An epididymite trilling 4 mm in diameter from Mont Saint-Hilaire. The “Y” crystal is elpidite, and the green/brown patches are probably fillings in cavities caused by penetrating aegirine crystals that have disintegrated. Note the green staining - despite repeated washing. All is revealed inside with Quintin Wight’s article - which might have been titled “Green Wash”.

Photo Quintin Wight

The Contented Editorial

A huge thanks to all the contributors to this winter 2016 newsletter – and to those whose contributions I could not squeeze in this issue - you will be in BMS NL 98! So let’s get cracking on what we have got this time – it’s a tasty brew.
We have to start by saying good bye to a lovely lady with the obituary of Pam Pearce. She will be missed – but with many fond memories. We pick ourselves up with Member’s Plans for 2016 (and some Report Cards on 2015 achievements). Then it’s off to Killham Mine and a New Cornish Location for Jeanbandyte by Martin Stolworthy and Martin Gale. With one bound we effortlessly cross an ocean to be challenged on our selection of collecting sites at Mont Saint-Hilaire by Quintin Wight in his If Yer Knows of a Better ’Ole…. Then back across the sea to Germany for Ulrich Wagner’s master class in High Quality Mineral Photography on a Low Cost Basis. Peter Todhunter then braves the elements to bring us the latest news headlines from Cumbria with Desmond’s Legacy.

Pausing briefly to dry off we have some Food for Thought from Paul Monk who casts his museum curator’s eye over the problems of leaving your mineral collection as a bequest to your favourite museum. Richard Bell was faced with rather more immediate problems with the future of his mineral collection as he describes in Moving the Mineral Shed. In rather warmer (and drier) climes David Roe battles with delectable Portuguese phosphates in Purple haze in Folgosinho. We then get personal as Andy Castleton has the Member’s Profile spotlight focused on him as he talks about his passion for minerals and his “other job” as a mineral dealer. And Colleen Thomson makes a welcome return to the BMS Newsletter with a splendid riff on the theme of My Rock Room.

Cornwall battles back to centre stage with a classic specimen from Wheal Hatchet in Rob Selley’s latest Notes from the Duchy – and not to be outshone Sheila Harper journeys from Dieppe to Greystones Quarry via Paris in Sheila’s Fizz—Vauquelinite. Harry Critchley follows that with a trip to Driggeth Mine and then pops down to see how collecting in Tasmania is progressing in his latest Tomato Tray Tales. Not to be outdone David Green weighs in (literally) with In Praise of Ores.

Now all that is needed is some Rock Chippings on the BMS SW field trip, and Vitamin C, Tech Tips on LED Lighting, a Curator’s Corner and associated news of plans for a Digital BMS Reference Collection, plus branch reports (check out the double act from the Midlands enthusing on slags or take a refresher course on worldwide arsenates from the Sussex Branch) and we have a pretty jam packed 48 pages to digest.

David Roe

SUBSCRIPTIONS REMINDER

If you have a scarlet highlight on your address label please pay your 2016 subs as soon as possible

Subscriptions are: £15 for a single UK member, £18 for UK family, £18 for overseas single members and £21 for overseas families. (Overseas members electing to receive their newsletters electronically may pay the UK rates).
BMS Reference Collection goes digital?

Walter Veldsman, has perhaps come up with an idea “whose time has come”! He has suggested that the micromineral photography enthusiasts in the BMS capture the BMS reference collection as digital images. Coincidentally Martin Stolworthy was so impressed with the reference collection specimens made available to the recent Norfolk branch meeting that he started photographing the ones he had to hand and has put some of those images on the BMS webpage. Walter has offered to act as the liaison point for any BMS members who would like to discuss this project, plan what could be achieved and how it could be done. Please contact Walter on veldsmw@aol.com to get the project moving.

Perhaps this might be the way of bringing the wonderful resource of our reference collection into the 21st Century by making it available on line to all members at the click of a mouse.

