse to reach our dinghy pick-up at the normal landing point in Loch Scresort, we abandoned the idea of climbing the hill. We headed up trackless Glen Guirdil to join up with the higher track around the flanks of Orval. Big mistake! That trackless terrain turned into an ankle-wrenching, sweaty (as per the title) clamber through a variety of vegetation types - not a route of choice, though probably typical of much of the island. Gaining height at least provided us with some fine views back out to sea, where the Outer Isles loomed hazily on the horizon.

Further on, along the jeep track not far from the Kilmory turn, an eagle-eyed newsletter editor(!) made an unexpected discovery of an unfamiliar rock amongst the road metal. With imagination, the rounded patterns in this rock could be fossilised 'teardrops' (the final element of the title), but a bit of research yielded a description of a spherulitic texture produced in thermally metamorphosed Torridonian sandstones which form the bedrock nearby. The 'spherulites' represent radial aggregates of intergrown needle-like plagioclase and quartz crystallising out of equilibrium with the melt-rocks. In other situations, this texture results from the rapid cooling, or devitrification, of volcanic glass, such as the well-known 'snowflake obsidian'.



*Rock showing spherulitic texture*

Interestingly, the large body of granite (technically a granophyre) that makes up the south-western part of the Rùm plutonic complex (south of Orval and Bloodstone Hill), is described as having a core of spherulitic microgranite, which might be the same thing but on a bigger scale. There are further interesting rock types described amongst the gabbros and peridotites of this complex, which represents the deep-seated magma chamber from which the volcanic rocks were erupted, for instance, 'harrisite', named after another location on Rùm, refers to a variety of peridotite in which large, dendritic olivine crystals are preserved in a finer ►

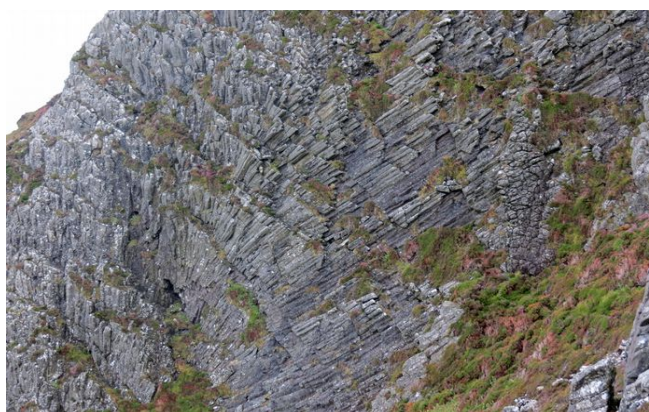


matrix of pyroxene. They grew to large sizes as they were left to settle slowly on the floor of the magma chamber, indicating quiet conditions without any convection currents disturbing their development.

From a slithery pick-up point at Dibidil on the south-east coast of Rùm we sailed around the west coast of Eigg, by-passing the little isle of Muck, and settled for the night in the sheltered harbour at Galmisdale. We were heading for one of the most iconic sights in the whole of the Hebrides, 'An Sgùrr', or the 'Sgùrr of Eigg'. The most familiar and impressive profile of this 'diminutive giant' in the Hebridean landscape is when seen end on. Like Canna, this part of Eigg is composed of 'trap' lavas and tuffs. The Sgùrr is usually interpreted as the remains of a valley infilled by a very different type of lava, a 'river' of highly acidic pitchstone. The pitchstone itself sits on the lavas and consists of a lower layer of columns inclined in such a way as to suggest just one side of a valley, capped by an upper layer of generally vertically disposed columns (see *front page photo*). Being much harder, the pitchstone now stands proud above the worn down, more deeply eroded, lava outcrop.



*The Sgùrr of Eigg*



*Radiating fans of slender columns*

On a col that affords access to the summit ridge, the upper layer becomes somewhat topsy-turvy, with radiating fans of slender columns. In hand specimen the pitchstone appears to have a 'crazed' or spotted appearance. This highlights the difference between true volcanic glass (obsidian) and pitchstone, in which small crystals of feldspar and pyroxene stand out from the glassy phase of the quartz.

