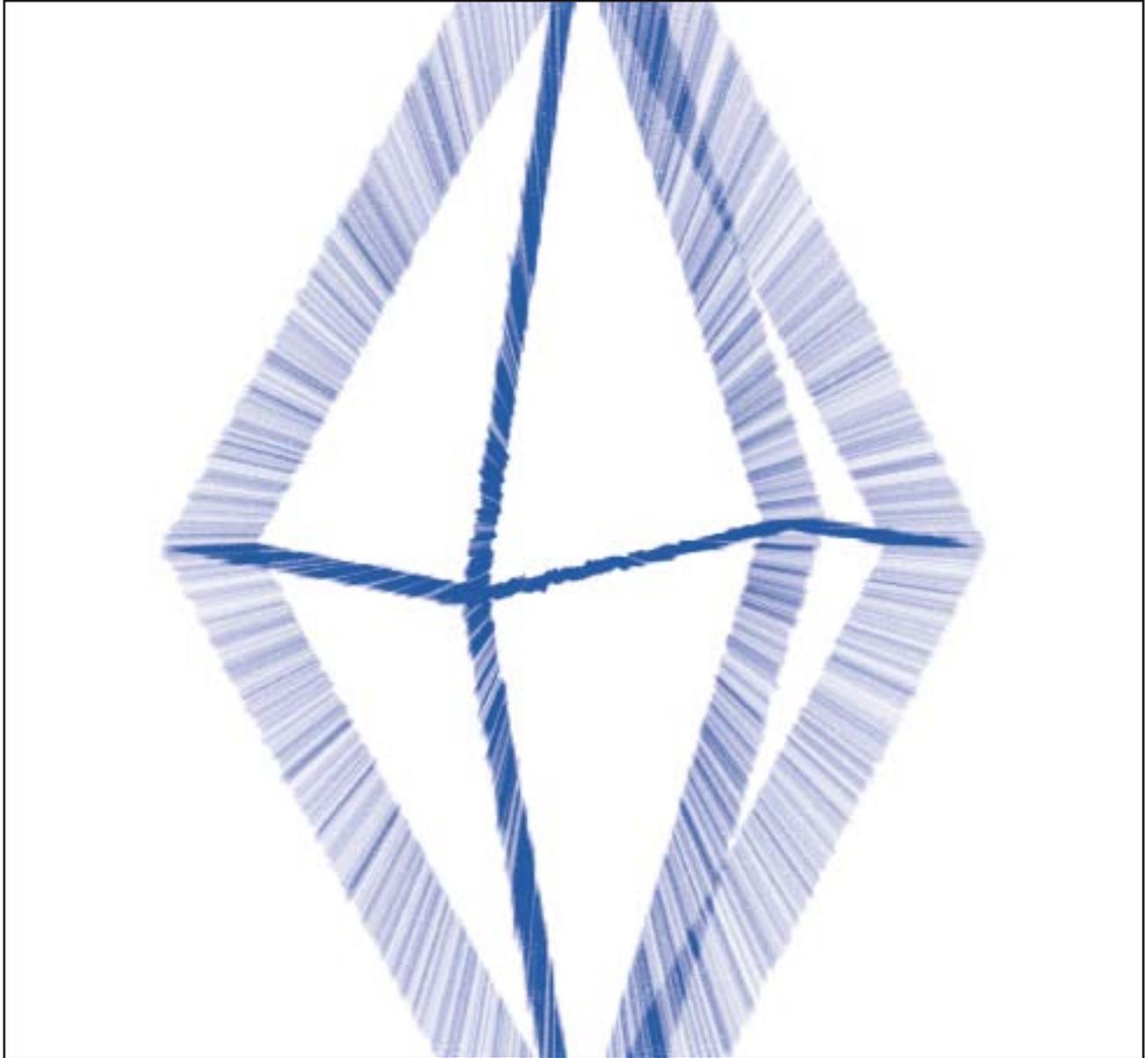


The Russell Society Newsletter



*Number 72
March 2018*

The Russell Society is a society of amateur and professional mineralogists which encourages the study, recording and conservation of mineralogical sites and material.

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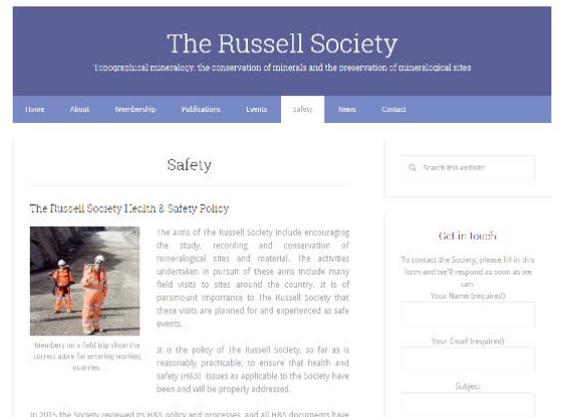
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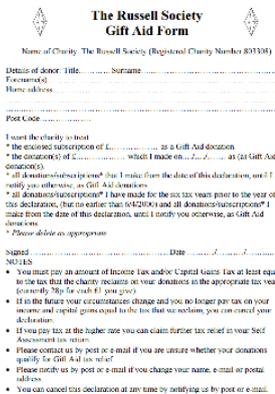
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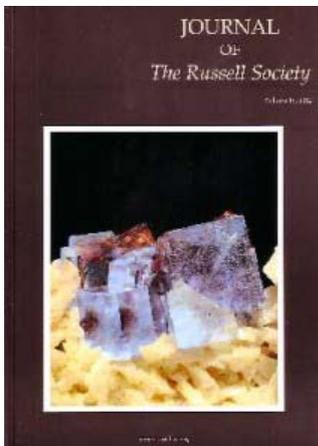
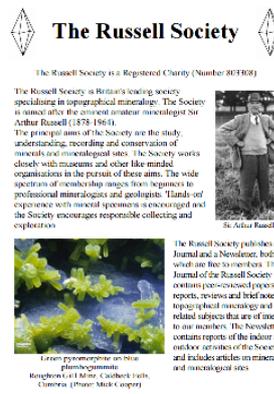
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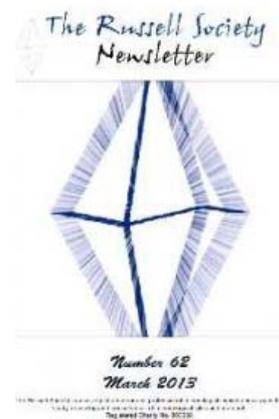
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Few



Clicks!



The Russell Society Website has been changed & updated. Be sure to check it out!

Russell Society Newsletter

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The Russell Society Health and Safety Policy:

Adopted by Council 2015.

- It is the policy of the Russell Society, so far as is reasonably practicable, to ensure that health and safety issues as applicable to the Society have been and will be properly addressed.
- All members of the Society are to take reasonable steps for the H&S of themselves and others who may be affected by their acts or omissions.
- All members of the Society are to co-operate with the Society, so far as is reasonably practicable, to enable the Society to comply with any duty or requirement imposed on it.
- In the event of an accident or injury members of the Society should seek the appropriate medical attention and notify Society officials who will properly document all details.
- Any member of the Society can bring to the attention of Society officials any suggestions or ideas which could improve safety and prevent accidents.

One of the aims of the Russell Society is to encourage the study, recording and conservation of mineralogical sites and material. Among the various activities undertaken in pursuit of this aim, members make many field visits to sites around the country and attend many lectures and other indoor meetings. The Russell Society promotes a high degree of responsibility amongst its members in the achievement of its aims, especially with regard to Health and Safety (H&S) matters.

It has
A Health and Safety Policy
A Risk Assessment Form
A Guide to Good Practice

A Field Leaders Indemnity Form
An Incident Report Form
A Field Visit Check List

These documents are to encourage enjoyable and interesting visits and meetings that are educational, involve conservation and recording, and are incident free. They also show the responsible attitude that the Russell Society and its members have to health and safety issues.

The Society holds Public Liability Insurance with a limit of Indemnity of £5,000,000 (extended to include Member to Member) and Personal Accident Insurance with Zurich Municipal under Policy No: XAO-122015-4493.

H&S Review 2015

The views and opinions expressed in this Newsletter are those of its correspondents, and are not necessarily agreed with or shared by the Editors, the Council, the Russell Society or its Members. The accuracy of submissions is the responsibility of the authors or Society branches and will not necessarily be checked by the Editor for validity.

“Editorial”:

Welcome to the first Russell Society Newsletter of 2018. In this issue you will find a fairly varied collection of items which I hope will take your fancy, pique your interest and give you something to think about. We start, as so often, with an obituary – an appreciation by Roy Starkey of the life of Doug Morgan, a long-time and much respected member of both the Russell Society and the British Micromount Society. Doug was, unfortunately, one of several RS members who died over the past year.

You will, as usual, find the field trip and event programme in the centre of this issue and (also as usual) the Branch field trip co-ordinators have put in a lot of effort to provide members with a wide selection of options for getting out and about to acquire your own specimens from localities across the country. I hope you will repay their effort by supporting the programme and making sure that these visits are well attended. I have also included the annual listing of UK and European mineral shows, which I hope you find useful. It is not claimed to be exhaustive but I hope it will give you an idea of what is happening around the place. It goes without saying that the UK-based events need and deserve your support, but I know that many of you find yourselves travelling in Europe during the course of the year on holidays, business trips or whatever and you may be able to “coincide” with one of these events. It’s amazing how often you can come across good British specimens on foreign dealers’ tables – just begging to be repatriated. On a subject related to Branch activities there is an interesting and thought provoking note from Steve Warren which I hope you will read and think about. You may detect something of a “museum flavour” about this issue, with insider reports from the Natural History Museum in London and the University Museum in Oxford as well as an account of a visit to the Museum of the School of Mines in Paris. I have also inserted a note about the paper vs pdf Newsletter question which has been ongoing for some time. I hope that you will read it and - most importantly - let me have your views and preferences.

You will recall that I constantly ask for feedback from members about the style and content of the Newsletter – what you like, what you don’t like and so on. I don’t usually get a lot of response but a couple of comments have come to me which I should probably try to address.

- The first concerned the use of pictures – can we have more pictures and can they be bigger? In simple terms the answer is “yes” to both. However, as in most things, there is a balance to be struck. Financial considerations more or less limit the overall size of the issues I can produce in terms of numbers of pages. Thus, if I put in more pictures or make them bigger, I end up having to leave out or hold over some of the copy I receive. The last issue, for example, contained 45 pictures and increasing their size by any significant amount would have taken up at least a couple of additional pages. There is also the point that a lot of items get sent to me without any pictures and I cannot always conjure up suitable ones - also that some (I’m tempted to say “many”) of the photographs I do receive are not of great quality and do not look good if blown up too far. In this issue I have tried to increase the size of at least some of the illustrations as much as possible, which I hope will meet with your approval.
- The second comment referred to the amount of “non-UK” material included in the “News Items” sections of recent issues. This is an issue that I take quite seriously. I know that the Russell Society is strongly focused on British topographic mineralogy and, clearly, its Newsletter should reflect that. The field trip reports, which represent around 25 - 40% of an average issue, are obviously totally British. With regard to the rest I would offer two comments. One is that “British mineralogy” does not (cannot) exist in isolation and that it pays to keep at least a general eye on mining and mineral news from around the world. The other is that, to maximise the “British” content of future Newsletters, it would be immensely helpful if people would offer up more contributions on the subject of specifically British mineral occurrences, parageneses and so on. The late Trevor Bridges was very good at this but, of late, such pieces have been less common. The resolution of this conundrum is, at least to some extent, in your hands.

Finally; it occurred to me in December, as I was sending out my usual requests and reminders for the copy for this issue, that I have been doing this for more than seven years now. It’s been great fun, but I think this might be the time to start looking for a successor as Newsletter Editor. I would ideally like to hand over the role at the end of 2018 so that the new Editor can start with a fresh year in 2019. The job obviously entails a certain degree of thought and planning and a certain amount of work during the actual production process but it’s far from excessive and it’s a great way to keep in touch with what’s happening within the Society and the mineral/mining community generally. There would obviously be plenty of experience and advice from the “old hands” available to anyone taking it on and I would be happy to work with a new Editor in the transition period. If any of you “out there” fancy trying your hand at producing paper and pdf newsletters for an audience of interested amateur and professional mineralogists and collectors then please get in touch (my details are on the back cover). I would be happy to talk to you in more detail about what is involved. I look forward to hearing from you. In the meantime, enjoy your Newsletter.

Michael Doel

From the President:

A New Year and, with luck, some new faces on the Council by April. Steve Warren's article in the following pages gives some ideas on how you might contribute to this. We are still looking for a new President and, in an attempt to assist this process, I have set out a brief 'job description' for the post. You will find this in the following pages and I hope that it might give you an added incentive to look seriously at the role - and possibly volunteer your services!

We have also been looking for a new Journal Editor, to succeed Malcolm Southwood. This process was envisaged as having a lead-in of a year or two, with Malcolm more than happy to work with someone (as Norman Moles did with him) to ease the transfer process. You will be pleased to learn that David Green has agreed to work with Malcolm in this way and he will take over from Malcolm in the not-too-distant future. As we know, David has an enviable breadth of mineralogical and publishing experience, and future issues of the Journal will benefit greatly from his input. I would like to take this opportunity to thank Malcolm for his hard work and dedication that enabled the varied content and high standard of the Journal to be maintained.

Following a request from the estate of the late Norman Cogger, the Society has arranged an auction of his mineral collection. Austin Lockwood and Richard Tayler inspected, sorted, catalogued and photographed the minerals and the collection has now been auctioned, with proceeds going to the Kent and Sussex Hospital League of Friends.

Hopefully you will be able to attend the Society ASM, in Leicester this year. I know several members will have already returned the forms that were sent out with the Journal. Those attending will also be interested in the details, later in this issue, of the new 'Ron Cleevely Award' for the best Journal article in the last twelve months. The Award, established in appreciation of the late Ron Cleevely, comes as a result of a generous donation from his widow Ros. Hopefully you have enjoyed reading the Journal, and will come to the ASM ready to vote for the best article. Some guidelines on selecting the best paper (thank you Roy Starkey) are given in a note later in these pages.

All members who attend Society field trips will wish to read the reminder about how to 'stay safe' while doing so in my Health and Safety Note later. I'm glad to say that, last year, most of the field trips were well supported and many are written up in this Newsletter.

As part of our efforts to 'keep the Society in the public eye' we now have new Society display cabinets. You may have spotted this at Bakewell with a wonderful display of minerals by Steve Warren. You couldn't possibly miss the new promotional banner there! The banner was designed by Martin Bastable (many thanks Martin) and four of them were produced for promoting the Society's activities. For this coming year Scavenger Hunts or Lucky Dips have been arranged for the Leyburn, St. John's Chapel and Bakewell mineral shows. If anyone can help to man the table for half an hour or so at one of these events, your help will be more than welcome.

Christine Critchley
Hon. Vice-President and Acting President.

SOCIETY NOTICES

OBITUARY: Alfred Douglas (Doug) Morgan, FGA (1919–2017).



Doug at his microscope in Bryony House – October 2017

Doug Morgan will have been known to many members, and for a wide variety of reasons. He has been, for many years, the ‘faceter of choice’ for British collectors (and the occasional dealer too) who wanted a piece of fluorite (in particular) turned into a sparkling gem, but there was much more to Doug than this.

Born in Birmingham, he attended Holly Lodge Grammar School, and went on to study at Birmingham College of Technology. He started his working life at the British Cast Iron Research Association (BCIRA) in St. Paul’s Square in the centre of Birmingham, as a trainee in the chemical laboratory. A few years later, the Second World War started and the building suffered a direct hit from a German bomb. The Director decided to move the entire operation out to Bordesley Hall near Alvechurch. Doug was put in charge of the physical testing and machine shop, and later worked as an analytical chemist on the microanalysis of non-metallic inclusions, and during wartime was involved in the development and metallography of nickel-molybdenum acicular cast irons and the physical testing of cast iron.

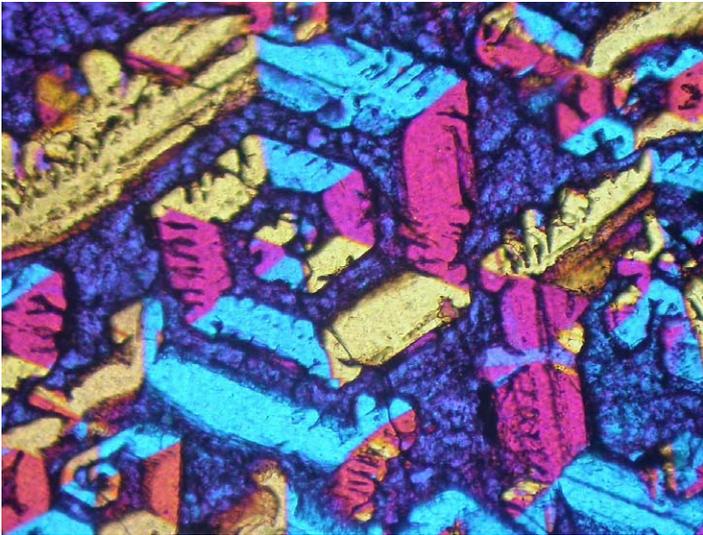
In 1944 he left BCIRA to take up the post of metallurgist at the Idoson Motor Cylinder Co., developing acicular irons for the Avon aircraft engine, and introducing the new Shell Moulding process for intricate automobile cylinder castings. In 1953 he moved again, this time to take up the position of Chief Metallurgist to the Radiation Group Central Research Laboratories. Here he investigated problems arising in vitreous enamelling of cast iron and steel, and was awarded a Diploma for his work on the role of manganese sulphide segregation in causing enamelling defects.