Contributor – Walter Veldsman
A founder member of the British Micromount Society, Pam was one of 33 people listed in the first edition of the British Directory of Micromounters. She lived in Burgess Hill, West Sussex for over 50 years, and in spite of her share of poor health was a tremendously active and outgoing person.

Pam started her career as matron’s secretary at Harefield hospital before going on to train as a nurse. She later worked in a Civil Engineering firm in Westminster and as a sales assistant in a John Lewis store in Reading, enamelled coins, started a pre-school play group, trained as a primary school teacher in Brighton specialising in art and then went on to work at Paar Scientific in Raynes Park for ten years. She started a Sussex osteoporosis support group which raised funds to buy a DEXA wrist scanner and Pam organised volunteers to scan over 5000 patients. In 2000 Pam was awarded an MBE for her work with osteoporosis.

Like her father before her, Pam was a very creative person and liked to sculpt and paint as well as making jewellery and silver smithing. She loved to travel and visited every continent including visits to the Galapagos Islands, and an African safari. Her spirit of adventure saw her scuba diving near Green Island in Australia, riding a mule down the Grand Canyon, flying in a helicopter over the forests in Hawaii, paragliding, when 60 years old, in Cancun, Mexico and hot air ballooning across Sussex. Back home she was very active with the local U3A, leading the Discuss and Discover Group for some time, involved in the Gardening and Food for Thought and the U3A Luncheon Groups,

The Sussex Mineral and Lapidary Society was a very important part of Pam’s life. She joined the Society in 1975 and was its secretary for 15 years. She was actively involved with John in the club’s many activities including producing 200 issues of a bi-monthly journal and organising overseas trips including those to Paris, Krakow, Budapest and Siberia, and memorably, was the first SMLS member to land on Sgurr nam Boc beach on the exposed western coast of the Isle of Skye. This involved jumping from a fibre glass dinghy onto a rock, sometimes protruding...
from the sea! During the SMLS’s first field trip to Leadhills and Wanlockhead in August 1981 Pam discovered some tiny purple crystals in slag from the Meadowfoot smelter. Subsequent examination of the material at the NHM confirmed that this was the first occurrence in the UK of the mineral elyite.

For many years Pam was a prominent attendee at the BMS Micromount Symposium, often stepping forward to assist with organising and generally “making things happen”. Pam was also a member of the Russell Society and the Brighton and Hove Geological Society.

She was very proud of her daughter Julie who graduated top of her class in Geology at Hull University and then went on to work for BP eventually ending up in Houston Texas. She also enjoyed seeing her grandchildren grow up, but was sorry that because of the distances involved, that she did not see them more often. Pam and John spent many happy holidays in sunny Lanzarote over 35 years, where they sometimes managed to meet up with SMLS and BMS member, the late Jamie Nelson and his wife Doris.

Pam loved the sun and sea and just watching waves. She wants her ashes to be scattered over Seaford Head on a windy day.

We offer our condolences to her husband John to whom she was married for 55 years, her daughter Julie and grandchildren Emma and Thomas. We’ll all miss you greatly, Pam.

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**Crystal models**

The wonders of 3D printing will generate many oddball business opportunities – and one that might interest micromounters is the crystal shapes available from Smorf crystal models. Over fifty “crystals” are available off the shelf (and others to order if you have a favourite that is not on the list). They are printed from white polyamide (but also available in a range of colours) to exact crystallographic dimensions with crystal sizes at a volume of 125 cc – about small hand size. How about a 100 mm long scalehedron calcite, a {110} dodecahedron with {211} trapezoid or an orthoclase Karlsbad twin? All are priced at between £10 and £15 - they are not exactly “cheap”, but the quality looks good and relatively affordable – certainly in comparison to buying an “antique” set. Have a look at [http://www.smorf.nl/models/](http://www.smorf.nl/models/)

*Contributor – Roy Starkey*
Plans for 2016

BMS members look forward to a new collecting year and tell us what they plan to be doing in the warmer weather. New locations, new minerals or a return to old faithfuls?