One final detail that is used to argue in favour of the 'river of lava' model is seen along the southern margin of the ridge, where undercutting reveals a layer of contemporary conglomerate in which fragments of vegetation including the celebrated

'Eigg Pine' were found. This was first described in 1831 by Henry Witham in his wonderfully titled 'Observations of fossil vegetables'. Collecting pieces of 'Pinites eiggensis' was also whimsically recounted by Hugh Miller. The conglomerate is interpreted as a fluvial deposit in the wooded river valley pre-dating the flow of pitchstone lava.



*Pitchstone sample from the Sgùrr of Eigg*

While we sailed round the western coast of Eigg I was hoping to see a clearer exposition of the valley, where both sides of it are preserved and a distinct 'infill' is to be seen to advantage. This was thwarted by rather hazy conditions, so I had to settle for the one-sided valley described above. It has been pointed out that the offshore skerry of Oigh Sgeir, some 30km west-north-west of Eigg, is also composed of pitchstone, and might represent a continuation of the Sgùrr river. That would make it a sizeable valley system indeed.\*\* ■

*Mike Allen*

\* *Matthew Forster Heddle, 'The Mineralogy of Scotland, Vol. 1.'*

\*\* **Stop press:** After Mike's presentation on this subject at the Members' Evening, there was some lively discussion on the origins of the Eigg pitchstone. Roy Starkey has now found an alternative theory in a paper by Brown, D.J. & Bell, B.R. in the *Journal of the Geological Society, London*, Vol. 170, 2013, pp. 753–767. Go to <http://eprints.gla.ac.uk/79502/> to read the abstract. Thanks Roy, Ed.



## WMOUGS Seismic Refraction Survey in the Black Country

Extending its programme of study days, the West Midlands Branch of the Open University Geological Society introduced another new activity this summer: a seismic refraction survey. The Dudley Kingswinford Rugby Club (DKRFC) gave permission for an investigation on their property, and the survey took place on 5th July. The playing fields provided a conveniently flat and well-manicured site in the Smestow Valley to the West of Dudley. A nearby sand and gravel quarry suggested the presence of glacial outwash deposits blanketing the underlying Permian sandstones. The purpose of the survey was to establish the probable nature and depth of the drift deposits.



*The Bison 1570C seismograph*



*Visual display on the seismograph*

The group used a Bison 1570C seismograph with a single geophone. The seismic signal was provided by a sledge hammer with an impact switch connected by cable to the seismograph. At the moment of impact, the switch closes, starting a millisecond timer in the unit. As the seismic waves arrive at the geophone, the vertical motions produce an electrical signal which is converted into a visual display on the unit's small cathode ray screen. As this was a simple refraction survey, we were only interested in identifying the first wave (the first P-wave) to reach the geophone (the 'first arrival'). An on-screen cursor is scrolled to the start of the first arrival on the line trace, and the travel time in milliseconds is displayed below.

A 60m survey line was marked out with pegs at 4m intervals, and the geophone was planted firmly at the origin of the transect. An aluminium anvil plate was placed on the ground at the first 4m peg and struck with the hammer. By repeating the impact a few times, the seismograph was able to stack the signals, reinforcing the signal from the hammer impact and reducing random noise. The travel time of the first arrival was recorded, and the anvil plate was then moved to the next point on the transect.

When the forward survey was complete, the geophone was moved to the far end of the survey line, and the survey was repeated in reverse to allow the dip of any boundaries to be calculated. The two surveys were plotted as 'first arrival' line graphs: each bend in a survey plot reflects a boundary between drift deposits or rocks with different physical attributes. The positions of the bends on the graph allow the depth of each boundary to be calculated. The slope of the line on the graph is proportional to the velocity of the wave within each layer: each type of drift and rock has a characteristic range of seismic transmission velocities. As a result it is possible to suggest the likely nature of the subsurface geology. ►