He rejoined BCIRA in 1956 as a development engineer, and in 1959 was appointed Head of the Moulding Materials and Methods Investigations Group. His work on furfuryl-phenol-formaldehyde resin binders resulted in the invention of the BCIRA Hot Distortion Tester and the design of other high temperature methods for testing core making materials. This led on to him developing the Castable Sand Process, clarifying the need for limited life foam surfactants and patenting this. His pioneering work on the study of waste foundry sand reclamation indicated the direction in which industrial development of this highly important ecological and economical aspect of the industry should take to avoid complex problems of nitrogen and hydrogen pick-up by the liquid metal. At this time he also served as Chairman of the Foundry Industry Joint Sand Committee, Council Member of the Institute of British Foundrymen, on several Technical Committees, and as the UK Delegate to the International Committee of Foundry Technical Associations (CIATF) - now the World Foundrymen Organization (WFO).

Doug continued his investigations into slag and refractory related problems, resulting in 1963 in publication of his paper “Identification of Slag and Dross Inclusions”, which became the main reference work dealing with the subject. The

optical microscopy associated with this work triggered his interest in crystallography, gemmology and mineralogy – later to become his principal pastime. This in turn, particularly in later life, stimulated Doug's enthusiasm for manufacturing thin sections of rocks and slags. One of his favourite slides is pictured below.

Doug was a well-known lecturer on moulding and core making technology, speaking at numerous international conferences, and publishing over thirty papers and technical articles. He was awarded the prestigious Oliver Stubbs Gold Medal by the National Ironfounders Employers Federation, in recognition of his services to the industry.



Phosphorus slag, from a carbon arc furnace, showing pseudo-hexagonal twinning in bredigite at x150, in crossed polars, with a quarter wave plate inserted. He was particularly proud of this thin section.

David Roe presenting the Mike Rothwell Memorial Shield to Doug in September 2008.

Doug married his wife Edna in 1944, and they had two daughters Jean and Susan, enjoying many holidays with their caravan in North Wales and in Europe. I first met Doug in 1982, after he had contacted me about purchasing some micromount boxes. We arranged to meet one lunchtime in Redditch (where I was working at the time), and we have been seeing each other on almost a weekly basis ever since.

Doug was an immensely practical person, and came from the generation when “making do and mending” was a way of life. He developed a high level of competency in many different skills, including – engineering, machining, marquetry, book binding, wine making, playing the piano and the classical guitar, microscopy and optical instrument manufacture, thin section preparation, faceting of gemstones, gardening and a whole lot more. Perhaps the single, most dominant, memory of Doug to his friends is of “making things” for people.

His involvement with the Russell Society and British Micromount Society brought him into contact with many people across the mineral hobby, both at home and overseas, and he was always interested to learn about new things.

One of Doug's great friends, and very much a kindred spirit, was the late Jamie Nelson, who was involved in the design of various pieces of bespoke optical equipment. Doug was often tasked with producing fiendishly difficult precision optical components such as lenses, prisms and filters in exotic materials such as neodymium doped YAG (yttrium aluminium garnet) for example. I understand that there are some components orbiting the earth in the Hubble Space Telescope which were manufactured in Doug's workshop!

It is as an expert faceter of fluorite that Doug will probably be remembered by many readers. His fascination with the technical difficulty of grappling with fluorite's softness and numerous cleavages lead him to develop special techniques, and he has fashioned many fabulous cut stones in this difficult mineral.

Doug was also a very active member of both the Postal Microscopical Society, and the Quekett Microscopical Society, and much in demand for his technical and engineering expertise relating to optical instruments and equipment.

In mid-2017 Doug had decided that the time had come to start slowing down, and moved himself into a very pleasant care home in Northfield. In the run-up to this change in life style he had been extremely busy dispersing his engineering

and optical equipment, materials, chemicals, instruments etc. etc. in many different directions to his friends.

He was settling-in well to life at Bryony House, and getting to grips with a new laptop and Windows 10, when sadly he suffered a stroke on 21st October. He was admitted to the Queen Elizabeth Hospital in Birmingham, but his health deteriorated steadily, and he passed-away on the morning of 20th November.

He will be sadly missed by many, but remembered by all for his humour, his technical abilities, his never-ending desire to learn and acquire new skills, but most of all as a really nice guy. Our condolences go to Jean, Sue, Bill and the rest of the family.

Roy Starkey.

Position Vacant: President of the Russell Society.

Since the AGM in April 2017 the Russell Society has not had an Honorary President. To date nobody has come forward to take up this key Society role. The role of President is an important one but is perhaps not as onerous as members might imagine. In an attempt to help members understand the role better I have set out a 'job description' for the President's duties below:

- **Act as a Trustee of the Society.** Along with other Council members the President is a Trustee of the Russell Society for the purposes of the Charities Act 2011.
- **Encourage and lead the Society.** The functions of the Society are well established and, usually, run efficiently on their own. An enthusiastic President, however, is a key part of the Society, encouraging other Council members and providing general leadership to the Society.
- **Attend Council Meetings.** There are two Council meetings each year, the President chairs these meetings.
- **Attend the ASM and AGM.** Attend the ASM and AGM and deal with any actions this creates. This normally involves thanking those who organised the ASM Weekend, judging the Trevor Bridges Trophy competition and presenting awards.
- **President's Report.** Write a brief President's report for each newsletter and the AGM, with details of recent activities within the Society.
- **Respond to Correspondence.** Most of the correspondence goes to the Secretary, although there are some occasions when input from the President is needed.
- **Communicate with other societies.** As President of a mineralogically-focussed organisation there could be invitations to events, like the Mineralogical Society President's Lunch, London.
- **Promote the Society.** At events or at mineral shows for example, with the support of the Vice-President and other Council members.
- **Identify a successor.** Again, with the help of Council.

In all of the above actions the President is invariably well supported by other members of the Council. Past-Presidents are always available to turn to if further advice is needed.

It is important that all members of the Society understand that the Society only exists because some members are prepared to undertake the key roles at Council and Branch level that enable it to function. If we all took the view that 'someone else will do it' the Society would cease to exist.

I know there are many members who could fulfil the role of Russell Society President. I very much hope that somebody will answer the call.

Christine Critchley.

Hon. Vice-President & Acting President.

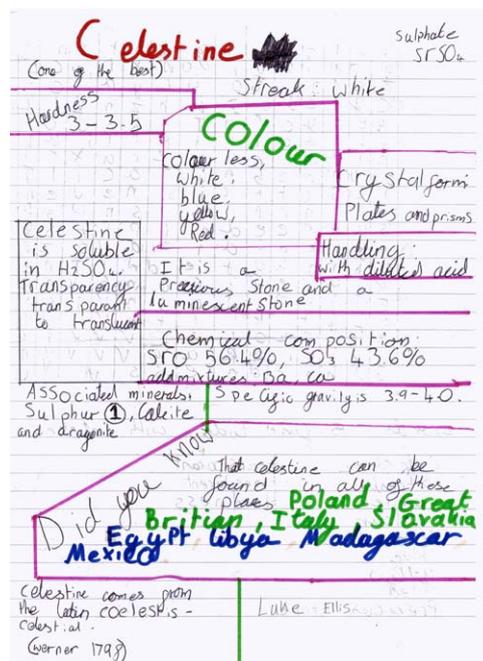
The Bakewell Mineral Show, 14th and 15th October 2017: Russell Society Scavenger Hunt.

The Bakewell Show is one of those shows 'for collectors by collectors' and the Russell Society had a stall to 'promote activities and to encourage new members'. We were very lucky this year in that we could both use the new mineral display cabinet and give a first showing to the new display banner. In the cabinet Steve Warren had set up an interesting display of azurite and malachite from the British Isles. These eye-catching minerals certainly drew in the crowds. The specimen of malachite over altered chalcopyrite from Great Orme Head, Llandudno, Wales, originally in the Richard Barstow collection, was seen as the 'best in cabinet' for most people. The banner was also very eye catching and several

people commented on the activities of the Society and many were impressed by the images of minerals collected on Russell Society field trips.



The Reception Committee! Pam, Christine and Margaret introduce visitors to the Society. MTD Photo.



Sowing the seeds of a long-term interest? Part of Luke Ellis's project resulting from his Bakewell visit. MTD Photo.

We also ran the usual Scavenger Hunt for children (and the young at heart). Several parents, carers and grannies helped those children scavenging for clues around the rooms and one team of 'young at heart' completed the hunt for their absent grandchildren! Forty-six of the Scavengers managed to complete and answer correctly at least 16 of the 18 questions and gained a choice of three or four gifts from the table. Some chose books, others minerals specimens, and several chose lucky dip prizes. All the prizes are donated by members and we thank them for these donations. We would also like to thank those who volunteered to do a stint on the table, this year we had several 'workers' including Marashean, Margaret, Pamela and Roy as well as Harry and myself. More hands make the work a lot lighter – thanks to all. One of our Scavengers also brought in a project. As a result of a promise of a specimen from a previous visit, Luke had completed his project on celestine. It was very colourful and extremely informative, he had even included a word search! Well done Luke. We organise the hunt at three events each year and any members who can donate 'child suitable' spare minerals (labelled with location and species) or books, can do so over the coming year. Thank you in anticipation.

Christine Critchley.

Final Call for the 2018 ASM Weekend.

The Society's major annual event – the ASM Weekend – is now well over the horizon and bearing down on us fast. I hope that many of you will already have booked to attend it. This event, with its mix of talks, displays, museum visits, field trips, mineral trading opportunities and socialising, never fails to provide a pleasant and informative experience and I'm sure this year will be no exception. The programme will include a practical demonstration on photo manipulation using Photoshop by Jeremy Fraser-Mitchell. Would anyone who would like to see their images manipulated please send them to Jeremy before the ASM. Organised by the Society's Central Branch, the event will be based at the College Court Conference Centre in Leicester and will take place from the 6th to the 8th of April. You will already have received registration and programme information with your copy of the latest Russell Society Journal in November 2017.

There is still the opportunity to register for the meeting and, especially if you have never "done" an ASM weekend, you really should consider giving yourself a treat. By the time you read this, the in-house accommodation at College Court may be fully booked but there are B&B and other accommodation options in the area. Further details are available from any member of the Central Branch Committee – whose contact details can be found at the back of this issue. We would love to see you in Leicester in April. Go for it!

Editor.

The 2017 Maisemore Event.

This annual event took place on Sunday October 22nd, 2017 and attracted 48 people from the Russell Society, Cheltenham Mineral and Geological Society and surrounding geological groups including Newent U3A.

The highlight of the day was a wonderful display of barium minerals from Northern England provided by Frank Bouweraerts. Talks included "How to prepare ammonites" by CMGS Membership Secretary, Tom Carr; "The Early History of Witherite" by Tom Cotterell; and "The palaeobiology of ammonites and some thoughts on their stratigraphical use" by Professor John Cope, Honorary Researcher at the National Museum of Wales. A small display of historic witherite and strontianite (to show how these two minerals were confused prior to the discovery of the element strontium) specimens from the National Museum of Wales' collections was put on by Tom Cotterell.

Our thanks go to Marashean Parker and Carole Allaway-Martin for organising refreshments and food, Denis Martin for booking the hall and Tony Parker for overseeing the setup of the hall. Plans are already in place for a similar event in 2018!

Tom Cotterell.

The 2018 Maisemore Event.

The Wales and West branch plan to hold their Maisemore day of events on Sunday October 21st, 2018. Once again this event will be organised in collaboration with the Cheltenham Mineral and Geological Society (CMGS).

The day will comprise a number of talks on mineralogical, geological and palaeontological themes, displays, giveaway specimens, sales, and the dispersal of the library of the late Tom Levinson.

Planned talks include "The Minerals of the Midlands" by Roy Starkey whose book of the same name is in an advanced stage of preparation following many years of research.

Tom Cotterell

New 'Ron Cleevely Award' for Best Journal Paper in the last 12 Months.

The Award has been established in appreciation of Ron Cleevely, former Senior Scientific Officer in the Department of Palaeontology, at the Natural History Museum, London, as a result of a generous donation from his widow Ros.

Although primarily an eminent palaeontologist, Ron's fame in palaeontological circles, lay more in his exceptional knowledge of 18th and 19th century collectors, their specimens and associated natural history works. He had undertaken extensive research on the Sowerby family in particular, and recently published a fascinating account of the development of early mineralogy in southwest England - "Collecting the New, Rare and Curious – Letters selected from the Correspondence of the Cornish Mineralogists Philip Rashleigh, John Hawkins and William Gregor".

Ron was an invited speaker at the Bob Symes' memorial meeting at the Geological Society in December 2016, and gave a thought-provoking address about the preservation of historical data, with particular reference to the changing nature of records and the ephemeral nature of electronic media, and its potential loss in the future.

Ron was a kind and thoughtful person, always willing to impart some of his immense knowledge about collections and collectors, and he would surely have been supportive of any initiative which encouraged enthusiasts to document and record their researches.

In considering nominations for the award for the best Journal article published in the previous 12 months, members might wish to consider:

- Novelty value of the article.
- Significance of the contribution to British mineralogy.
- Quality of the illustrations.
- Bibliographic rigour to ensure a thorough literature search has been undertaken.

As the first presentation of the Ron Cleevely Award will be at the ASM to be held in Leicester this coming April, the four articles in the recent RS Journal Vol. 20 will be used to select a choice of best article by each member at the ASM.

Voting slips will be provided at the ASM. The process will be very similar to that of voting for the best photo at the BMS. I hope you all enjoy reading the Journal and can come to the ASM with your 'Best Article' chosen using the above considerations.

Christine Critchley.
Hon. Vice-President & Acting President.

**Use of The Society's Mineral Display Cabinets.
 Display Your Specimens?**

At recent mineral shows you may have noticed that the Society table is now graced with a mineral cabinet showing member's specimens. The idea is to put on a different display of member's minerals at shows, for our own interest, for the public's interest and to hopefully attract new members. I've put on the last two displays to get things going but now we need other members to join in. We will provide the cabinets if you can provide the specimens.

About 10-20 good quality specimens is enough to fill a cabinet, accompanied by easy to read labels. Specimens must be of British Isles origin and can be self-collected or purchased. The cabinets are securely locked and guarded at all times, so your specimens will be safe. The Leyburn, Weardale Expo and Bakewell shows all need displays putting on during 2018. Don't be shy, please get in touch with either Christine Critchley or myself to get things moving.....



Part of the display of Leadhills and Wanlockhead minerals put on by the Society at the Leyburn show. in 2017.

Photo: Steve Warren.

Steve Warren
General Secretary

Important! Health & Safety Note.

We all look forward to field trips and these are well managed through our risk assessment process. Every now and then though, Council feels that a reminder to members about some of the key risks that we encounter, and how to deal with them, won't do any harm. So, when you are enthusiastically going about your collecting in the future here are a few things to bear in mind.

- Any rock face must be approached with caution and should only be done so with the consent of the quarry representative or field leader, but when you encounter a vein or fault that runs parallel with a rock face a higher level of care is needed. Always remember, that in these circumstances, the back of the vein could be very loosely attached to the country rock, increasing the chance that it might come away easily and unexpectedly. Always approach these situations very carefully, weigh up the risks and if in doubt, keep clear.
- Always assume that the safety of anyone working near you is your responsibility. Take great care not to dislodge loose material onto those nearby and do not work directly above or below anyone else. When someone is already working in an area do not start working above or below them under any circumstances.
- When you are hammering near other people always be aware of where rock splinters might be flying. Best practice is to hammer in a different direction or ask the other person to move clear until you finish what you are doing. We all wear safety goggles but flying rock splinters are not pleasant to encounter under any circumstances.

N.B. Remember, the Society holds health and safety information and guidance on our website (<http://russellsoc.org/safety/>) and if you have any doubts or need to ask about something either contact me or discuss with your field trip leader. Wishing you happy and safe collecting!

Christine Critchley.
Hon. Vice-President & Acting President

Russell Society Looking to Support Suitable “Projects” and Analyses.

Our treasurer, Rob Bowell, has reminded Council that we still have a healthy bank balance and that it would be good to put some of this to use in terms of researching and promoting mineralogy, in line with our charitable objectives. We did cover this matter a few years ago but a reminder won't do any harm.

If any Branch or individual has an idea for an exhibition, talk, workshop or other special project that would help to promote mineralogy amongst our membership and the wider public, and you need funding support, please put it to Council for consideration. The Central Branch, for example, recently held a one day 'mini symposium' and put on an excellent display on the geology and mineralogy of the Charnwood area. It would be great to see more of this type of activity across the country.

We have also established a mechanism for having mineral analyses undertaken, *via* Tom Cotterell, with the aim of results being reported in both the Newsletter and the Journal. I know some members have started using this, again it would be good to see more involvement.

Please get in touch with either Tom, myself or any Branch or Council member if you've got some ideas and want help.

Steve Warren
General Secretary

Wanted: Mineral and Locality Pictures for the Society Website.

Some members have commented that our website would benefit from more images of minerals and sites on it, similar to the Branch pages that we used to have. This is a good idea, but is totally dependent on members supplying high quality photos of good specimens. If you are able to help would you please send high resolution images of your British Isles minerals (either self-collected or purchased), along with a caption providing mineral species, size, locality and any collecting history to myself at steve.warren@estellwarren.co.uk. If single images, or banks of images are more than 10 Mb in size please send them to my home address on a CD or *via* a file transfer system such as Dropbox/We Transfer.