David Roe  Still intending to find an Ugborough cassiterite and a South Brent magnetite, both of which I failed to achieve last year - and a new one - North Devon cacoxenite campaign. And also to take one just one good micromineral photograph after 30 years of half-hearted attempts. Finally I must get round to opening up my two boxes marked “Faroes 2011” – everyone trips over them in the porch. Trouble is I have no more display space – the joys of a small house and no garage or mineral shed!

Roy Starkey  Continue to promote Crystal Mountains – Minerals of the Cairngorms – looks like it may become a “collectors’ item”. Research for the “new book” – Minerals of the English Midlands – is well under way with 7000 specimens already examined. Planned publication date is late 2018. A 30th Anniversary re-enactment of the “long walk in” to Beinn a’ Bhuird is planned for July in celebration of this achievement by a much younger Roy and John Faithfull. And preparation of a paper for the Journal of the Russell Society reviewing a fascinating historical mineral collection.

Peter Todhunter  My mother still lives in the ‘family’ home in Cumbria, so my collecting plans tend to be very flexible and spontaneous – drive up the M6 and go from there. Obviously there are several mine sites that may be worth a revisit in the aftermath of the flooding. But I don’t want to swamp myself with too much fresh material as sadly my father passed away two year ago and he accompanied me on many trips and amassed quite a volume of material which I aim to finish going through this year. I also intend to check out some of the mines around the Newlands Valley/Borrowdale area that I haven’t previously visited as I strongly suspect they won’t produce much! A particular objective is to re-locate some lead mineralization I found high up on Grasmoor in rather steep ground in the mist. I failed to find it last year which has made me more determined to find it again. And finally a week down Cornwall in the autumn.

Report Card for 2015

Roy Starkey  Achieved his goals on book promotion and the presentational aspects of the new mineral gallery at the Lapworth Museum. The paper on Buxton Diamonds was completed in time for the last Russell Society Journal.
Overall a good effort B+!!
David Roe  Failed to achieve 3 out of 4 of his planned expeditions to local locations although he did achieve success at Loddiswell Antimony Mine and great success at a South Hams Iron Mine.  

As always: must try harder C-

Richard Bell  Re-labelling the collection is still “ongoing”. The chase for glacial erratics in the Burscough area never happened - the proposed hole wasn’t excavated. Maybe in 2016. And didn’t make it as far as Skye for the rare-earth minerals but ended up on Arran instead looking for allanite-Ce and fergusonite-Y. Successfully found along with a lovely 8 mm doubly-terminated beryl crystal. Fixed the mineral shed.

Solid progress in practical work B+

More Membership Stuff!

It is now possible to pay the subs by bank transfer – or if you’re feeling daring – to set up a standing order (please make this for 1st January each year).
The BMS NatWest account details are: A/c no: 69530467, sort code: 60-10-22

Welcome to new members

Rupert Harrison  No details

Colin Robinson  19 Moricambe Crescent, Anthorpe, Wigton, Cumbria, CA7 5AS, 01697 352975 cath.col@btopenworld.com

Changes, additions and corrections to the Membership List

Pete Briscoe  pbriscoe45@gmail.com

Phil Taylor  phil.g.taylor@icloud.com

Ivan Tingley  ijtingley4@gmail.com

BMS Field Trip to West Devon May 2016.

Field trip dates 11-16th May – note the change of week!

Arrangements are in hand for this trip. We already have Hingston Down Quarry (Friday 13th), High Down Quarry (Saturday 14th), Bampfylde (Sunday 15th) booked. Other site visits are being planned including Plymouth Museum, Greystones, Tamar Valley Lead Mines, and various sites on Exmoor.

The trip is open to any paid up BMS member. It will take place even if only a handful wishes to take part. I hope this will be a social event as well as for collecting. Please let me know by email or post if you hope to attend and I will keep you posted as to how arrangements are progressing and you can decide if the whole (or part of the) trip is for you. I am still taking bookings so please contact me if interested at crinnis@btinternet.com or David Ifold, Long Meadow, West Lane, Dolton, Devon EX19 8QU.