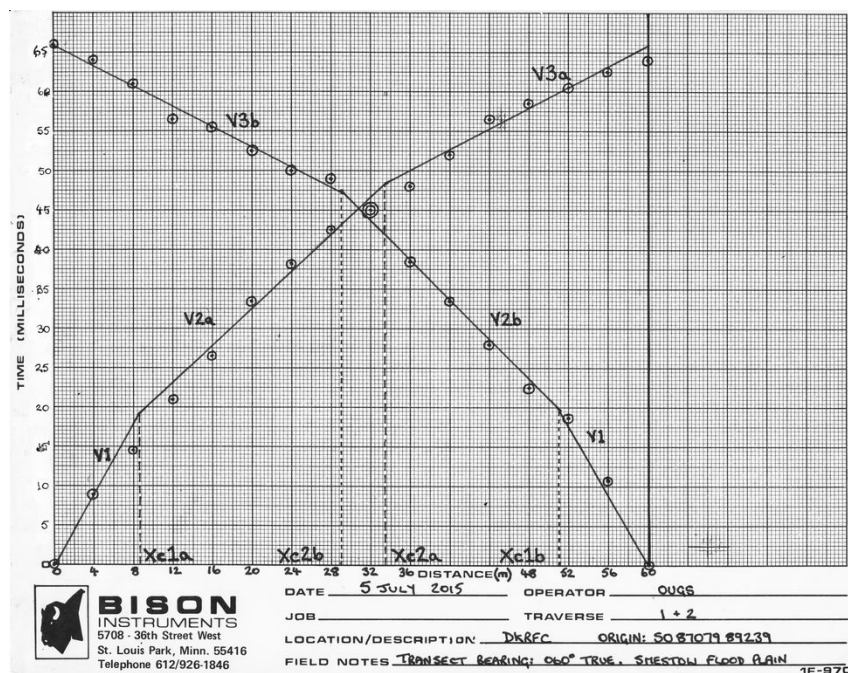
*Rick takes readings*



*Stephen, Adrian and Zbig watch Emma doing the hard work*

## Results

First Survey: W - E		Transect Origin SO8707989239 Bearing 060° True	Reverse Survey: E - W	
Distance (m)	Time (ms)		Distance (m)	Time (ms)
0	0		60	66.1
4	8.9		56	64.0
8	14.6		52	61.0
12	21.0		48	56.7
16	26.4		44	55.6
20	33.6		40	52.6
24	38.3		36	49.8
28	42.6		32	48.9
32	45.1		28	45.1
36	48.0		24	38.6
40	52.1		20	33.6
44	56.6		16	28.1
48	58.4		12	22.7
52	60.5		8	18.8
56	62.6		4	10.8
60	64.2		0	0



First and reverse survey results

likely to be 'soft sandstone'. In the context of the local geology, Layer 2 is likely to be glacial outwash, while the boundary between 2 and 3 is probably the weathered upper surface of the Permian sandstone. Any errors in the processing and interpretation of the data are my own. ■

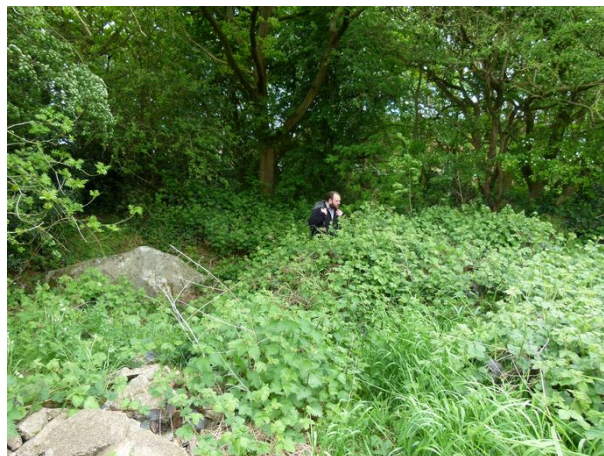
Alan Richardson

## Birmingham Glacial Erratics under scientific scrutiny

A few years ago, Cambridge PhD student Sebastian Gibson applied to BCGS for assistance in locating erratics in South Birmingham suitable for dating, using recently developed techniques involving the measurement of cosmogenic nuclides. Following an earlier spate of BCGS interest in glacial erratics (Newsletters 206, 207, and 210), Roland Kedge and I were pleased to be able to help Sebastian locate some of the large erratics in S. Birmingham on a memorable field trip in 2013. Some time elapsed while Sebastian awaited the necessary funding-dependent 'go-ahead', then earlier this year, Roland and I had the pleasure of accompanying Sebastian once more for a sample collecting trip. Roland tells the tale... Ed. ►



Some members will know that Julie Schroder and I have previously expressed our interest in glacial geology (especially glacial erratics) and because we both live in South Birmingham there has been a focus of interest on the profusion of large erratics to be found there. Glacial specialists seem to be agreed that most of these large erratics derive from the volcanics of North Wales, while some of the smaller ones in the till could have come from Rowley Regis, the Wrekin and elsewhere. What is not agreed is when these erratics were deposited. While past investigations have established the local depositional order of the glacial deposits, correlation with other areas has been problematical because of the lack of a means of surface exposure dating.