**Baryte helicitite. Brandy Bottle Incline, Old Gang Mines, Swaledale.
Specimen and Photo: Steve Warren.**

We are not looking to recreate Mindat here, just to liven up our website. All images will be credited to their authors and may also be used to illustrate the Newsletter and for preparing publicity posters for shows. I know some of you have already prepared nice photos for the recent SMLS publication, or put good photos on the Collectors of British Minerals Facebook page. Receiving some of these would get this off to a flying start.... Thank you in anticipation.

Steve Warren
General Secretary

Have a Think About This The Future of the Society.

Having been General Secretary to the Society for a couple of years now I can't help but notice the twin trends of gradually falling membership numbers and a general apathy amongst members when it comes to Branch and Society meetings and volunteering for Council and Branch Committee positions, i.e. helping to run the Society. The latter has led directly to our current position of not having a President, not being able to replace existing Council members who have served the Society for a long time and the loss of our South East and Northern Branches. I am also aware that at least one other Branch is struggling to keep its committee going and is unable to commit to organizing an annual meeting. As

a Society, and please do remember that this is your Society as much as Council's or mine, I think we have two choices from hereon in; allow matters to drift, or; look now at changing the way we do things.

'Changing the way we do things' would cover two main issues; how to attract more members, to reverse or halt the gradual decline in numbers and; how to make it easier to run a Society with a smaller membership, and the inherent smaller pool of people who are prepared to 'do something'. Council is looking now at how to improve publicity and how to bring in new members, your views on this would be welcomed. Personally, I am not convinced that it will be possible to bring new members in fast enough to replace our ageing membership and, even if we do increase numbers, there is no guarantee that new members would be willing to help out at Council and Branch levels.

My suggestion to the Society at this stage is, therefore, to look at ways of streamlining bureaucracy so that a reduced, or indeed enlarged, membership can continue to run the Society efficiently. To my mind, the most obvious way of reducing the overall Society workload is to do away with the Branch structure as we know it and the reporting requirements for Branches that is set out in our Constitution.

Branches could be replaced with a more flexible system of 'Regional Groups' (as an example name), that are simply groups of interested members that get together when they wish to, rather than having to hold formal meetings. Regional Groups would operate under guidance issued by Council and would be asked to send an annual summary of their activities to Council. Each group would set up their own field trips, using existing guidance on procedure and health and safety, and would be required to report their field trip programme to the Newsletter Editor as we do currently. Regional Groups would not have their own bank accounts but would ask Council direct for funds, which would be agreed on a case by case basis. The effectiveness of each Regional Group would be down to the people involved, much as happens now with Branches, but the need for two committee meetings per year and formal reporting would be removed, with the intention of allowing members to focus more on minerals and socialising, rather than procedures, when they meet up. This approach might enable us to overcome geographical distances in the current Branch structure, for example people living in Scotland, the North East and the South East could set up small groups to meet locally. My hope would also be that a reduction of reporting requirements at Branch level would encourage some Members to become more engaged at Council level.

Streamlining is one matter that could be addressed by change. Apathy is a more difficult thing to address. All I would say is that if, at a relatively close point in time, more people don't come forward to help run the Society we could, to use a geological analogy, reach an extinction level event at some point in the not too distant future. I don't know about you, but to me that would be damaging to my collecting prospects, and I would very much miss the social side too.

At the moment these are only my views, rather than those of Council. I would really appreciate hearing your views on the points I have raised and think we should have a discussion on this at the 2018 AGM.

Steve Warren
General Secretary

The Electronic Newsletter: Becoming a More Attractive Option?

It has been a while now since I began sending out pdf versions of the Newsletter to all of those among you for whom we have a valid e-mail address. Over that period, I have received quite a lot of feedback, pretty much all of it positive, about this and most of our overseas members now receive only this version. In addition, a number of people in the UK have said to me that they would be quite happy to receive only the e-version in future.

So far, I have held off from putting anyone on a "pdf only" list and continued to send paper versions to everyone in the UK. Now, however, with postage costs continuing to rise and with them the total cost of producing the Newsletter, I would like to revisit this option. From Issue 73 in September 2018 I would like to send paper versions only to those who are really wedded to this format and send only the pdf version to those who are happy to go this route.

Can you let me know please if you would be willing to receive only the pdf Newsletter in future and forgo paper versions after this current issue? E-mail is the best medium for this.

Editor.

NEWS ITEMS:**A Brief Jaunt Around Spain, May 2017. Part 2 (Weeks 2 & 3).**

Time to move on from our campsite at Albarracin in the province of Teruel and head east to our next destination of La Fresneda also in Teruel province but close to our main point of interest being a visit to the amazing Limestone mountains and canyons of the Reserva Nacional de Puertos de Beseit. Close to our destination we had a planned stop at the quarries around the village of La Canada de Verich.

Day 4 – Suner Quarry, La Canada de Verich (Teruel Province)

We arrived at Suner Quarry during a thunderstorm so a wait in the Land Rover was required for half an hour, and well not great timing seeing as the quarry works refractory clays!!! Eventually the storm moved on so we “booted up” and tested the very sticky clay before kitting up further, well to say the least it was indeed a tad sticky!

The 3 quarries around La Canada de Verich are all working clays of the Utrillas Formation and have long been known for their large calcite-lined geodes, some as large as 40 cm, found mainly in the upper level limestones. It was not long before we came across numerous evidence of calcite lined cavities within the limestone, some within very large boulders on the quarry floor. We came away with some nice examples of dogtooth/scalenohedral groups to 9 cm some being water clear, others more milky. Well worth a visit despite the sticky boots.



Large boulders with calcite-lined cavities. Suner Quarry.

Day 5 – Los Pedrenales, Azaila (Teruel Province)

On our way to our next campsite stop at Borja (Zaragoza Province) and armed with a Google Earth map of the next locality, Los Pedrenales which is a vague area within a lowland (c. 300 m) just 20 km west of the Rio Ebro and only 15 km south of the famous alabaster quarries of Fuentes de Ebro. After a very slow drive along a deserted B-road (how I love driving in Spain) we spotted the likely exposure and pulled over and investigated.

The exposure of reef limestone containing boulders of Silexite [N.B. Quartzolite or silexite is an intrusive igneous rock, in which the mineral quartz is more than 90% of the rock's felsic mineral content, with feldspar at up to 10%. **Ed.**] which are exposed in the semi-arid landscape, most of these boulders and nodules are solid flint/quartz but some have cavities within containing crystals of celestine up to 1 cm in size usually associated with amethyst, some nodules here are also formed into chalcedony and jasper with some also containing massive anhydrite. After a good few hours of searching and breaking open nodules we managed to collect some small but very nice amethyst groups to 3 cm and some with a few small crystals to 4 mm of golden-yellow celestine coupled with anhydrite, also some nice chalcedony nodules.

We then continued on our journey north through the vineyards of Carinena arriving at Borja, yet another vino-producing area and pitched up!!

Day 6 – Minas Ampliacion a Victoria, Navajun, (La Rioja Province)

Up early today for our 1.5 hour drive from our



Large pyrite cubes in situ at the Navajun quarry.

campsite at Borja to Navajun. We had arranged to meet Pedro Ansorena the owner of the mine at the chapel at the bottom of the track up to the mine at 10 am and, on arrival, we were greeted by a couple from the Netherlands in their camper van who had also arranged to meet Pedro for a collecting trip to the mine (a testament to the worldwide appeal of this locality).

Pedro arrived and we parted with our Euros for a 4 hour duration of collecting and headed up the side of the mountain following Pedro and the Dutch couple in his 4 x 4 to the opencast. I find there is something about this classic pyrite locality that never fails to draw your interest. Some folks might get a tad underwhelmed as a result of the “swamping” of the specimen market by pyrite from this locality, it is however unique as I am sure most folks would agree.

We arrived and kitted up and Pedro told us where we were allowed to collect, there were 2 members of his staff in another freshly exposed area cleaning and packing into crates pyrite groups and single cubic specimens. We “tooled up” and got chiselling the Marl face to extract the glinting cubes of pyrite, hot work in 28+ degrees centigrade! But well worth every minute. We found several twins and triples. Having amassed a crate of our own of cubes and groups in the marl matrix we loaded them into the Land Rover. All in all, a very rewarding and interesting visit - maybe I won't leave it as long as 18 years to revisit.

Day 7 – Las Bardenas Reales, Tudela (Navarra)

Surely a visit to this part of Spain is incomplete without visiting the UNESCO Biosphere Reserve of Las Bardenas Reales, an unpopulated semi-desert landscape of some 41,845 hectares. We started by visiting the information centre which gave us a good idea of where we wanted to go in this very large reserve. Armed with a map of the trails, which cover those allowed for vehicles, cycles and pedestrians we set off.

The Landscape here is largely formed by the erosion of clays, containing fragments of gypsum, which have been eroding gradually since the Eocene Epoch, and thus it has left marvellous plateau formations of differing altitudes up to 659 m combined with numerous canyons and gullies which whilst spectacular are also a habitat for a wide variety of Steppe flora and fauna.



Spectacular desert scenery at Las Bardenas Reales.

As we drove around the dusty tracks admiring the wonderful plateaus we were joined by Griffon and Egyptian Vultures circling overhead and several times when we stopped nearer to wetter ravines we spotted the ever-colourful Bee Eaters. Such a wonder of nature this place is, the photos we took hardly do it justice.

Day 8 – Mina Santa Rosa, Tierga (Zaragoza Province)



The Mina Santa Rosa in its arid setting.



Cavity containing crystals of hematite and clear dolomite.

Today we were to journey south 32 km to the foothills of the Sierra Moncayo mountain range to the village of Tierga and to look out nearby for the mine of Santa Rosa. Not long past the village of Tierga we spotted a very red dusty track which appeared to lead to some buildings in the distance, so we investigated. Sure enough, it led to some old disused mine buildings with the current operational mine further along, currently operated by Promindsa. Iron ore has been mined here since 1913, specifically haematite which is crushed on site and sold for pigment use.

We found a reasonably fresh ore pile and got hammering and soon found some nice samples of hematite, and some nice small but well crystallised groups of dolomite, with one small cavity of specularite coated with water clear dolomite crystals. After a good few hours of hammering we wrapped up our specimens and headed back to our campsite at Borja to admire the sunset going down over the Moncayo mountain range whilst enjoying a drop of the local grape juice!

The next day it was time to move on to our last campsite, a drive of some 354 km. It was to be a tiring day to get to our campsite at Valle de Cabuerniga within the Reserva Nacional de Saja in Cantabria. Having driven the last 50 km stretch in the mountains in thick fog, we could tell we were now in Green Spain.

Day 9 – Minas Andara, Picos de Europa , Sotres (Cantabria)

Today we took a drive west into the towering limestone beauty that is the Picos de Europa mountain range, our destination was to be the Andara mining district high up in the Macizos Oriental (western Massif of the range) so we took the narrow road up from Arenas de Cabrales a long and winding road up through the pretty mountain village of Sotres and arrived at the car park at the start of our walk. We were pleased that we were the only ones here - until another car with Spanish registration pulled up with 4 guys in it who proceeded over to us, pointing at my Land Rover (Defenders have that effect on blokes!). Yes, you guessed it, 4 British guys on a hiking holiday, doing the same route as us but in reverse.

We got our walking boots on and headed up the track to the mine, a distance of some 3 km. It took longer than expected, however, as Natalie kept coming across numerous alpine flora and taking photographs. Having said that, the area is justly famous for its variety of calcareous flora species.



Old mine car at the entrance to the Minas Andara.



Specimen of honey-coloured sphalerite from Minas Andara.

We arrived at the mine, which is very easy to spot as there is an old mine cart still suspended on its tracks coming out of the adit above the track on it's way to the tip - and also the old mine building which is now a mountain refuge (Refugio Caseton de Andara). We set about looking for samples of honey coloured sphalerite for which most of the mines in the Picos de Europa are well known. It wasn't long before we found some small but massive samples that glistened nicely in the sunshine together with some more familiar darker brown samples and some associated galena. Happy with our little finds we packed everything up and took some photos of the amazing views from here and then went to see the ranger who had arrived with his dog to "man" the refuge. He invited us inside to take a look; bunk style accommodation but with the addition of a fully functioning kitchen and a fully stocked bar. Not bad for a refuge some 1,700 metres up a mountain!

Day 10 – Cueva El Soplao, Rabago, Cantabria

Our last day was to be a no-collecting trip; more an opportunity to gaze in awe at the wonderful caverns of this tourist cave. First discovered early in the 20th century by miners working the nearby La Florida mines, it was only opened to the public by the Cantabrian Government in 2005. We had already secured our tickets for "Tourist Adventure Visit" before leaving the UK. This is a 2.5 hour visit of the deeper caves requiring you to be being kitted out in helmet, lamp

and disposable overalls. We headed in with our 2 guides and the rest of the pre-booked group of 15. All the caverns displayed many wonderful speleothems and in particular magnificent helictites, a must visit for those with an interest in karst formations.

Kevin Garrod.

(Editor's Note: The first part of this description of a collecting trip around Spain was published in the previous Newsletter in September 2017. All photos and specimens: Kevin Garrod)

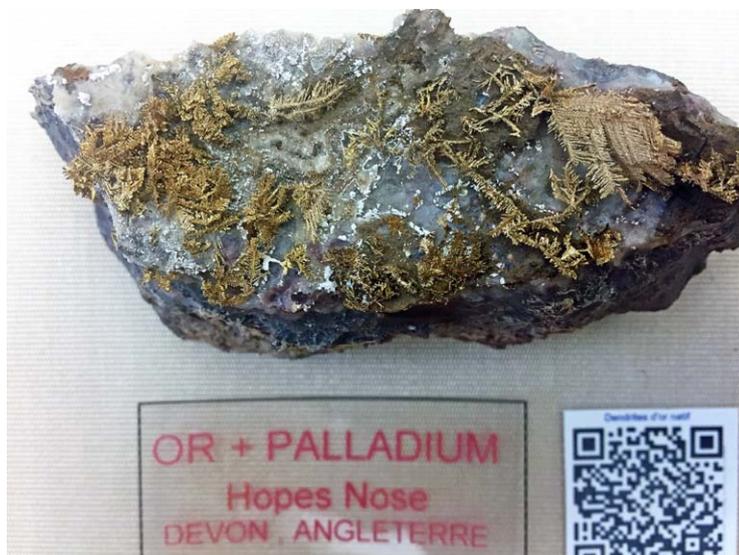
A Visit to The Museum of Mineralogy at the School of Mines, Paris.

There are many reasons to visit Paris but for me the main area is close to the Jardin de Luxemburg where, in four blocks, one can visit three world class mineral museums; the Sorbonne, the Museum of Natural History and the Museum of Mineralogy at the Paris School of Mines.

When back in Paris last month, I had an afternoon to myself and stole away to the latter museum for 3 hours of mineral beauty and tranquility. Although I have to say I did not have the galleries to myself, despite being there in the middle of August there were 12 other people viewing the minerals. When did that happen to you the last time you were in the NHM - sadly?



Crystals of liroconite to 1 cm. from Wheal Gorland.



A fine gold specimen from Hope's Nose, Torquay.

The museum has one of the largest mineral collections in the world, some 470,000 samples with approximately 120,000 mineral specimens in the catalogue and approximately 4,000 samples on show (according to the curator, I chose not to dispute this!).

The collection includes those of several pioneers in the science of mineralogy such as Haüy, the first professor of mineralogy at the school, and Beudant, a former professor of mining. The minerals are displayed in a beautiful 80 m long gallery overlooking the Luxemburg Garden, in a historic building dating from the beginning of the 18th Century. The museum staff are actively involved in research as well as curation and the collection is up to date with modern acquisitions adjacent to mineral classics.

The museum has an excellent display of French minerals and those of former French colonies, but equally good are the UK minerals, especially English fluorites. Some of the highlights of the museum for me are shown in the adjacent photographs.

Even before getting to the first-floor museum the stairs to the museum are richly illustrated by pictures depicting areas of classic European geology including Mt. Blanc and Fingal's Cave. Pass through the beautiful wooden doors into the first gallery and you are met by well-made and illustrated cases of large aesthetic specimens. The main gallery itself features

a portrait of Haüy looking down over a case of his wooden crystal models and scientific instruments.



A splendid specimen of baryte from Frizington.



Leadhillite from Leadhills!

The museum is open all year round, Tuesday - Friday: 1:30 - 6pm and Saturday: 10am - 12:30pm; 2 - 5pm. The cost is €10 and it is well worth it.

Rob Bowell.

Editor's Note: The Paris School of Mines - (known officially as the *École Nationale Supérieure des Mines de Paris* and nowadays as MINES ParisTech) - was created in 1783 by King Louis XVI for the purpose of training mining engineers. For anyone interested in paying a visit, the address is: Musée de Minéralogie, 60 Boulevard Saint-Michel, 75006, Paris, France. The Museum website can be found at: <http://www.musee.mines-paristech.fr/Home/>.

The Marsh Award for Mineralogy 2017 Won By David Green.

The winner of this year's £1000 Marsh Award for Mineralogy was Dr. David Green, a thoroughly well-deserved recognition of David's contribution to the enthusiast mineralogy community over a great many years. David was presented with the award at a small reception on the 7th of December at the NHM in London. Alongside the award presentation for David were further presentations of the Marsh Award for Palaeontology, awarded to David Ward, and a new award for an Earth Sciences book, which was won by 'The Origin and Nature of Life on Earth: The Emergence of the Fourth Geosphere' by Eric Smith and Harold J Morowitz.