Contributor – David Ifold
A New Cornish Location for Jeanbandyite

Martin Stolworthy and Martin Gale,

As you travel down the A38 towards the west of Cornwall you reach the village of Doublebois. If you turn right at the crossroads onto the B3360 towards Minions, and go about a kilometre up the road there is a turning to the left that goes down to Ashford Bridge. Killham Mine is situated in woodland a little way up from the bridge and about 1.25 miles from St Neot, Liskeard, Cornwall. The only visible signs of a mine are the remains of a small chimney stack, just to the right of the track about half a mile from the entrance to the wood.

It was worked by a shaft and two adit levels in the valley side. Shallow Adit is located about 12 metres above the river, just off the track running through the forest. It has been driven to reach the incline shaft and there are very rotten timbers around the shaft area. Deep Adit starts close to the river and is driven as a crosscut for about 45 metres till it meets the lode. It was then driven over 80 metres west where it stops in a dead end. There are shallow winzes in the floor, which are flooded to the level, and there are several areas where timbers have been placed to support some of the more fractured rock. Near the end of the level is an incline constructed of rails and these go out to surface. This incline carries on down into lower flooded workings. An area outside the mine shows the remains of at least four round buddles.

The lode consists of hard grey quartz with chlorite and siderite containing copper, arsenic, iron, lead and zinc sulphides. It seems to have followed a vein in the roof of the level. The walls of the level are of a brecciated killas with patches of pyrite. Cassiterite was found in the hardest part of the rock. (Dines 1956, Vol. 2, page 614).

The reason for our initial interest was to see the gypsum crystal growths on the walls and waste rock. On the first trip in 1998 we only collected samples of gypsum and a few small pieces of the sulphide material from waste near the flooded lower level, which were taken home for closer inspection. On 12th March 1999 we went in again and collected more of the rock. This was mainly from waste material placed as 'deads' along the base of the walls, close to an area near one of the winzes. When this was later broken down, small yellow/orange bi-pyramidal crystals, which were later confirmed as jeanbandyite, were found in rotten sulphides of galena, sphalerite and pyrite. At the time it was found it was the third British locality after Hingston Down Quarry and Penberthy Croft Mine.

Inside Killham  March 2010  Photo Martin Stolworthy
The type locality is Sigio Veinte Mine, Catavi, Bolivia and it also occurred at Potosi Mine, West Camp, Chihuahua, Mexico, but no date is given on Mindat. There is one more recorded location at Mount Pleasant Mine, New Brunswick, Canada.

Samples were taken from various other locations in the levels and from some iron pyrite bearing rocks. The only mineral found in this was the pyrite. The pyrite occurs as both cubic brassy well-formed crystals and as filiform needles. We also took some material from the vein in the ceiling of the main level, close to the incline. This material contained anatase, titanite and crystalline sphalerite mixed in with acicular tourmaline and chlorite. Subsequent trips since that first one have produced more of the same material, but not in any great quantities.

Recent work on material collected in 2001 has produced some very small clear pale yellow glassy unknown crystals in a pyrite matrix. These could be a variation of anglesite. The matrix itself is varied with at least four different types producing a different suite of minerals from each one.

Chris Jewson arranged for five small pieces of handpicked matrix to be tested (many thanks Chris) and we are grateful to Wheal Jane for carrying out the analysis.

Of these sample 3 was interesting because it had a cassiterite content of 1.49%, which equates to 33 lbs per tonne – close to the 30 lbs reported by Edward Pascoe at the mine in 1872. A more detailed history of the mine will be the subject of an article in a future BMS Newsletter.