*Glacial erratics at Frankley New Town before...*

Julie and I were therefore thrilled when Cambridge PhD student Sebastian Gibson met up with us for a dating expedition. We took him to three previously identified erratics; one on the eastern slopes of Frankley Beeches Hill, another in the Illey valley just west of Birmingham, and a third just above the abandoned shallow railway cutting in Frankley New Town (*grid ref: SO 985787*). Because we understood that the scientific analysis of samples involved high-tech procedures I, at any rate, assumed that the sampling method would be equally high tech - perhaps the use of a hand held equivalent of the core drilling machinery used in the sampling of ocean sediments? Not a bit of it. It was a club hammer and cold chisel job!



*...and during sampling and clearance*

It was then that we appreciated how hard and tough the material of these erratics is. It took Sebastian hours of hard work to gain the amount required for laboratory testing. I will not now say anything about the method of surface exposure dating until we know the eagerly awaited results of the sampling in due course\*.

While the student was hard at work on the Frankley cutting erratic, Julie and I turned our attention to another nearby erratic peeping out from under years of plant overgrowth. It took a good hour to clear around the erratic and to remove from its surface inches of leaf mould. What emerged was a magnificent platform of rock standing two and a half feet high and eight by nine feet across. We hope local kids will play on it and some of them might even wonder about it. ■

*Roland Kedge*

\* We're hoping that Sebastian will write a report for our Newsletter when he has some results. Ed.

## Geobabble

We are very fortunate to be living in a part of the country with such varied geology. Most people with an interest in the subject will know of the diverse nature of rock types in the West Midlands. We only have to look back at previous copies of the Newsletter to find the star attractions of Black Country geology.

The Wren's Nest always comes top of the list and there is no need to list the merits of this world famous locality. The Coal Measures also provide much interest for geologists, with their famous plant fossils. Indeed, it is the palaeontology of the Black Country that has attracted so many enthusiasts to take an interest in the area. I would think that if a survey was taken amongst our membership to ascertain their main interest in geology, it would be fossils.

The third attraction to the area would be the 'red beds' of the Permian and Triassic that make up the bulk of sediments on the periphery of the area. There is little in the way of fossils here, but a huge resource for sedimentologists with a vast array of sedimentary structures to examine and photograph. ►

It is an interesting story to join up the stratigraphy of the Coal Measures and the Permian. The Westphalian was a time of high humidity and high water table whereas the Permian had an arid climate. This would be between 300 and 296ma. The palaeolatitude was between 10°N and 20°N and the Permo-Triassic super continent, Pangaea was forming. Also at this time there was extensive glaciation in the Southern hemisphere which resulted in the lowest sea level of the whole Phanerozoic.

In our own area, the earth movements of Pangaea produced faults with fault scarps, grabens and half grabens. Most of these ran approximately North to South, and most influential to our geology is the Worcester Basin. Some late Carboniferous early Permian sequences are preserved but generally the base of the Permian is unconformable on the reddened Carboniferous. The landscape of the time would consist of high hills of some tough old sediment, such as the Lickey Hills, and the Longmynd. In this type of environment there would be the products of downslope deposition, fans and screes that would be preserved in the geological record as breccias.

'The present is the key past', so we should be able to find a similar landscape on Earth today. The photograph is of Death Valley National Park in California and Nevada. There is very little rainfall, but there are occasional huge downpours resulting in mass wasting of the steep slopes with screes, temporary lakes with high evaporation, and some salt deposits. In the valleys there are sand dunes. In our Permian rocks the initial deposits, with breccias are eventually overtaken by the massive dunes of the Bridgnorth Sandstone.



*Sand dunes in Death Valley, California*

Breccias in different areas have local names and the Clent breccia is our local representative. Because they are coarse we can identify the source of the large clasts and there are sandstones and grits from the Longmynd, abundant Lickey Quartzite and Llandovery sandstones, often with fossils. The clasts range in size from 30cm down to less than 1cm.