The event is held annually at the NHM and is free to attend although registration is required, in addition to the short award presentations there is a talk given by an Earth Sciences Academic, on a topic, where possible that spans the Earth Science disciplines of mineralogy and palaeontology. This year the lecture was given by Professor Richard Herrington, ore deposit mineralogist and Head of the Earth Sciences department at the NHM. Richard's talk was about the sulphide mineralogy of the 'black smokers' found on the ocean floor, their unique biome and how we are able to recognise these in the preserved geological environment thanks to both the minerals and fossils. The talk was a fascinating overview of this incredible topic which is still in its infancy.

The awards will be held again next year and I encourage Russell Society members to attend, if you are interested, look-out for some promotional aspects with the 2018 dates at mineral shows later on in the year (probably Bakewell and Haywards Heath). It is also worth reminding everyone that this is an open nomination. Every year on the NHM

website there will be a nomination form which can be downloaded so that anyone can nominate whomever they feel deserves recognition for outstanding voluntary contributions to the mineral sciences, be that in the form of community involvement, academic research, fieldwork or in the heritage sector.

The nominations are reviewed during November by a panel of five academic mineralogists, spanning several areas of interest – Mineralogy, petrology, gemmology, history of geological science and meteoritics. I would encourage everyone to think of potential recipients and do note that being nominated but not receiving the award, does not stop someone from being nominated the following year.

In celebration of David's award, I include a small section from his nomination:

"A quick skim through Andy Tindle's Minerals of Britain and Ireland shows no less than 45 citations of works by David, and there are many others where he appears as a co-author. His prolific publications record is all the more remarkable because of his incredible commitment in taking on the role of Editor of the UK Journal of Mines and Minerals, which was published from 1986 through to 2013. David has always been helpful to other collectors and enthusiasts, often providing instrumental analysis and identification of specimens. It is his currently unfulfilled hope, to set up a private laboratory and to provide an affordable mineralogical analysis and identification service to the mineralogical community."



David Green receiving his award from Mr. Marsh.

Mike Rumsey

(Senior Curator in Charge, Natural History Museum & Chair of the Marsh Award for mineralogy panel)

News From The Museums:

a) Natural History Museum, London.

Well, yet again we've had a busy twelve months at the NHM. In addition to business as usual, facilitating a large number of exhibition and research loans across the globe while adding to and managing the collection, there have been further significant changes to our own NHM exhibitions centred on the Hintze Hall.

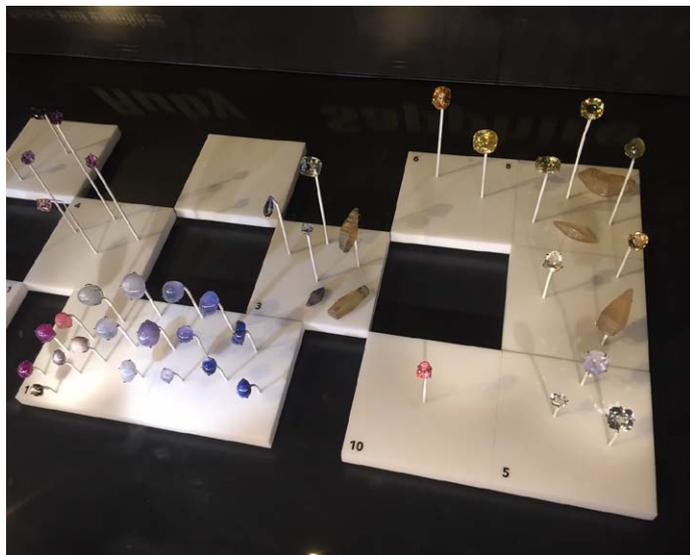
You may remember that last year I let you know that the Central Hall (now Hintze Hall) was to be closed during the year for a re-imagining of this iconic space. I'm sure you have all seen that Dippy (the Diplodocus) has been replaced by Hope (the Blue Whale), and what a great addition she is. Suspended in the central Hall, Hope, alongside the other large feature specimens on the ground floor were selected to highlight the importance of us looking after and understanding the origins of the natural world around us. I won't spend too long on this but I highly recommend that you come and visit the new Hintze Hall, it really is spectacular. Even if you saw the TV program, it's worth seeing Hope up close and looking at the large slab of Banded Iron Formation (BIF) whilst thinking about what this represents for the origins of life on our planet and its connection to geology. Personally, I recommend going up to the top floor (by the Giant Sequoia) at dusk early or late in the year just before the museum closes, when Hope is lit a subtle shade of blue – it really does give that underwater feeling!

Our focus in the Hintze Hall redevelopment was the East balcony. As I mentioned last year a new mineral display was being planned for this space and a great deal of curation time went into the preparation of this display. We received a brief from the designers for a case of large colourful minerals designed to entice visitors up from the Hintze Hall and onto the balconies, where they might then meander through to the systematic mineral gallery. Designers are not always familiar with the specifics of what nature produces, so finding the right compromise of specimens in the collection that both designers and curators were happy with was a time-consuming process! One of the key difficulties was that the size of the case is so large, (5 meters tall by 1 meter wide) that finding specimens large enough to fill the space that were not already being used for display elsewhere in the museum was extremely challenging.

The end result is a spectacular monolithic display studded with mineralogical form, colour and diversity, which also introduces the concept of mineralogical complexity, having simple minerals at the North of the case and relatively complex ones at the South. I suspect some purists are likely to be disappointed by the lack of readily available interpretation as there are no labels in the case, however there is interactivity using your phone or tablet that will allow you to see all

the regular species and locality information, virtually, on your on mobile device. The distinctive display may not be to everyone's taste but it is really eye-catching, attracting, through colour and diversity new visitors to the world of minerals and subsequently the mineral gallery - it is definitely well worth a visit. Knowing that not everyone seeing the cabinet will be new to minerals, we made sure to put a few UK classics in the case at eye-level specifically for the UK collectors, do look out for the lironite and bournonite, and for the systematic connoisseur, the Swedish pyrosmalite or South African gaufreyite.

After the changes last year in the mineral gallery, it's been relatively quiet there apart from a number of our star objects going on tour. Right now, and for the next few years a small number of our most iconic specimens are in Asia visiting a number of museums as part of the NHM's museum wide, 'Treasures' exhibit. Significant time and preparation went in to ensuring that these most special objects were carefully selected to those that could withstand a global tour, fully documented, conserved and prepared with new mounts and full narrative to accompany them. Key objects temporarily missing from "The Vault" are the Latrobe nugget, perhaps the world's largest morganite gem, important alexandrite gem and rough, The Cursed Amethyst, the original moulds and casts of the koh-i-noor, Hans Sloane's historic sapphire button and Samuel Hearne's copper from the exploration of arctic Canada. A few other specimens are missing from other displays around the NHM site, the type specimen of jadarite (AKA kryptonite), gold from Leadhills and silver minerals once the property of King George III. The exhibit is currently in Singapore, if you happen to be there, here is the website <http://www.marinabaysands.com/museum/treasures.html>



Part of the upgraded gemstone collection. Mike Rumsey photo - permission granted by the Trustees of the Natural History Museum.

Right at the very end of the year, we were lucky to get a small amount of funding to do a little bit of work in the Earth's Treasury gallery, this is the 'dark' one in the part of the building that was once the old Geological Museum. From a curatorial perspective we wanted to improve the visibility and lighting of the gems and rough stones in the diamond, corundum and beryl cases and allow us better access to these specimens so that they may be easily used in more touring exhibits like 'Treasures'. Our designers also wanted to change the style of the display and improve the mounting methods as no one liked the wire mesh that was in there! A frantic couple of months with individuals from Project Office, Design, Conservation, Mounting, Interpretation, Technical Production, Security, Joinery, Directorate and Earth Science finally saw the new cases and layout put in place just before Christmas. They are a great improvement (see photo) to what was previously in place and I highly recommend coming to take a look, in particular the star sapphires now show asterism really well and the great mounting allows us to see just how good some of the larger cut stones are. Please do note that due to different departments working on different projects, the interpretation panels in the back of the case will be updated later in the year along with others in the rest of the gallery when this team have finished other commitments.

The NHM Minerals team also took displays to Tucson, St. Marie and Munich mineral shows, thereby increasing global outreach of the collection and introducing more people to British minerals. Displaying at shows subsidises attendance and allows us the opportunity to look for significant new additions to the collection on the global stage. Members of the team also went to a number of the UK shows and were kind enough to represent the NHM in their spare time.

With all this exhibition work going on and the curation team's involvement in a large project with the European Space Agency there has been little time for anything else this year and as such there have been fewer additions to the collection. However, there have been some great donations and contributions to help us acquire important specimens and I would like to personally thank this year (in alphabetical order) Christophe Gobin, G.O.M (Gruppo Orobico Minerali), Simon Harrison,



Large azurite "sun" from the Malbunka Copper Mine, Australia. Mike Rumsey photo - permission granted by the Trustees of the Natural History Museum.

Neil Hubbard, John Jaszczak, Alan Jobbins, Robert 'Bob' Jones, Anatoly Kasatkin, Frank Keutsch, Wayne and Dona Leicht, Ed Loye, The Mineral Shop, Musee cantonal de geologie de Lusanne, Deborah Roman, Russian Minerals, Steve Rust, Richard Tayler, Brent Thorne, Anna Vymasilova and Austin Woodbridge, for their philanthropy. The most significant new specimen this year is probably one of the largest azurite 'suns' from the Malbunka Copper Mine in Australia, not only a large aesthetic specimen and a classic of the future, it is one of the largest in any global museum (see photo of specimen on previous page) and the deposit is of particular scientific interest in terms of its genesis, potentially representing a new type of copper deposit and a primary crystallisation of azurite.

Long term volunteers, Austin Woodbridge and John Crocker continue to be invaluable to the curation of the collection and extra support from part-time volunteer Adam Stephens was again available in between his studies. I am extremely grateful for all their continued support. To follow up on my comments from last year, Austin and I are still preparing a manuscript for the Journal on the Ludlam Collection.

Apart from a bit more work regarding the interpretation panels in the Earth's Treasury, next year is looking like a return to normal for the first time in several years and a time to embed back into managing the collections and researching or facilitating research on the important objects within. For those looking and waiting for more information about the mineral collection to appear on the NHM data portal, that will have to wait as mineralogy is relatively far better documented than all the other science areas, so digitisation staff, focus and funding is not available at this time.

The new science strategy for the NHM is being drawn up and collections development is a key feature. I am hopeful that we shall get some great collection opportunities in the next few years and I would like to add to the less glamorous, but really important systematic representation of the UK's topographic mineral diversity, so if you would like to help the nation's largest and most important mineral collection please do get in touch.

Mike Rumsey
Senior Curator in Charge, Natural History Museum.

b) Oxford University Museum of Natural History.

It is a time of change at the Oxford University Museum of Natural History and I'm delighted to welcome our new Collections Manager, Dr. Robert Knight, who will be taking over from me looking after the mineralogy and petrology collections when I retire at Easter. Rob is an ore geologist and, like me, is a Leicester graduate. He studied for his doctorate at Cardiff and since then has been doing postdoctoral research on deep-sea mining at the University of Southampton.

He arrived in the Museum last November and I'm busy trying to pass on as much information about the collections to him as time will allow! You may already have met him, as we took a display to the Sussex Mineral Show last November. We decided to focus our display on the humble specimen label, something we all too often take for granted, but can reveal far more about a collector or a specimen than the writing may actually say! We still carefully protect all the labels that arrive with new acquisitions to the collections and a specimen of arsenopyrite from Freiberg that Pearl Freeman gave to us many years ago, came with a total of seven labels made by previous owners!

Pearl and Sid for many years placed specimen labels in a shoe box, having carefully numbered each specimen and recorded all the information about it in a catalogue. Pearl's family remembered that she had wanted her collection to come to our museum and when she moved to a care home, they generously invited us to make a selection of specimens. We now have a beautiful 'Freeman collection', worldwide in scope and rich in barytes and Indian zeolites, minerals that she and Sid had particularly liked. When Mick Cooper was researching mineral dealers for his book "Robbing the Sparry Garniture", he put out a call for any labels that were no longer associated with specimens – 'orphan labels', if you like. The Freemans gave him their shoe box full, and when Mick



Robert Knight with the OUMNH display at the Sussex Mineral Show in November 2017.
Photo: Monica Price, OUMNH

died, he bequeathed to us his research archive, including the labels. Chris Finch is a very welcome new member of our team of volunteers, and as a little puzzle, he is investigating whether or not any of the Freeman specimens can now be reunited with their dealer labels.

There has been lots happening in the Museum in recent times. The Mineral Collections have grown with major acquisitions of British material from Norman Thomson and Trevor Bridges, and many smaller collections and individual specimens that broaden the range of species and localities that we hold. We now have plenty of cataloguing to get up to date, but the greater part of our collections can be searched online at www.oum.ox.ac.uk/collections, and we'll be adding newer acquisitions and more photographs as soon as we can. At the moment we are having a new website developed, and Rob is going to be kept very busy in the coming years as we start planning new and exciting displays.

We both thoroughly enjoy getting the collections seen and used, and if you think we can help you with any of your mineralogical projects, or if you would like to see material that is not on display, do contact Rob: robert.knight@oum.ox.ac.uk. For visits to our permanent exhibitions and a great programme of temporary displays, the Museum is open daily from 10.00-17.00, admission is free, and we have lots of family activities to enjoy.

Monica Price
Collections Manager (Mineralogy and Petrology)

Crystals of Balmoral – Secret Hidden Gems of the Cairngorms – New Exhibition.

I am working with Gary Marsden, Visitor Enterprise Manager for Balmoral Estate, to put on an exhibition of mineral specimens, jewellery and artefacts, from the collection at Balmoral Castle. The Castle, and exhibition, will be open to visitors from 30th March to the end of July 2018.



Balmoral Castle. Copyright Balmoral Estate.

The exhibition, in the Ballroom at the Castle, will offer a unique opportunity to see the large smoky quartz crystal found by James Grant in 1851, and presented to Queen Victoria, together with a selection of other fine specimens, some rough pieces of fabulous gem quality 'cairngorm', specimens collected by Queen Victoria herself from Beinn a' Bhuid, and three of the largest beryl crystals ever found in the Cairngorms. Another notable item of interest is the elaborate Atholl Inkstand, designed by Prince Albert as a gift for the



**Crystals
of Balmoral**
SECRET HIDDEN GEMS
OF THE CAIRNGORMS

Explore how gems hidden in the Cairngorms were discovered and used during Queen Victoria's reign.

Queen at Christmas in 1845.

(see <https://www.royalcollection.org.uk/collection/themes/exhibitions/victoria-albert-art-love/the-queens-gallery-buckingham-palace/the-atholl-inkstand>).

If you are in the area, don't miss this one-off chance to see these historical treasures. For reasons of copyright, it is unfortunately not possible to reproduce sample images here, but you can see some of the specimens in my book "Crystal Mountains – Minerals of the Cairngorms", published in 2014 (see pages 53, 59, 60, 64, 67, 71 and 72).

Roy Starkey.

Calcium Carbonate: Nature's Tissue Paper!

It is surprising what gets a mention in Chemistry World (Royal Society of Chemistry), e.g., the chemical composition of the shells of bird's eggs (Malhotra, 2017). The Greater Ani (*Crotophaga major*) is a gregarious member of the cuckoo family that lives in the mangrove swamps of the Caribbean, and Central and South America. Bearing in mind the European view of birds in general, and cuckoos in particular, it is remarkable that a group of Greater Ani construct a fairly crude communal nest made of sticks, twigs, and leaves (see photo) with as many as 4 females laying a total of 20 eggs

in one nest (Riehl, 2017).

Who would have thought that the Greater Ani uses the diverse properties of calcium carbonate to protect its eggs?

A newly-laid egg is almost totally covered with a very thin white fibrous crust (up to 28.5 μm thick) that is gradually worn away as the eggs are moved around in the nest; the abrasion revealing a greenish-blue egg (see photo). It turns out that the thin white crust is mainly vaterite; whereas the greenish-blue eggshell is primarily calcite (Portugal, *et al.*, 2017; Riehl, 2017). Vaterite is the least common of the three polymorphs of calcium carbonate (the others being calcite and aragonite) and it has only been found as very small prisms and fine fibrous crystals (usually $\ll 1$ mm long). Vaterite has a complex 3-dimensional structure and, together with calcite, belongs to the hexagonal crystal system (although they have different space groups). Vaterite is not the most stable of minerals and can gradually change to calcite; a property that might make it an important intermediary in the biomineralisation of calcite.



The Greater Ani - interesting use of materials.

The results of evolutionary processes continue to amaze me, and it is interesting to contemplate exactly how the inner-workings of the Greater Ani developed so that crystal structure of the two hexagonal polymorphs of calcium carbonate could be controlled at the appropriate time.

Malhotra, R. 2017. Rare mineral cushions eggs. *Chemistry World*, **October 2017**, p. 40.

Portugal, S.J., Bowen, J. and Riehl, C. 2017. A rare mineral, vaterite, acts as a shock absorber in the eggshell of a communally nesting bird. *Ibis*. DOI: 10.1111/ibi.12527.

Riehl, C. 2017. www.bou.org.uk/blog-riehl-vaterite-eggshells/.

Frank Ince.