The full analysis of sample 3 (expressed as oxides %) is:

\[
\begin{align*}
\text{SiO}_2 &= 71.90 & \text{Fe}_2\text{O}_3 &= 17.82 & \text{ZnO} &= 1.93 \\
\text{SO}_3 &= 1.80 & \text{TiO}_2 &= 1.75 & \text{SnO}_2 &= 1.49 \\
\text{CaO} &= 1.18 & \text{As}_2\text{O}_3 &= 0.90 & \text{RuO}_2 &= 0.76 \\
\text{Rb}_2\text{O} &= 0.76 & \text{PdO} &= 0.22 & \text{Eu}_2\text{O}_3 &= 0.22 \\
\text{CuO} &= 0.21 & \text{PbO} &= 0.13 & \text{Ag}_2\text{O} &= 0.11 \\
\text{ZrO}_2 &= 0.10 & \text{V}_2\text{O}_5 &= 0.08 & \text{MnO} &= 0.07 \\
\text{Cr}_2\text{O}_3 &= 0.06 & \text{Y}_2\text{O}_3 &= 0.03 & \text{SrO} &= 0.03 \\
\text{Y}_2\text{O}_3 &= 0.02 & \text{Ga}_2\text{O}_3 &= 0.01
\end{align*}
\]

The other four samples gave much the same results for the minor minerals but sample 1 and 2 gave high iron and zinc % (\(\text{Fe}_2\text{O}_3 = 30.8\), \(\text{ZnO} = 6.2\)) (\(\text{Fe}_2\text{O}_3 = 17.3\), \(\text{ZnO} = 38.9\)). \(\text{Al}_2\text{O}_3\) was found in three of the samples and all of the samples showed TiO2 - sample 5 gave a
very high titanium reading (\(\text{TiO}_2 = 5.4\%\)). It is also noteworthy that the “rare earths” such as \(\text{Eu}_2\text{O}_3\) are present.

A suite of all the minerals collected at the time was sent to Dr David Green at Manchester University, Museum, for testing and we are very grateful to David for all the time and work he did in the original analysis of the samples on the list below.

<table>
<thead>
<tr>
<th>Mineral</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anatase</td>
<td>As small brown/ yellow or clear blue plates that form in cracks and joints in the chlorite rocks</td>
</tr>
<tr>
<td>Anglesite</td>
<td>As blocky and elongated very clear glassy crystals</td>
</tr>
<tr>
<td>Arsenopyrite</td>
<td>As bi-pyramidal steel grey crystals</td>
</tr>
<tr>
<td>Cassiterite</td>
<td>Very rarely as small blocky, prismatic crystals and as brown masses within the matrix.</td>
</tr>
<tr>
<td>Chlorite</td>
<td>This varies in colour from dark black to green and to a pale white and gives a green hue to most of the matrix</td>
</tr>
<tr>
<td>Gypsum</td>
<td>Several forms of gypsum occur. On the walls are sprays coating everything and as small, glassy plates mainly with the pyrite</td>
</tr>
<tr>
<td>Jeanbandyite</td>
<td>As very small yellow/orange bi-pyramidal crystals. (First collected 12th March 1999)</td>
</tr>
<tr>
<td>Monazite</td>
<td>As small white rosettes on matrix (our grateful thanks to Dr Richard Braithwaite who confirmed this identification)</td>
</tr>
<tr>
<td>Pyrite</td>
<td>These occur as normal cubes and as small filiform needles.</td>
</tr>
<tr>
<td>Quartz.</td>
<td>This seems to occur only in the chlorite rock associated with needles of tourmaline and plates of anatase and cassiterite.</td>
</tr>
<tr>
<td>Serpierite</td>
<td>One blue specimen has been visually identified as serpierite</td>
</tr>
<tr>
<td>Siderite</td>
<td>Pale brown plates on quartz</td>
</tr>
<tr>
<td>Sphalerite</td>
<td>As reddish black triangular crystals on quartz</td>
</tr>
<tr>
<td>Sulphur</td>
<td>Very glassy multi-faced clear pale yellow crystals</td>
</tr>
<tr>
<td>Tourmaline</td>
<td>On the chlorite rock, nearly all broken surfaces and where quartz has formed are very tiny acicular needles of tourmaline.</td>
</tr>
<tr>
<td>Titanite.</td>
<td>Occurs as very small honey brown blocky plates – it was originally thought to be cassiterite.</td>
</tr>
</tbody>
</table>

There are several unknown specimens awaiting confirmation.