You can see Clent breccia on Clent itself and there was/is? a small exposure at Buckpool just off the Brierley Hill road in Wordsley. However, there are people reading this who know more about Clent breccia than I do and I would welcome feedback, corrections, or further information. ■

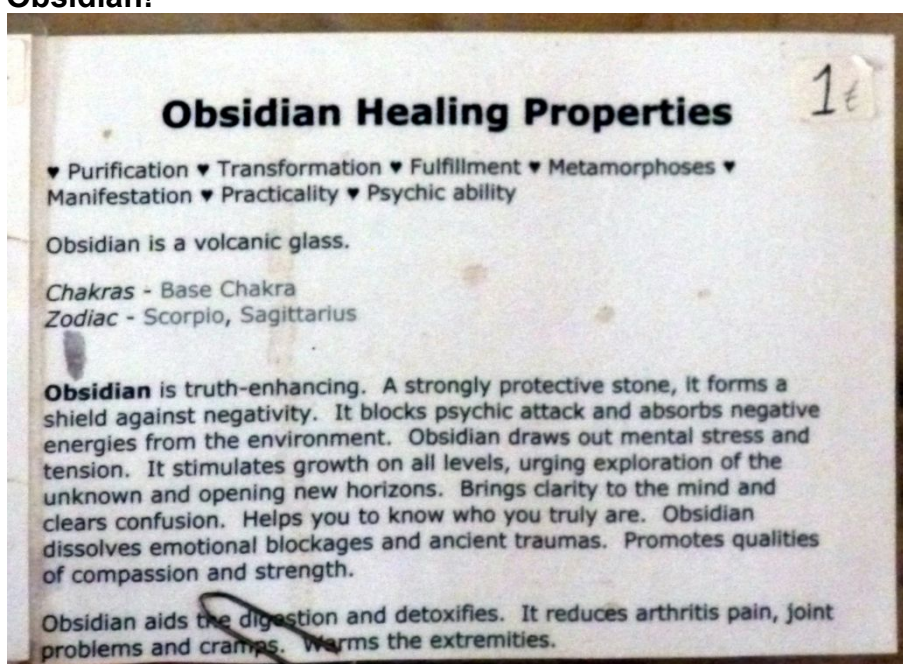
*Bill Groves*

## Members' Forum

### Extraordinary claims for Obsidian!

During the GA's 'Greek Island Volcano' trip in September, one of the highlights was a visit to the Stefanos crater on the Island of Nisyros. Surrounded by lava domes, this area is richly endowed with obsidian in various forms. Thus, this notice caught my eye on the counter of the cafe/souvenir shop beside the Stefanos crater. It was sitting beside a box of specimens for sale and I couldn't resist taking a surreptitious photo! Sadly it doesn't explain exactly what one has to do to achieve all these miraculous benefits. Look at it? Feel it? Eat it? The mind boggles! ■

*Julie Schroder*

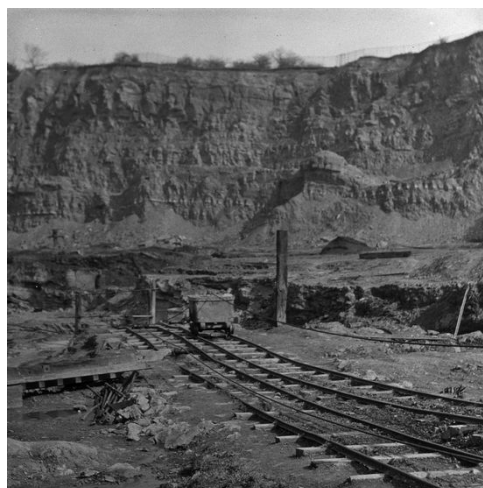




## Doulton's Claypit photos for BCGS Archive

Doulton's Claypit is now part of Saltwells Nature Reserve. Thanks to BCGS member Bernard Duggan, we have been able to add four photos of the claypit from years gone by courtesy of The Lapworth Museum. Here is one, and the others can be seen at [http://bcgs.info/pub/?page\\_id=1099](http://bcgs.info/pub/?page_id=1099)

If anyone else can contribute images to swell our ever-growing photo archive (electronically or hard copies for scanning), please contact the webmaster, John Schroder, at: [webmaster@bcgs.info](mailto:webmaster@bcgs.info) ■



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