Pope's Grotto Preservation Trust, Twickenham.

Some members will already be aware that I have been helping in a mineralogical advisory capacity with a project to restore Alexander Pope's Grotto – see <http://www.popesgrotto.org.uk/>

The conservators have been seeking to acquire a quantity of mineral material to patch holes and do further restoration work. I contacted a number of people, to solicit contributions, and would like to place on record here my personal thanks for the enthusiastic response from Mike Leppington, Tony Rigby, Chris Jewson, Neil Hubbard, Stuart Shrimpton, Frank Ince, Frank Bouweraerts, Emma Corke, Richard Taylor for their help (I hope I have not forgotten anyone).

We have now shipped a total of about 10 square metres of mixed mineral specimens, broadly comparable to material already in the grotto. As things stand at the moment, it seems probable that this will be sufficient to complete the currently planned work.



Work continues in the 18th Century Grotto. Photo: Roy Starkey.

Visiting the Grotto - The next public openings will be in June 2018. To be notified when bookings open, see the web site <http://www.popesgrotto.org.uk/visits.html>

Roy Starkey

New Book on Mineral Pseudomorphism.

In August 2017, the publishers Elsevier produced a 290-page book which is the only one I have ever seen specifically devoted to the fascinating subject of mineral pseudomorphs. The authors are J. Theo Kloprogge of the University of Queensland in Brisbane and Rob Lavinsky, the well-known American mineral dealer and Stretch Young.

The process(es), by which one mineral is replaced by another but still maintains its original crystal shape, has been known for more than 200 years and is far more common than you might think. Apart from its inherent interest, it can be important in understanding the geologic history of rocks. There are very many examples of pseudomorphs – your collection probably contains multiple examples - but they have not previously been gathered together in a single reference book featuring high-resolution, full-colour pictures of pseudomorph formations, together with the original minerals that they have replaced.

In the UK we are familiar with, for example, quartz pseudomorphs after baryte from a number of Cumbrian and North Pennine localities, the chalcedony pseudomorphs after octahedral fluorite from Wheal Mary Ann and the (very much rarer) galena pseudomorphs after pyromorphite from Wheal Hope – the latter two examples both from Cornwall. The book does feature a number of UK occurrences, including such gems as hilgardite pseudomorphs after boracite from the Boulby Mine in North Yorkshire and the pyromorphite pseudomorphs after cerussite from Whitwell Quarry in Derbyshire but who knew that the World held such delights as hedenbergite pseudomorphs after ilvaite (Dalnegorsk, Russia), meyerhofferite pseudomorphs after inyoite (Monte Azul, Argentina) and fluorellestadite pseudomorphs after hemimorphite (Mapimi, Mexico)? Go on – broaden your horizons!

This is not a cheap book and it is not exhaustive in its coverage, but it is certainly interesting. I have a copy and I found it fascinating. Apart from the array of first rate photographs, it provides much interesting history of the subject as well as information on classification of pseudomorphs and the processes which give rise to them. It is available from the publishers, but you can also find copies – at a range of prices - on a number of websites, including Blackwell's, Google Books, The Book Depository and Wordery.

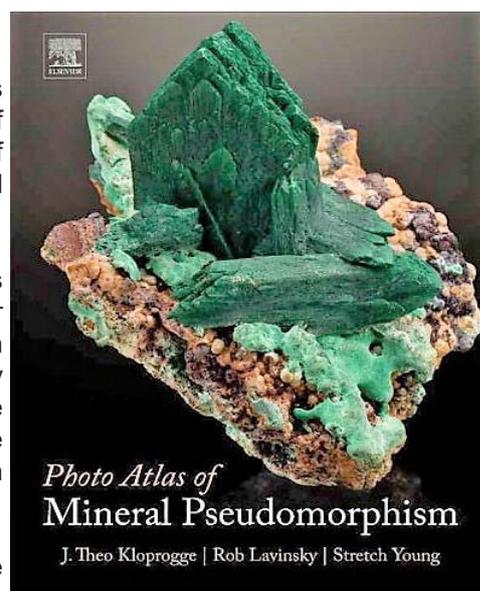
Editor.

Free Specimen Boxes and Trays!

I have had two notifications from members concerning the availability of free specimen trays and boxes:

- Sue Cowdry has a large quantity of white card mineral specimen trays in various sizes and also several dozen plastic, slide-top specimen containers. These are available free to Russell Society members but would need to be collected from Sue. Anyone interested should contact her.
- Chris Finch recently received an offer from Monica Price at Oxford University Museum of Natural History of some surplus card trays that are looking for good homes. There are pictures of the boxes on the Russell Society web-site, just search for free mineral card trays. The museum has received various collections in trays but, because they are not conservation standard, they do not want to keep them. There are three styles, brown thick trays, white covered ones, and a bin liner full of the flatpack ones in various sizes. Chris can pick these up from the Museum for anyone who is interested and distribute at the ASM or on field trips. If anyone is interested please contact him.

Editor.



UK & EUROPEAN MINERAL SHOWS IN 2018

Date:	Event:	Location:	Organiser/Site for Information:
04 March 2018	Oxford Mineral Show	Exeter Hall, Kidlington, Oxford. UK. OX5 1AB.	http://www.oxfordshow.co.uk/
09-11 March 2018	Bologna Mineral Show	UNIPOL Arena, Via Gino Cervi, 2, 40033 Casalecchio di Reno, Bologna, Italy.	http://www.bolognamineralshow.com/
19-22 April 2018	Rochester Mineralogical Symposium	Radisson Hotel Rochester Airport, 175 Jefferson Road Rochester, New York.	http://www.rasny.org/minsymp/
05-06 May 2018	Antwerp mineral Show, "Minerant"	Antwerp Expo, Jan Van Rijswijcklaan 191, 2020 Antwerp, Belgium.	http://www.minerant.org/minerant.html
13 May 2018	Oxford Mineral Show	Exeter Hall, Kidlington, Oxford, UK. OX5 1AB.	http://www.oxfordshow.co.uk/
19 May 2018	International Freiberg Mineral Show	Huebnerhalle, Dörnerzaunstrasse, D-09599 Freiberg, Saxony, Germany.	http://www.freiberger-mineralienfreunde.de/mineralienboersen.html
18-20 May 2018	Verona Mineral Show	Verona Exhibition Centre, Viale del Lavoro 8, Verona, Veneto 37135, Italy.	www.veronamineralshow.com/en/home-2/
19-20 May 2018	Yorkshire Mineral & Fossil Fair	The Garden Rooms, Tennants Auctioneers, Harmby Road, Leyburn, DL8 5SG.	Don Edwards, 01433 620304. www.leyburnfair.co.uk
21-24 June 2018	Exposition Internationale Mineral & Gem	St Marie aux Mines, Alsace, France.	http://www.sainte-marie-mineral.com/an_index.php
14-15 July 2018	North Pennines Mineral Expo	St. John's Chapel, Weardale, County Durham.	NorthpenninesMineralExpo@gmail.com
29 July 2018	Oxford Mineral Show	Exeter Hall, Kidlington, Oxford, UK. OX5 1AB.	http://www.oxfordshow.co.uk/
01 September 2018	Hampshire Mineral Show	Lyndhurst Community Centre, Lyndhurst, Hampshire, UK. SO43 7NY.	http://www.sotonminfoss.org.uk/smfss-how.htm
5-7 October 2018	Euromineralexpo Torino	Pala Alpitour, Corso Sebastopoli, 153/d, 10134 Torino, Italy.	www.euromineralexpo.it/
13-14 October 2018	Bakewell Rock Exchange	Lady Manners School, Bakewell, Derbyshire, UK. DE45 1JA.	http://www.rockexchange.org.uk/the-rock-exchange-2014
26-28 October 2018	Munich Mineralientage	Trade Fair Centre, Munchen-Riem, Munich, Germany.	http://www.mineralientage.com
9-11 November 2018	Expominer Barcelona	Hall 1, Montjuic Exhibition Centre, Avinguda Reina Maria Cristina08004, Barcelona, Spain.	www.expominer.com
17 November 2018	Sussex Mineral Show	Clare Hall, Haywards Heath, West Sussex, UK. RH16 3DN.	http://www.sussexmineralandlapidarysociety.org.uk/Home/Show
23-25 November 2018	Verona Mineral Show	Verona Exhibition Centre, Viale del Lavoro 8, Verona, Veneto 37135, Italy.	www.veronamineralshow.com/en/home-2/
25 November 2018	Oxford Mineral Show	Exeter Hall, Kidlington, Oxford, UK. OX5 1AB.	http://www.oxfordshow.co.uk/
30 November - 2 December 2018	Paris International Mineral Show.	L'Espace Charenton, Rue de Charenton 327, Paris 75012, France.	Www.mineralexpoparis.com
Various Dates in 2018	Rock 'n Gem Shows	Various Locations.	http://www.rockngem.co.uk/

SHORT REPORTS & PAPERS.**Bologna Stone: A curious case of persistent luminescence.**

It's strange how some topics stay in one's mind. After reading the BMS Occasional Paper No. 23: "UV-induced Fluorescence in Minerals" (Doel *et al.*, 2010), the Bologna Stone has been one such topic. Since then, I have noticed several articles that have described various aspects of the preparation and luminescent properties of this remarkable material (e.g., Lastusaari *et al.*, 2012; Ball, 2016; Principe, 2016).

It is worth pointing out that the persistent luminescence described here is not the fluorescence or phosphorescence that are more usually associated with organic molecules, e.g., dyes and pigments. Indeed, the emissions of light (photoemissions) in minerals and other inorganic compounds that we might have thought of as fluorescence or phosphorescence, should be described as luminescence or persistent luminescence (Mika Lastusaari, *personal communication*). The mechanisms of the photoemissions in these processes can be quite different (see Figure 1):

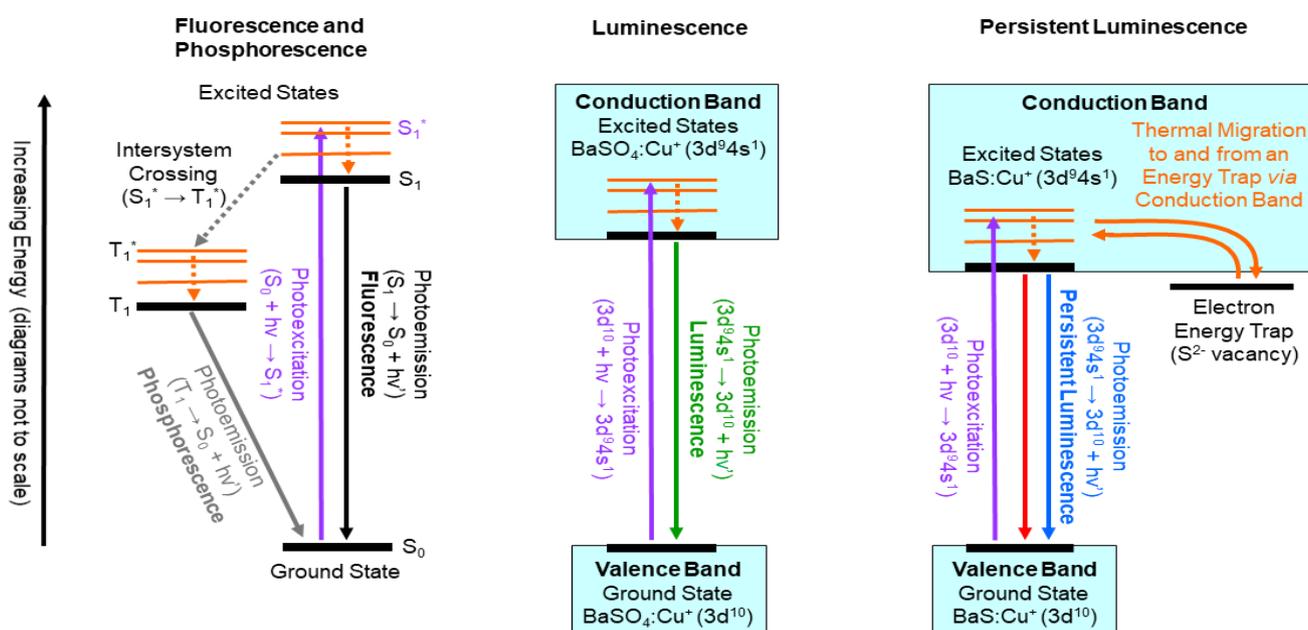


Figure 1. The electronic transitions related to photoemissions in the Bologna Stone after photoexcitation (purple). Left: fluorescence (black) and phosphorescence (grey) of organic molecules. Middle: short-duration bluish luminescence of copper-containing baryte from Monte Paderno ($BaSO_4:Cu^+$, green). Right: persistent orange luminescence of natural Bologna Stone ($BaS:Cu^+$, blue) and synthetic copper-doped barium sulphide ($BaS:Cu^+$, red).

- Fluorescence and phosphorescence: These processes involve the radiation-induced electronic excitation (photoexcitation: $h\nu$, purple arrow) and subsequent photoemission from different energy levels in the same chemical species (shown here as singlet (S_0, S_1) and triplet (T_1) states for an organic molecule). After the removal of the photoexcitation source (e.g., UV or visible light), the photoemission of fluorescence ($h\nu'$, black arrow) diminishes almost instantaneously, much faster than that of the short-duration photoemission of phosphorescence ($h\nu'$, grey arrow). Fluorescence is faster, because it involves allowed transitions, whereas phosphorescence is somewhat slower as it involves nominally-forbidden transitions; symmetry issues control these processes.
- Luminescence: With inorganic compounds, fluorescence and phosphorescence are difficult to separate (Mika Lastusaari, *personal communication*) and these processes are better described by using band theory of photoexcitation and photoemission (Nassau, 1983). After photoexcitation from the valence band ($h\nu$, purple arrow) to the conduction band in an ionic species, the subsequent photoemission is usually referred to as luminescence ($h\nu'$, green arrow). In the case of the baryte from Monte Paderno, the luminescence is caused by the effects of small amounts of copper that are present in the baryte crystal lattice (see below); pure baryte does not show any luminescence. The short-duration emission can be described as being partly allowed; as before, symmetry issues control these processes.
- Persistent luminescence: The process described here involves the photoexcitation of electrons ($h\nu$, purple arrow)

in an ionic species followed by the thermal migration of the excited electrons to adjacent electron energy traps via the conduction band (orange arrow: left to right). After the removal of the photoexcitation source (e.g., UV or visible light), the slow, thermally-induced reversal of this process (orange arrow: right to left) can lead to a long-lasting photoemission (afterglow) as the electrons eventually return to the ground state ($h\nu'$, red or blue arrows). The actual emission proceeds through the same states as luminescence, but because of the trapping, the duration of emission is longer (Mika Lastusaari, *personal communication*). This property has been widely investigated and has resulted in a variety of useful applications (Li et al., 2016); these authors refer to the materials as 'long persistent phosphors'.

The original method of preparation of the Bologna Stone (by Vincenzo Casciarolo, a shoemaker and would-be alchemist from Bologna) was described in about 1603 (Lastusaari *et al.*, 2012; Principe, 2016): baryte (collected from Monte Paderno, Bologna, Italy) was ground in a mortar and pestle and the powdered baryte heated in a charcoal-fuelled furnace. After exposure to light, the calcined powder emitted a long-lasting bright orange glow that was particularly noticeable in the dark (Figure 2). Unfortunately, later in the 1600s, key details of this preparation were lost and it was a topic of much discussion amongst alchemists and early chemists (Principe, 2016). Even though the Bologna Stone has been known since the early 1600s, it is only relatively recently, and after many trials and tribulations, that the intricacies of its preparation and the mechanism of the persistent orange luminescence have been revealed.

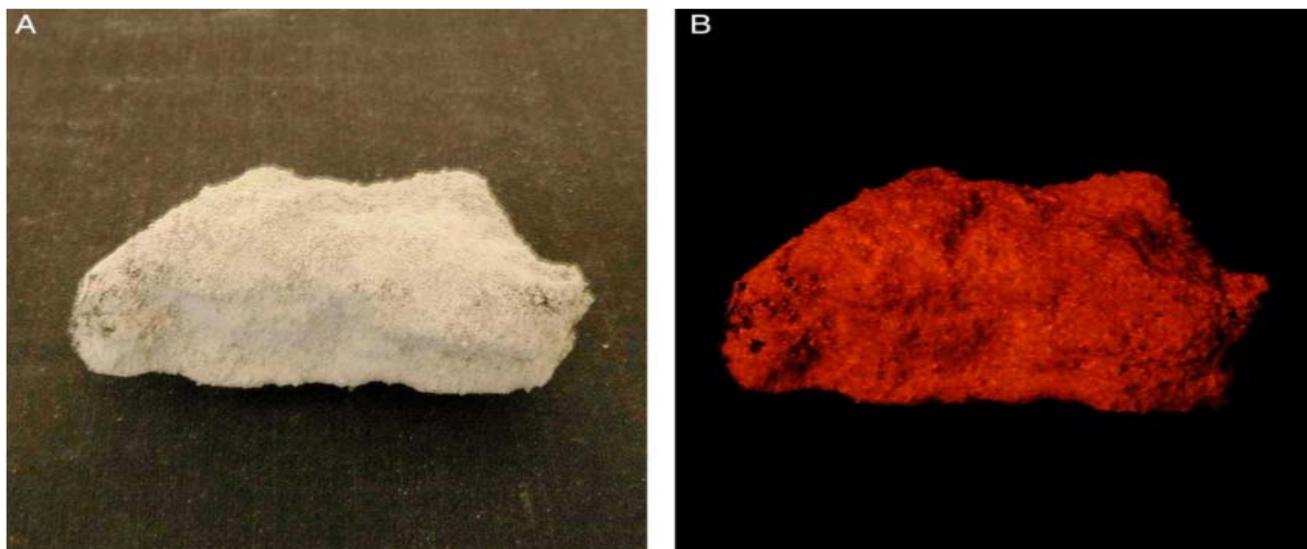


Figure 2. The Bologna Stone prepared and calcined according to Homberg's method. **A:** in full light; **B:** glowing in the dark after exposure to light. Reproduced with permission from Principe (2016, Figure 7).

In summary: powdered baryte (BaSO_4) containing crucial impurities (see below) is reduced to barium sulphide (BaS) in a furnace at elevated temperatures; the calcined product, when exposed to UV or visible light, exhibits a persistent orange luminescence (afterglow) that is caused by the presence of very small amounts of copper in the barium sulphide (an unusual copper-doped barium sulphide; Lastusaari *et al.*, 2012). The baryte used in this process can be naturally-occurring (and may contain various impurities: Al^{3+} , Ti^{3+} , Mn^{2+} , Mn^{4+} , Fe^{2+} , Fe^{3+} , Cu^+ , Cu^{2+} , Sr^{2+} , Ag^+ , Eu^{2+} , Sn^{4+} , Pb^{2+} , Bi^{2+} , Bi^{3+} and UO_2^{2+}) or synthetic, and its composition controlled (Lastusaari *et al.*, 2012):

- In Casciarolo's original procedure it has become evident that the source of the baryte, together with the grinding and calcining processes are particularly important; Principe (2016; Larry Principe, *personal communications*) has described these discoveries. Copper may be present in naturally-occurring baryte (as in some, but not all, samples from the area around Bologna, e.g., Monte Paderno). Alternatively, copper may be incorporated into the powder when it is produced from copper-free baryte, if the mortar and pestle being used are made from a copper-containing material (e.g., bronze). For the Bologna Stone to exhibit persistent luminescence, the powdered baryte should contain 0.005–0.02 mol% copper. The powder must also contain < 0.005 mol% iron; one of the possible impurities that quenches the luminescence (an observation that was made by Homberg later in the 17th century following his use of an iron-containing mortar). In his description of studies aimed at reproducing the original Bologna Stone, Principe (2016) constructed a furnace based on the design of Homberg (from the 1680s): it must generate an atmosphere of carbon monoxide (the reducing agent that converts the baryte to barium sulphide: $\text{BaSO}_4 + 4\text{CO} \rightarrow \text{BaS} + 4\text{CO}_2$) and this was best achieved using oak-derived charcoal which produced a temperature of 800–900°C.
- Lastusaari *et al.* (2012) described their laboratory experiments where the reduction of powdered pure baryte (with or

without additives) or powdered natural baryte from Monte Paderno was carried out using hydrogen-nitrogen mixture in a furnace at 1200°C: $\text{BaSO}_4 + 4\text{H}_2 \rightarrow \text{BaS} + 4\text{H}_2\text{O}$. A small amount (about 0.5 mol%) of a metal salt (MCl_n or $\text{M}(\text{NO}_3)_n$) could be added to the powdered pure baryte and subsequent reduction produced a metal-doped barium

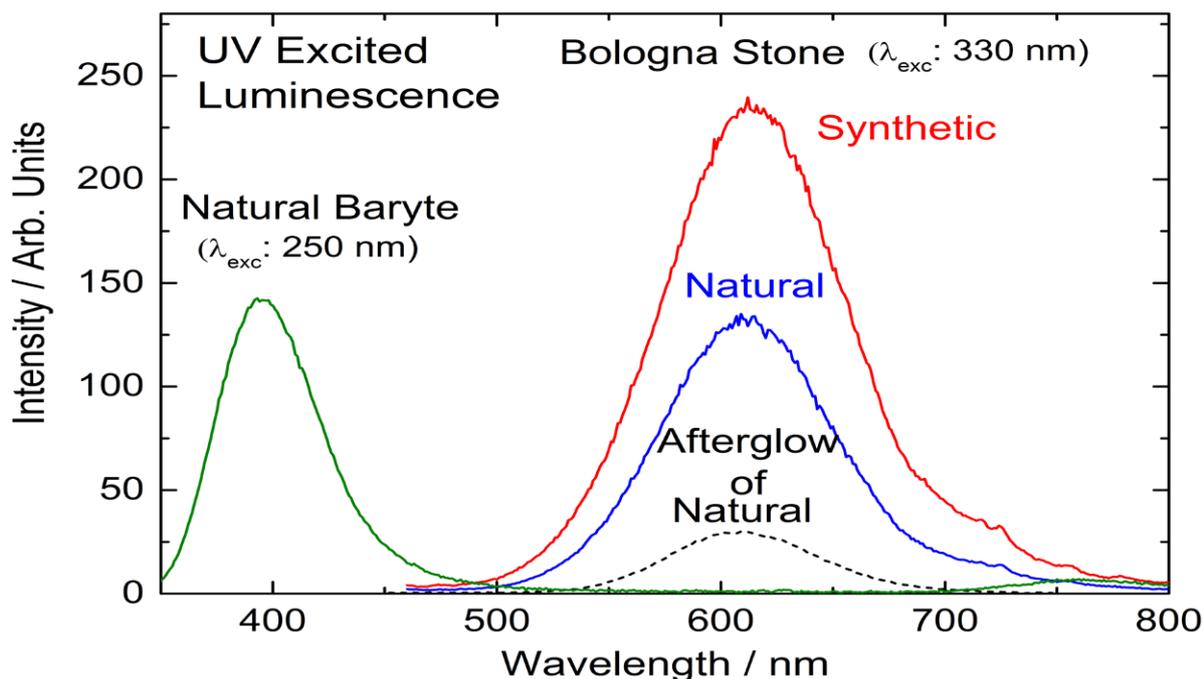


Figure 3. The room temperature, UV excited emission spectra of natural baryte from Monte Paderno ($\text{BaSO}_4:\text{Cu}^+$; green), natural Bologna Stone ($\text{BaS}:\text{Cu}^+$; blue) and synthetic Bologna Stone ($\text{BaS}:\text{Cu}^+$; red); the persistent emission spectrum (afterglow) for the natural Bologna Stone is also shown (dashed line). Modified from Lastusaari *et al.* (2012, Figure 4) by Mika Lastusaari and reproduced with permission.

sulphide ($\text{BaS}:\text{Mn}^+$). As noted above, Principe (2016) indicated that the amount of copper should be 0.005–0.02 mol%.

Figure 3 shows that, after exposure to UV light (λ_{exc} 250 nm), copper-containing baryte from Monte Paderno ($\text{BaSO}_4:\text{Cu}^+$) had a bluish-white luminescence (λ_{max} at 395 and 760 nm; green curve; short duration), whereas, both naturally-derived Bologna Stone (produced from the copper-containing baryte; blue curve) and synthetic Bologna Stone (copper-doped barium sulphide; red curve) had an almost identical persistent orange luminescence (λ_{max} 613 nm) after exposure to UV light (λ_{exc} 330 nm). In their description of the properties of various doped barium sulphides derived from both naturally-occurring and synthetic (doped) baryte, Lastusaari *et al.* (2012) indicated that, when incorporated into the doped barium sulphide and exposed to UV light (λ_{exc} 330 nm), many of the metallic impurities listed earlier did not give rise to the observed orange luminescence; in particular, iron was found to be an inhibitor of any luminescence. Compositional and structural studies indicated that the copper was present in the Cu^+ state and was thought to have replaced some of the Ba^{2+} in copper-containing baryte from Monte Paderno ($\text{BaSO}_4:\text{Cu}^+$) and the modified cubic halite structure of the natural or synthetic Bologna Stone ($\text{BaS}:\text{Cu}^+$).

These studies demonstrate that the short-duration luminescence seen with copper-containing baryte and the persistent orange luminescence (afterglow) seen with the Bologna Stone (Figure 3; dashed curve) is caused by the effects of Cu^+ on the electronic properties of the $\text{BaSO}_4:\text{Cu}^+$ and $\text{BaS}:\text{Cu}^+$ lattices (Lastusaari *et al.*, 2012; Mika Lastusaari, *personal communication*); with both effects being related to transitions between the Cu^+ ($3d^{10}$) and Cu^+ ($3d^9 4s^1$) energy levels. This is shown mechanistically in Figure 1: the photoexcited electrons ($h\nu$; purple arrow) undergo thermal migration (orange arrows) to and from electron energy traps (related to S^{2-} vacancies) and, after switching off the UV light, the persistent orange luminescence (afterglow) is produced by the photoemission process ($h\nu'$; blue arrow).

Acknowledgements

I am very grateful to Professor Mika Lastusaari (University of Turku, Turku, Finland) for his patience during our discussions of the mechanism of persistent luminescence and for providing a simplified version of Figure 4 in Lastusaari *et al.*

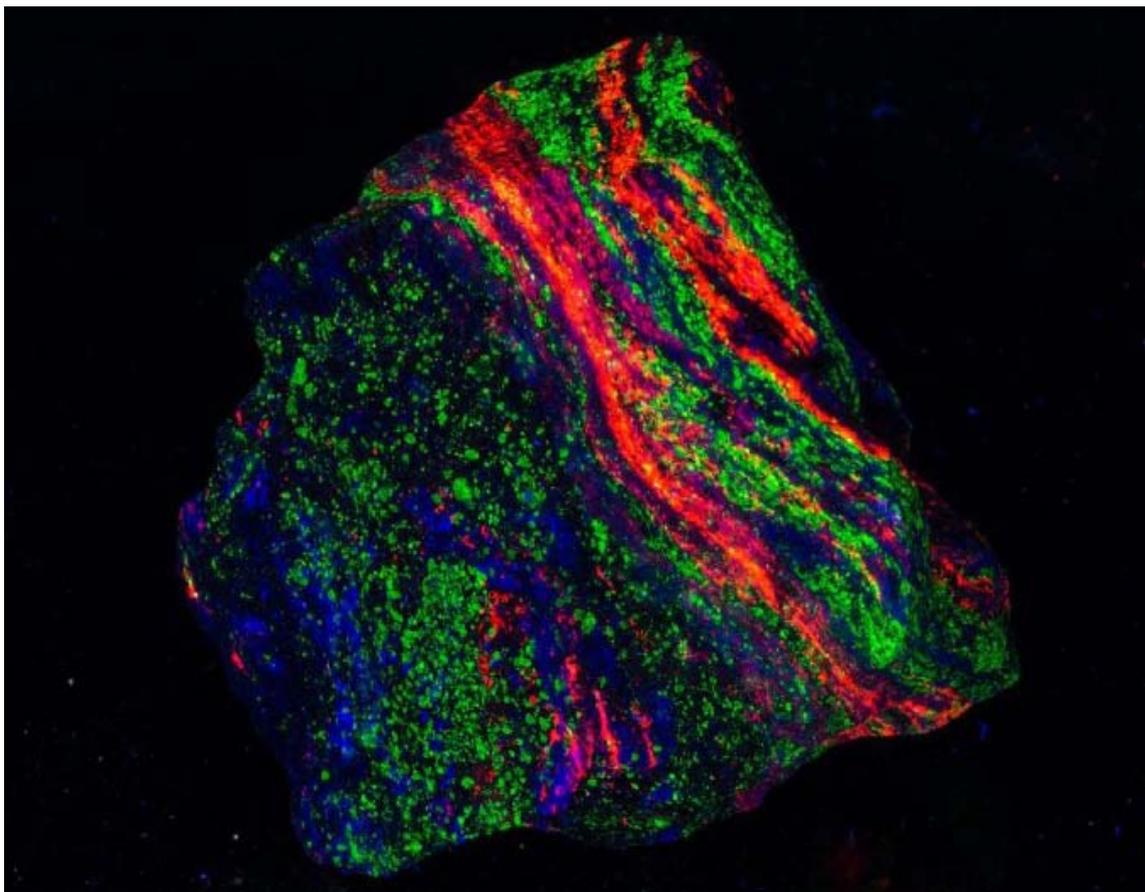
(2012). I would also like to thank Professor Larry Principe (Johns Hopkins University, Baltimore, USA) for his additional comments on the production of the Bologna Stone and permission to reproduce Figure 7 from Principe (2016).

References

- Ball, P. (2016). A lode of Bologna. *Chemistry World*, December 2016, 44.
- Doel, M.T., Malcolm, G. and Belson, R. (2010). *UV-induced fluorescence in minerals*. British Micromount Society Occasional Paper, No. 23.
- Li, Y., Gecevicius, M. and Qiu, J. (2016). Long persistent phosphors – from fundamentals to applications. *Chemical Society Reviews*, **45**, 2090–2136.
- Lastusaari, M., Laamanen, T., Malkamaäki, M., Eskola, K.O., Kotlov, A., Carlson, S., Welter, E., Brito, H.F., Bettinelli, M., Junger, H and Hölsa, J. (2012). Bologna Stone: history's first persistent luminescent material. *European Journal of Mineralogy*, **24**, 885–890.
- Nassau, K. (1983). *The Physics and Chemistry of Colour: The Fifteen Causes of Colour*. John Wiley and Sons, New York.
- Principe, L.M. (2016). Chymical exotica in the seventeenth century, or, how to make the Bologna Stone. *Ambix*, **63**, 118–144.

Frank Ince.

And - with marginal relevance to the above - because I know I'm not the only person who likes photographs of fluorescent minerals:



Specimen of willemite (Fl. green); fluorite (Fl. blue) and calcite (Fl. red) from the Garpenburg Mine in Hedemora Municipality in Sweden ("The world's most productive underground zinc mine"). Luminescing under a mixture of LW and SW UV. MTD specimen; Mark Cole photo. Used with permission.

Branch Meeting and Field Trip Reports

Saturday 8th July 2017. South-West Branch Visit to Wheal Edward Incline Shaft [SW 3605 3265] and Cliff Shaft dumps [SW 3595 33280].

Leader and Reporter: David Ifold.

Each year, the SW Branch schedules a visit to one of the mines in the Botallack area. Our favoured site is Wheal Edward and, like the other mines in this coastal strip, it is part of the Aire Point to Carrick Du SSSI. A map is available on the internet showing the extent of this SSSI which includes a considerable number of mines including well known mineralogical sites such as Wheal Castle, West Wheal Owles, Botallack, Wheal Cock and Roscommon Cliff.

Last year we were unsuccessful with our plan to visit Wheal Edward in part because Natural England considered the site over-collected. Our request this year included the offer to report on the state of the dumps and to list what could still be found. The National Trust who are the landowners and Natural England both agreed to our request.

The party of seven members of the Russell Society met ready for an 11:00 start in the car park next to the Count House. The National Trust has turned the Count House into offices and a visitor centre with cafe, audio visual entertainment and toilets. They are developing the area using the title "The Tin Coast" and the video running during our visit was on how the area had been used for filming the Poldark Series.

All of the group were seasoned collectors so after paying at the recently installed parking meter, we headed straight for the dumps with no interest in what Ross or Demelza had been doing between shoots. We had been given permission to survey the dumps of both the Incline and Cliff Shafts but not the adjoining dumps which in part are part vegetated with interesting lichens and bryophytes.



Even if you don't find minerals, the cliff views are pretty nice!

The dump next to the Incline Shaft shows the results of numerous prolonged visits from collectors. There are some large holes visible that would have taken many hours of heavy work. Some of the holes seen two years ago have increased in diameter but others have been filled completely with material from more recent excavations. Several members commented that samples left lying around indicated these unauthorised collectors had either very particular 'wants lists' or were unsure of what to look for. Wheal Edward attracts not only regular mineral collectors but also enthusiasts who like collecting anything to do with nuclear radiation. The dumps of Wheal Edward are certainly not the most radioactive place in Cornwall but as a result of this searching for pitchblende is relatively easy. Exploring the dump typically gives a reading of 5 cps with a Geiger counter and during our visit the 'hottest' specimen found produced a constant scream of noise showing a reading in excess of 2,300 cps. This specimen was collected from the bottom of a recently dug hole some 0.6 m deep.

Minerals identified visually on the Incline Shaft dump included anatase, arsenopyrite, bismuthinite, bismutite (?), brochantite, calcite, cassiterite (sparable xls), chalcocite, chlorite, connellite, dolomite, fluorite, galena (possibly argentiferous), goethite, hematite, langite, mixite (?), pitchblende, sphalerite and quartz. It should be added that many of these were not quality specimens but just token pieces. The specimen of pitchblende has areas of yellowish and greenish secondary minerals but these all have the same colour of fluorescence under UV (SW) light. Galena is to be expected at a mine producing uranium but at other sites (i.e. South Terras) it lacks silver.

The braver members of the party pushed their way through bracken and brambles to reach the Cliff Shaft dump. We paused for a short time at the spot where the pitchblende stockpile had once stood in the 1950's. When nuclear war was expected during the Cold War, a secret government survey



Large hole found in the Cliff Shaft dump.

had many of the mines with potential for producing uranium re-opened. Wheal Edward was just one of many that were visited. This area is now grassed over and although cleared of ore minerals, earthy pitchblende has broken down into the soil to produce an area six by four metres with a constant rate of around 220 cps on a Geiger counter – a good thing that this spot has no view so picnickers do not sit here! Some years, radioactive ant hills can be found but not on this occasion.

The Cliff Shaft dump was examined and radioactive vein stuff was noted. Most interesting was a specimen of calcite crystals sitting on white quartz. Specimens like this, even though genuine, always look so out of place on a mine dump dominated by granitic rocks. A large hole in this dump was noted which was not there when I did my risk assessment earlier in the year.

We all took a break in Sheila's van when the rain passed through. After this interlude, we resumed collecting but with less enthusiasm. Eventually we gave in to the attraction of teas in the cafe and shortly before leaving for home the area was bathed in sunshine. Before leaving, we agreed that subject to the necessary permissions we would be back next year. It is expected that in time a more detailed report will be produced for Natural England and the National Trust. Should anyone require a copy then please let me know.

Our thanks go to Alice Lord of Natural England for consent to collect representative samples from the SSSI. We also thank Ash Pearson (National Trust Countryside Manager for West Cornwall) and Daniel Fields (Estates Manager, Heart of Cornwall Lizard and Penrose, West Cornwall) acting on behalf of the landowner.

**Friday 14th and Saturday 15th July 2017 South West Branch Visit to Lemon's West Shaft, Wheal Unity known by Natural England as Wheal Gorland SSSI. [SW 7323 4289].
Leader and Reporter: David Ifold.**

Members may be surprised to hear that this event has taken place. Late last year, we discussed the possibility of digging on Wheal Unity and the trip was immediately full! I approached Natural England to see if it would be possible to survey this heavily overgrown SSSI. Tom Cotterell surveyed the mine dump August 2014 with limited success and we thought that washing everything thoroughly might reveal secrets of the site. Natural England report the condition of the site as 'Unfavourable – Declining'. On contacting Natural England, I was very pleased with the positive response. We agreed to a thorough reporting and recording process and we were given a two day permission to visit the site with a mechanical digger to excavate two trenches. Another condition we agreed to was that significant specimens would be given to the National Museum of Wales. If any branch is interested in doing something similar in their area, I can supply a copy of our agreement with Natural England.



The site prior to clearing ready for excavation.

Prior to the official visit, I went to the site with a petrol driven brush cutter to clear a working space. This area was covered with long grass, bramble and bracken. Tom Cotterell had previously had a mini digger clear this part of the site some three years earlier when it was covered in gorse. The plan was to dig two trenches and lift the bottom material to the top so that members could collect from it the following day. On day one, three of us watched while the driver Mark did his work. Due to previous activity, including capping of the shaft, the mine waste is mixed with topsoil. The trenches were over 3 metres in depth and both trenches collapsed before completion. Fortunately, all three members were observing from a safe distance. On this first day three specimens of olivenite were collected. The site was left levelled ready for the next day when members would wash and search the exposed material. It is amazing how much the mine dump grew as a result of the excavation. On the first day, shortly before we left, Beth Tonkin (Natural England) dropped in on her way home to see how we were progressing. It was nice to put a face to someone with whom one only ever exchanges emails.



A three metre deep trench that has just collapsed.

The second day was a big disappointment. Eleven members arrived for what was hoped to be an exciting day. Considerable amounts of quartz/ fluorite/ arsenopyrite vein stuff was examined. Some blocks of vein material were over 30 kg in weight. Minerals provisionally recorded were arsenopyrite, chalcopyrite, chrysocolla, fluorite (green, white or purple but predominately green), olivenite, pharmacosiderite, scorodite, tourmaline (black or green) and quartz. Nothing blue was collected.



Day 2. David Aubrey Jones washing material on site.



Olivenite specimen. FOV 4 mm.

By the time this newsletter is published Natural England will have their first report which records the actual process of excavation and collecting. A further report will follow after everything has been examined and photographed. I believe there is insufficient material at the moment to justify an article for the Journal. Subject to the satisfactory production of all required reports this year it has been indicated we should get permission for a further dig in the future. The site is now resting with full legal protection. The window of opportunity to collect closed at midnight on 15th July.

I would like to thank Beth Tonkin and Dr. Hannah Townley of Natural England for their agreement and support in this project. Special thanks also to the St. Day Rugby Club and Mike Downing, President and Trustee of the St. Day Rugby Club who are site owners. Thanks also to the owners of the mineral rights to the mine waste at this site.

**Saturday 15th July 2017; North Branch Visit to Willyhole Mine dumps SSSI, Teesdale. [NY 803 335].
Leader & Reporter: Ian Dossett.**

According to the references in "The Geology of The Northern Pennine Orefield" by K. C. Dunham, Reddycomb Vein lies south of Reddycomb Syke whilst Willyhole Vein follows the course of Willyhole Syke. Reddycomb Mine exposed a 1500 ft section of the vein beneath the Tynebottom Limestone and also had a 900 ft crosscut from this vein to Willyhole Vein. Upper workings were also in the shale beneath the Jew Limestone and the Lower Little Limestone. The mines were worked initially for lead from 1852 to 1889, but from 1896 the name was changed to Willyhole Mine and they were worked for zinc.

Five of us were down for this visit, but 2 members unfortunately had to drop out. However John, Steve and myself arrived on a cloudy day for the steep walk up Reddycomb Syke onto Herdship Fell and Willyhole Mine. On the way up we briefly looked over 2 sizeable tips noting some minor galena, smithsonite and baryte. The SSSI citation GPS position for Willyhole Mine marks a collapsed adit and this with two other nearby collapsed adits appear to have provided the material for a large varied tip just below the top of the hill.

The tip was well weathered on the surface but there was evidence of past disturbance at the northern end. We dug three exploratory holes adjacent to the previous disturbances to expose unweathered material. The predominant material consisted of dark grey much decomposed shale in which were embedded lumps of limonitic limestone with cavities. The cavities occasionally contained brown to cream smithsonite in nondescript "dry bone" form. Occasionally small botryoidal crusts of lustrous smithsonite were evident ranging from brown to a faintly yellowy tinged variety, probably containing cadmium. Some galena was evident along with lumps of massive baryte. One lump of cerussite with a galena core was found. On detailed examination this revealed that it consisted of lustrous micro crystals. No sphalerite was seen. A small selection of material for study was collected and, at the end of the visit, the exploration and sample holes were backfilled and the surface restored.

Our thanks go to Lynda Currie of the Raby Estate and Sally Hopkins of Natural England for their support and consent to explore Willyhole Mine dumps.

Saturday 22nd July 2017. Central Branch Visit to Tearsall Quarry, Derbyshire. [SK 262 602].

Leader: Chris Finch (standing in for Stephen Seymour-Smith who was unable to attend due to illness)

Reporter: M. Czerewko.

At the agreed time of 10:30, nine society members (including Chris Finch; Steve Critchley; Pauline Critchley; Nick Millet; Mike Howe; John Davidson; Stuart Wagstaff; Alan Thorogood and Mourice Czerewko) assembled in the parking area north east of Tearsall Farm after being kindly guided in from the unsigned Bonsall Road entrance by our capable steward, Chris Finch. The site, located approximately 3.5 km to the west of Matlock, is hidden away from the main road and lies on the edge of Bonsall Moor overlooking Wensley Dale and the Derwent Valley.

The day had turned out to be clear and sunny following the previous week's mixed bag of British summer rain. Once everybody was kitted up, a short introduction to the site was presented by Mr John McGough, now retired and formerly of British Fluorspar Ltd. (BFL), who had kindly agreed to act as our chaperone for this visit. A brief account of the operation revealed that the fluorspar reserves had not been quite as plentiful as originally anticipated and that the operation at this site would likely come to completion by end of the year with restoration of the site due to commence in 2018. The planning permission had been granted to BFL for this site to postpone their intended extraction on Longstone Edge. As part of the planning permission for the Tearsall Quarry site, only removal of fluorspar had been permitted and not the limestone. Therefore, the limestone and overlying basalt is kept on site to be used for the final restoration. After the short introduction the party made hard work of the short walk into the site as the conditions underfoot were soft and slow going due to the wet volcanic clay of high plasticity.

The geological setting of the site comprises Dinantian strata of Carboniferous age which formed under a shallow marine origin with the site working the Monsal Dale Limestone Formation. The limestone is capped by tuff and basalt of the Upper Matlock Lava Member, which can be seen as an extensive capping across the northern and eastern parts of the site (Fig. 1). The limestone is confined towards its base by the Lower Matlock Lava Member, which is not seen in the opencast workings but is passed over in the approach road into the site from the south. The strata exposed in the quarry comprise thickly bedded light brown limestone locally affected by epigenetic dolomitisation with a bedding dip of between 28° and 40° NNE. The limestone contains a number of clay wayboards as was noted when entering the excavation and is host to hydrothermal mineralisation, associated with areas of dolomitisation, comprising of enriched veins occupying fissures within the limestone fault system. The enrichment and location of mineralisation is furthermore controlled by the clay wayboards which also produce the boggy ground conditions that proved challenging in the hot weather particularly when trying to access the upper workings in the northwest face. The quarry operation had broken through ancient lead workings along the Tearsall Pipe Vein and its associated stringers (Fig. 1). Old workings on the Tearsall Vein and the from the Tearsall Mine which extracted ore from depth are documented as far back as the 14th century. However, it is likely that the exposed shallow workings observed during the visit date back to the 18th century and, although extensive in the Rough Tearsall area, now occupied by the quarry, appear to be sparsely documented.



Fig. 1. Basalt lava and ash over dipping dolomitic limestone and old mineworkings. Steve Critchley for scale.

Photo: M. Czerewko.



Fig. 2. Infill of bladed baryte, occasional fluorite and galena with cerussite crystals and iron oxide staining.

Photo: M. Czerewko.

The mineralisation occurs in pipes which lie roughly along strike, and locally in flats situated along bedding. The infill consists partly of fluorite with baryte, galena and traces of quartz, but calcite is locally dominant occurring in large masses of poorly to locally well-formed scalenohedral crystals with flat rhombohedral points, as was recovered from a number of pipe voids along the eastern part of the site. Evidence of rabbit habitation was also present which under the warm conditions proved to be less than fragrant. The galena mineralisation occurs in stringers as disseminations and as

isolated masses comprising a combination of imperfect octahedral and rhombohedra occasionally with a dense surface covering of cerussite and in combination with sintered powder baryte and fine drusy cubic fluorite (Fig. 2). On this visit the galena specimens were not as abundant as during the visit of the previous year as the locality formerly sampled in the southern area of the site had been worked out and backfilled, although a few specimens were recovered.

By early afternoon labouring under the hot sun began to take its toll. Members, laden with heavy bags of samples and realising that the return to the vehicles was up-gradient through the claggy clay road surface, began to disperse. By 15:00 the last four of us had decided to call it a day, although Nick was rather reluctant to go, having found a large pocket of sintered baryte and fluorite mineralisation in an area exposing old mine workings. Soon however sufficient samples had been recovered and we returned to the vehicles to change and load our samples. With thanks to Mr John McGough for kindly giving up his time in attendance, the last of us departed, satisfied with our various finds from another, and possibly the last, successful collecting trip at this site.

**Sunday 30th July 2017. North Branch Visit to Shap Pink Quarry, Eastern Fells, Cumbria [NY 560 081]
Leader: Ian Dossett. Reporter: C R Minker**

Exposed granite faces stand guard at the quarry and stare out across Cumbria, ever watchful for those who would make their way to its borders intent on mineralogical activity. However, on this occasion the border was closed, even to this elite few, by a locked gate causing a bottle neck of vehicles that had gradually been gathering for the appointed time of 10:00. Fortunately, the trip leader - noted for having legs up to his armpits - effortlessly glided up the rough stone track that led to the staff cabins and returned with the security guard holding the most important piece of equipment that was to be used that day - the key to the gate. Under ever-darkening skies, a strung-out convoy of unmarked vehicles made their way up to the quarry with the exception of a single car that remained by the gate - the reason for this was not entirely clear.

A sheet of illegible signatures revealed those inmates on day release for quarrying duties who were; Ian Dossett, Lyn and Clive Minker, Steve Warren, John Davidson, Chris Finch, John Chapman, Richard Joel, Mike Leppington, Tom Jubb and Alan Thorogood. After the usual safety briefing we set off to an area adjacent to the offices and screening plant. Many of the small boulders here showed signs of decay but Steve did find some minor molybdenite. Rock was collected for its small cavities containing; anatase, brookite, magnetite, quartz, feldspar, mica and for further microscope study.

Mineralisation was scarce on the next level and it was interesting to note the different coping strategies used by collectors under the threat of an imminent drenching. While a breakaway group huddled against boulders wishing to move onto the next level, others took up position in an area overlooking the A6 approach road and near to one of the great granite faces. It was here that frantic demolishing of a small outcrop produced rock with white crystallised material containing blue fluorite cubes to about 1 mm.

The next level was the most productive and rewarding - for some anyway. It is often discussed why certain individuals have a reputation for finding good specimens. Is it a reward for years of experience and hours of dedicated geological study that provides an inner knowing of exactly where to look? No, of course not - it was far more likely that the briefest of breaks in the clouds allowed a ray of sunlight to shine down. This, together with the distant drone of Mongolian throat singing, drew the attention of Chris and Richard to a couple of jewel encrusted boulders whereas only moments before those same unlit rocks had been completely and totally overlooked by Steve. "Sharp orange brown lustrous scheelites to 3-4 mm in a quartz vein. Very nice." said Ian.

The group dispersed in the afternoon with some heading off early to the North Pennines Mineral Expo at St. John's Chapel. The dates for 2018 event are 14th & 15th July. This quarry has produced a variety of interesting specimens in the past and we look forward to further visits. Our thanks go to the Armstrongs for allowing us to visit the site. Visit www.virtualmicroscope.org/content/granite-shap and www.mindat.org for further study.

**Friday 11th August 2017. North Branch Visit to Milldam Mine [SK 175 781], Great Hucklow, Derbyshire.
Leader and Reporter: John Davidson.**

Five intrepid members met in the car park at Milldam Mine, and we were met by Mr. Rhys Hill a recent graduate of the Camborne School of Mines who would act as our guide for the day. Rhys gave us a safety briefing after which we were all equipped with the necessary safety equipment for our underground trip. Rhys led us into Sub-level three where all the current development is being carried out along the vein system. They are trying to connect each end of Sub-level 3 before they can start to drive Sub-level 4 as this will improve air flow through the mine and make transport of the ore out of the mine easier.

Rhys showed us where the miners were removing the vein and hit mud and shale and this area he explained was unstable and therefore back filled with large blocks of limestone to prevent further movement of shale from above causing problems in the future.

As Milldam is a working mine we were not allowed into the area where there was any drilling and excavation of ore. While we were collecting there was a production blast further down Sub-level 3. It was a hell of an experience as the noise was deafening and the shock wave made the tunnel shake a bit, but we were perfectly safe.

However, we were allowed to collect in an area that was safe and cordoned off with an excavator. Samples of fluorite and calcite were located in a few cavities. The fluorite ranged from blue through to colourless and the calcites from hand sized to dinner plate size samples.



**Nick Frost collecting underground in the Milldam Mine.
Photo: John Davidson.**

All good things come to an end just before the miners changed shifts we walked back out of the mine back to the surface.

We would like to thank Ian Dossett for organising the trip and Rob Ridley of British Fluorspar for giving us permission for the visit.

**Saturday 12th August 2017. Southern Branch Field Trip to Cavendish Mill [SK 205 752].
Leader: Chris Finch, Reporter: Michael Dunmore.**

Nine members, who are not strangers to Cavendish Mill, walked from the car park to an unusually quiet 'tips' area with splendid views across the Derbyshire countryside.

On previous visits we've had the company and assistance of a JCB driver who has moved the dumps around to give access to fresh material – but today we were on our own, accompanied by the occasional light shower. The dumps are separated in two main areas and the group progressively covered both areas during the visit; with a particular appetite for fluorite.

The sound of hammers on chisels started within a few minutes of arrival as the tips were tested for collectable specimens. This included breaking down large boulders formed predominantly from a mix of calcite, limestone, fluorite and baryte. Chris Finch kept a photographic record of one large lump as it progressively gave way to his efforts; leading to multiple specimens for wrapping and taking home. To balance things out, Chris also left behind the 'left overs' from his previous collecting trip at the Mill.

The visited area was very productive, with full bags and rucksacks taken to the car park after several hours of searching. Minerals collected include baryte, calcite, cerussite, fluorite, galena, hemimorphite and smithsonite. Fluorite specimens typically exhibited small cubes up to 5 mm with many varieties of colouration, including transparent, transparent with purple 'dots', light and dark blue, as well as purple - including very deeply coloured purple crystals which appear black when in groups and without any back or side lighting.

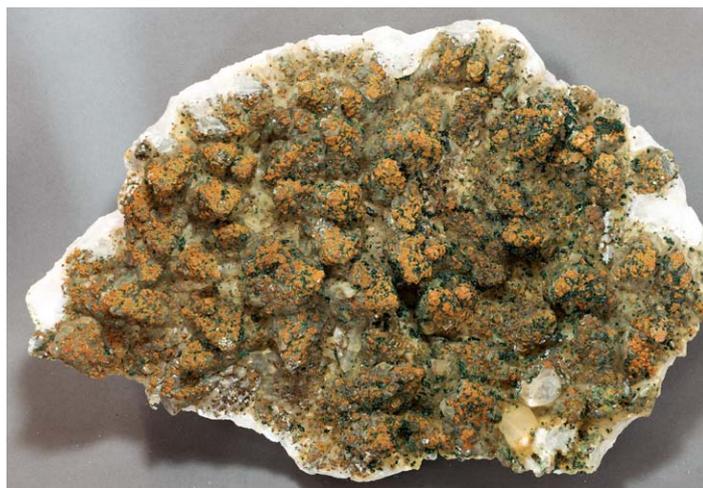
Our sincere thanks go to Chris Large, Production Manager and to the operator, British Fluorspar for allowing us to visit the site.

**Saturday 19th August 2017. Central Branch visit to Breedon Hill Quarry, Breedon on the Hill, Leics. [SK 406 236].
Leader and reporter: Frank Ince.**

Our party of nine was met by Stuart Shrimpton in the quarry carpark and, after the customary H&S briefing and a word or two about the geology, we strolled down the incline to the bottom bench (Level C).

One group made their way up to Level B and re-investigated the mineralised faults and karst features in the northwest corner [SK 4055 2357]. Some determined work on the Ba-Pb-Mo-Ca-Mg-mineralisation produced a few more specimens:

cubes of oxidised galena coated by small colourless cerussite crystals and a few very small, pale yellow to orange wulfenite crystals on a baryte-dolomite matrix. After a while this group returned to Level C.



A large plate (250 x 170 x 50 mm) of brown (iron stained), singly-terminated calcite crystals with small brown crystals of goethite ps. chalcopryite partly coated with tufts of green malachite. Photo: Peter Briscoe.

On Level C, a second group revisited what might be called the '2016 Briscoe-Millett Area' on the east face, where several calcite-rich fractures were investigated [SK 4066 2365]. Peter Briscoe and Richard Bateman were busy enlarging a cavity that had been found in 2016 and extracted some quite large specimens (see photo): tufts of dark green malachite on brown iron-stained, singly-terminated scalenohedral calcite sprinkled with crystals of goethite ps. chalcopryite. Close by, Nick Millett, Steve King and Chris Finch were investigating some veins with calcite-lined cavities containing small, but much less oxidised, yellow chalcopryite crystals and a little malachite.

After a while, a few of us decided to try our luck above the previous area on Level B [SK 4067 2364]. Calcite-containing veins were evident; however, they were not particularly rewarding. Nick spent some time cleaning out a promising-looking, mud-filled cavity; but, after ultrasonic cleaning, the relatively small calcites were all rather weathered. On the way to the previous locality, there were some patches of a

white to orange efflorescence coating dolomite-lined cavities in some sheltered corners of the sunny north face on Level B [SK 4064 2375]. The efflorescence is probably gypsum-rich (very little fizzing with dilute nitric acid) but may contain other sulphates; more analyses will be carried out.

After a few busy hours, we were very grateful to Stuart for transporting us (and our bulging rucksacks) back to the carpark and he was warmly thanked by everyone present. We would also like to thank the managers of Breedon Group for yet another opportunity to visit the quarry.

Saturday 19th August 2017. South West Branch Visit to Halamanning Mine and Croft Gothall, St. Hilary, Cornwall. [SW 569309]

Leader Sheila Harper. Reporter: David Roe.

These two mines have somewhat fallen out of favour with collectors in the last decade so it was a bit of a gamble hoping to find anything of mineralogical interest. The prospect of driving in Cornwall on a Saturday in August and a previous week of very unpredictable weather ranging from clear blue skies to ferocious downpours were also a disincentive. So perhaps it was not surprising that only two members accompanied Sheila on this field trip. The traffic turned out to be rather more unpredictable than the weather – it seemed to be lighter than a Saturday in April – so maybe everyone had seen a doom-laden weather forecast and gone home early – in which case they missed a day of glorious sunshine.

The tip at Halamanning Mine has in the past yielded a few nice specimens of copper and chalcotrichite and its relatively large area holds promise. One of us visited a year before and had an initial enthusiasm at the sight of a recent drainage channel dug into the side of the tip revealing a good scatter of colour. This turned out to be only surface coatings of post mining decomposition. Diligent searching and digging of the tip on this visit yielded nothing of interest other than a little cuprite with native copper and brochantite and a specimen of arsenopyrite.

We then drove up the lane to Croft Gothall (not to be recommended for car owners who are overly protective of their vehicles) and parked in a space just large enough for two cars. Croft Gothall is a lovely open site with classic inland Cornwall views on all sides. Unfortunately, part of the site is now much overgrown with heather and gorse which makes finding a suitable collecting spot somewhat challenging – a sturdy pair of pruning shears would have been useful. There is a variety of rock



Rosette of monazite crystals with chlorite from Croft Gothall. Photo: David Roe.

varying from semi-crystalline quartz on the eastern side of the shaft to a killas and slate assemblage elsewhere on the site. Some nice monazite had been found earlier in the year “just lying on the surface” so our appetites were wetted.

Much quartz was extracted from the undergrowth and battered into small fragments in search of chlorite vughs, hopefully encrusted with monazite. Sheila was lucky finding a number of monazite rosettes, plates and fibres amongst gemmy chlorite one of which David photographed and is appended here. On his return home, he found a very small deep blue anatase on quartz and chlorite. Scant reward for 6 hours hard work breaking rocks – but more than recompensed by a glorious day in the mining heart of Cornwall.

Our thanks to the Land Owner for allowing us access to this private land.

Saturday 26th August 2017. Southern Branch Field Trip to Hampstead Farm (Chipping Sodbury) Quarry [ST 724 840].

Leader: Chris Finch. Reporter: Lisa Scott.

As a new member of the Russell Society the task of writing this field report fell to me, who having tagged along on field trips in previous years, thought it was about time I joined officially so please forgive my amateurish approach and lack of knowledge.

Although I am new to mineral collecting, since the age of four I have grown up in a home full of rocks and hammers, spending many hours of my childhood in quarries with my father, Tony House. Before now, I have never progressed beyond picking up interesting/pretty specimens, but writing this report has made me learn mineral names and characteristics, taking more of an interest in what is looking pretty on my collection shelf. Plus, even starting to recall some of my A-level Chemistry from a very long time ago. It's finally coming to use!

Ten Society Members met at Hampstead Farm Quarry at 07:30. The Manager kindly provided transport deep into the quarry to what looked like the most promising areas, starting at the lowest level. Two years previously a cave had been exposed through blasting that contained lovely baryte veins in waves with calcite crystals growing around forming lovely rainbow arches. Perhaps not the rarest of minerals but a very prolific spot to find pretty pieces. Last year the cave had disappeared and only a few traces of the minerals within it were scattered around this year. However, not deterred especially those with sledge hammers got to work breaking up the larger rocks that looked promising with the hope of finding pockets of rarities within.

I'm not keen on trying this as I just end up smashing anything worth keeping, so scouted around the area hopeful of finding something that others had missed, but with little success, so hoovered-up any leftovers that others had extracted, including some nice calcite crystals under a large boulder. Thank you for letting me do that guys! Meanwhile Roger was successful in finding what he first thought were cerussite crystals, but on closer inspection turned out to be either sphalerite or baryte in strips. In addition, galena was found, as well as pyrite.

Despite the lack of new material, we still managed to extract a very large amount of rock to take home! Mainly encouraged by the fact that this year we could chuck it in the back of the Quarry Manager's vehicle rather than have to lug it up the hill ourselves. In small groups, we were then transported to a new quarry area (Brinsham Quarry), which only a few months before had been fields. At the far side of this area, a large pocket of pyrite had been blasted out. It had formed in wide solid veins around 10 cm thick and was extremely impressive with its silver/gold mirror shine and density, the biggest of which is destined for the museum in Frome. There is hope this area will prove extremely interesting in the future.

Thank you to Chris, to Hanson the quarry operator and the acting quarry manager – Richard Blannin for allowing access and making us so welcome.

P.S. As I write this, the pieces of shining pyrite are brightening up my window sill on this grey rainy day.

Saturday 2nd September 2017. Central Branch Visit to Llyncllys Quarry, nr Oswestry, Shropshire. [SJ 267 242]

Leader and Reporter: Roy Starkey.

Thirteen members (including the leader) attended on a day which proved to be pleasantly bright, and quite warm, out of the breeze in the quarry. Following a safety briefing by our hosts, we were escorted down to an area where freshly blasted ground was available for inspection, until plant movement ceased at 12.00 noon, and we could then explore at will.

The blast pile of fractured brown dolomitised limestone did produce a few specimens of aragonite, and lots of poor sparkling calcite in dark dolomitised limestone, but nothing really exceptional.

At noon we walked up to the area where they are stripping off the overburden. We saw lots of marl and shale, but nothing of any real note. Mike Howe and Frank Ince found some interesting green reduction spots with dark centres, and the blackberries on the old disused bench below where the “copper cave” used to be were excellent, and enjoyed by a number of participants.

A small green patch in the wall on the bottom level yielded some average to typical altered chalcopyrite with malachite (messrs Warren and Finch). People started to drift away from 13:00 and we brought the visit to a close at 14:00.



A general view across the Llyncllys Quarry site.
Photo: Roy Starkey.

Our thanks go to the Quarry Manager, Thomas Emerson, and operators Tarmac, for granting us permission to visit and collect at Llyncllys.

Sunday 10th September 2017. Central Branch visit to Bardon Hill Quarry Extension, Copt Oak, Leics. [SK 470 127].

Leader and reporter: Frank Ince.

Over the last 45 years the Society has had numerous visits to the ‘old’ quarry on the west side of Bardon Hill; however, on this occasion we were in unfamiliar territory as we made our way along the tree-lined Bardon Drive to the car park for the quarry extension on the southeast side of Bardon Hill. Here we were met by our hosts (Eddie Bailey and Jemma Moore) and, after a H&S briefing, we made our way to the perimeter of the quarry (see photo) where Eddie gave us a summary of the geology of the newly exposed rocks. The grey rocks of the Precambrian sequence (the volcanoclastic Beacon Hill Tuffs and the andesitic Bardon Breccia) were obvious at the bottom of the excavation. A prominent unconformity separated these ancient rocks from the younger Triassic Mercia Mudstones (mainly red-brown with some greenish-grey bands) and the much younger Quaternary glacial tills. These tills have proved to be interesting as, in addition to the anticipated Oadby and Thrussington tills, other tills have been recognised during investigations by members of the BGS, who will describe these new tills in the future.



Panorama of Bardon Hill Quarry Extension looking south-southwest, with Rise Rocks on the horizon. Photo: Roy Starkey.

As noted in the photograph, there are currently four benches and we made our way down the incline on the west face to the south side of Bench 2 [SK 4711 1263]. Here we were close to the Precambrian-Triassic unconformity and most of us found some copper mineralisation in the volcanoclastic rocks and the Triassic basal breccia: small amounts native copper, cuprite, malachite, chrysocolla, and, possibly of more interest, tight joints containing cleaved sprays of bluish-green tyrolite (a basic, calcium- and copper-containing arsenate-carbonate that is rare in Leicestershire). In the northeast corner of Bench 2 [SK 4769 1278], joints in an exposure of the andesitic Bardon Breccia contained a few

patches of a white clay-like mineral, possibly palygorskite (although, as Neil pointed out, it could be nacrite). Also in this area [SK 4700 1277], some blocks of the Triassic basal breccia contained prominent veins of cellular, cream dolomite, with the cavities being lined with small rhombs. From our vantage point on Bench 2, benches 3 and 4 looked rather barren and we decided that Bench 1 in the southwest corner of the quarry might offer better 'pickings'.

Bench 1 produced a similar array of minerals. Quite large patches of a white clay-like mineral (again, possibly palygorskite) were found amongst the newly-blasted boulders [SK 4713 1255]; Neil also found small amounts of epidote and possibly zoisite/clinozoisite. On the edge of a water-filled depression [SK 4714 1243], the Critchleys, the Minkers, Chris Finch and Nick Millett uncovered some more copper mineralisation: native copper, cuprite, malachite and chrysocolla (but no tyrolite), and possibly baryte. Also on Bench 1, Eddie was keen to point out what he thought was the Bardon Fault: reasonably evident as a discontinuity in the west face.

Having made it back to the car park, we all expressed our thanks to Eddie and Jemma for giving up their Sunday morning and we look forward to seeing how the new quarry develops in the future.

Saturday 23rd September 2017. North Branch Visit to Cae Coch Mine [SH 775 658], Trefriw, Conway, Wales.

Leader: Ian Dossett. Reporter: John Davidson.

The last field trip of the year by the North Branch was to Cae Coch Mine near Conway which is a SSSI on Forestry Commission land. Three members turned up for what would be an interesting visit.

Despite having a detailed map finding the right entrance adit took well over an hour due to it being in a dense woodland on a side of a hill and footpaths having been moved and very overgrown.

The Cae Coch ore body is a two-meter-thick bed of massive stratiform pyrite and the workings are accessed by a series of adits running down the very steep hillside in thick woodland. Most of these adits are either run in, or do not provide access to the main workings. Adit Number 2 provides access to the main workings and is huge. It is comprised of two entrances, the first one has a waterfall flowing over it and it's this water that finds its way into the mine. The number two adit accesses extensive pillar and stall workings and it's spectacular seeing relatively slender pillars supporting the ceiling of the vein. In places these pillars contain 6 feet thick beds of massive silvery pyrite.

The water in the mine is brownish orange and has the pH of battery acid so paddling through it was a non-starter. A few hundred yards in you pass a blockage holding the water back and reach an extensive area where the vein descends into the far distance down at about an angle of 30 degrees with timbering holding up the hanging ceiling of the vein. As you walk through the mine you notice the smell of acid in the air that originates from the bacterial oxidation of the iron pyrite.



Ian Dossett examining a large pyrite vein in Cae Coch Mine. Photo: John Davidson.

When you look just under the surface of the mine rubble you find melanterite and it seems to be everywhere and sometimes in large lumps that can make attractive specimens albeit difficult to keep in good condition due to the crystal structure losing water of crystallisation during storage. Also very apparent on the floor of the mine are piles of a soft orange brown material. On closer inspection there are two components of these intermixed. Firstly, fibroferrite occurring as typical almost micro curled aggregates and secondly bleb like material which is when separate from the fibroferrite contains copiatite.

Gypsum crystals can be seen coating the walls of the vein in places and near the adit entrance large quantities of gypsum can be observed. The gypsum is forming all the time and crusts to 20 cm fall off the wall, it would seem regularly, so making collecting samples easy. Samples of fibroferrite, copiatite, gypsum and melanterite were collected for study. Bats were observed nearer the adit entrance flying about near their winter roosts. We paid particular care to minimize any disturbance by us.

We would like to thank Ian Dossett for organising the trip. We particularly would like to thank Ray Roberts of Natural Resources Wales for giving permission and helping us obtain permission for the visit from Carol Owen of Natural Resources Wales.

Sunday 24th September 2017, South West Branch visit to Restormel Royal Mine, Lostwithiel, Cornwall, [SX 103 615].

Leader and Reporter: Tony Lee.

A group of four met at the car park for this regular trip to part of surface remains. The location for our visit is an ore pile left nearly 100 years ago and which is relatively rich in goethite and quartz vein waste.

The usual hand sized lumps containing specimens of goethite as prismatic crystals and radiating wood iron were found but on this occasion, I found a good example of shiny black cryptomelane. The find of the day was undoubtedly made by Nick Eastwood with a cabinet size lump of quartz and goethite with a cavity including several brassy 1 cm bismutite crystals. This is a relatively rare mineral at this location, I have only seen four or five specimens recovered in several years and this was by far the largest and richest.



Fine specimen of bismutite from Restormel. Photo: Nick Eastwood.

Our thanks go to Sharon Bowden from the Duchy of Cornwall Estate office, Stephen Hutchings of Restormel Farm, Helen Allen and Sally Titchner of English Heritage for their help and allowing our visit.

Saturday 30th September 2017. Southwest Branch visit to South Wheal Basset, Carnkie, Cornwall. [SW 694 396]

Leader: David Molding. Reporter: Rob Bowell.

A cold and wet morning greeted 9 members of the South West Branch with three guests from Central and Southern branch at the abandoned copper mine of South Wheal Basset on the southern side of Carn Brea. Access to the dump obtained *via* the lane that runs along the top of Basset Mine. Near to the riding school gate there is a small side gate in the hedge giving access to a field. The dump is reached by going through this gate and climbing the slope before branching off left. The dump is visible and a footpath leads to it. The site is used for clay pigeon shooting, mostly on a Sunday, and the entire area is littered by the shattered remains of the clays.

Despite the abundance of splintered clay pigeons some good material can still be found on the old mine dumps. Unlike other locations the dumps are still largely present. However, a shovel is essential in obtaining mineralized samples in the dumps with most samples coated generously in Basset mud! In addition, a Geiger counter is very useful in identifying potential suitable mineralized material.

The rain held off for a few hours from late morning allowing very pleasant collecting to be had. People fanned out over the site and a number of nice pieces were found. Tony Tucker obtained a small cassiterite and the occasional singing of the scintillometer identified mineralized samples. Fluorite was particularly abundant as pleasant purple veins and small crystals. I found one reasonable if a little corroded set of crystals with the largest crystal 3 cm on the edge. Well worth the digging in the mud. Other post-trip confirmed minerals include; uranospathite (possibly arsenouranospathite), bassetite, austinite, metatorbernite, uraninite, chalcocite, cuprite, azurite, brochantite, malachite, torbernite, siderite, chalcopyrite, cassiterite, chlorite, fluorite, pyrite, tennantite, apatite and clear quartz crystals.



Torbernite (1.4 cm blades) on gossan quartz matrix. Photo: Rob Bowell.

A good site with plenty of interest, especially for micromounters. Thanks to David Molding for leading the trip and David Ifold for organization and also for showing me where to look on the dumps.