Many thanks to Richard Bell for his useful comments during our work on this project. Chris Jewson greatly assisted us with obtaining numerous copies of documents on the history of the mine, associated properties and landowners from Truro Records Office and a detailed history will be published in a future BMS Newsletter.
If Yer Knows of a Better ’Ole…

Quintin Wight

1972 was a very odd year for me. For one thing, it was the year I got posted to the Canadian Embassy in Washington, DC - thus getting involved with the micromount scene on the eastern seaboard of the USA. For another, it was the year that the quarries on Mont Saint-Hilaire produced a number of “holes” (for want of a better term) that held interesting micromount material, and some surprising finds.

One such appeared on Sunday, 21st May 1972, in the floor of the northwest portion of the quarry. Someone had been working, probably on the Saturday before, and had exposed an oval-shaped opening roughly 48 × 30 cm in size, extending downwards some 15 cm. The area around the hole was scattered with green/brown dust, and the bottom of the cavity seemed to be filled with loose rock chips from above.

I scrabbled round amid the chips, and found that the hole extended deeper, and had rough sides and loose pieces that felt somewhat clinkery, like aa lava. Then, to my horror, I discovered that it was also full of green powder—a powder that stained my hands, then stained my tools, my clothes, and everything else it touched. It acted like fine, powdered graphite, working its way in everywhere, and like graphite, was enormously difficult to remove.

A sample of the ferroceladonite, epididymite, elpidite, and albite jumble, straight from the source, and staining everything in sight.

The long, straight crystal segments are elpidite

Photo Quintin Wight

The prize of the dig, however, appeared in the rough, clinkery bits and cavity walls. They contained beautiful “snowflake” trillings of the beryllium silicate, epididymite NaBeSi$_3$O$_7$(OH), caught up in a mixture of the zirconium-containing elpidite Na$_2$ZrSi$_6$O$_{15}$•3H$_2$O, albite, and a number of other minerals—all packed tight with the green powder. Gritting my teeth, I worked as many chunks of the epididymite material

Quintin sorted out his epididymites from his elpidites but was so green that he missed the new boy on the block
loose as I was able, covering myself in green powder in the process. In the long run, it was worth it. One of the matrix specimens is now in the Canadian Museum of Nature, and another is in the collection of Harvard University. Individual specimens of the epididymite trillings are in my micromount collection (and in the collections of several others) and there is an illustration in *Monteregian Treasures: The Minerals of Mont Saint-Hilaire, Quebec* by Mandarino and Anderson, Cambridge UP, 1989.

Having such good specimens was great. What was not great was trying to clean them. The green dust was packed into every crevice, and when wetted, it simply turned to mud and stayed there. I tried soap and water; I tried ultrasonic baths; I tried oxalic acid (that ruined some elpidite); nothing worked. Oh, I could get the majority of it off, but there was always that lingering green stain that lurked deep in the crevices and would not depart. Like the manganese mud from the seam in the Lochnell Mine at Wanlockhead, it stained and stayed.

Hoping to find a solution, I went to the X-ray technician at the Royal Ontario Museum in Toronto and asked for an identification that might help with cleaning. She came back a little later, saying “It’s a mica—probably fine-grained muscovite. Anything that dissolves that will probably dissolve everything else!” I was stuck, and went back to muscle power with detergent and water where the fragility of the other minerals would allow.

I, and those who had preceded or followed me into that hole, spent the next 25 years cursing the green mud that made such a mess of our specimens (not to mention clothing and everything else). Then, in 1997, a paper appeared: Gejing Li, Donald Ralph Peacor, Donald S. Coombs, and Yosuke Kawachi (1997) Solid Solution in the Celadonite Family: The New Minerals ferroceladonite K$_2$Fe$^{2+}$$_2$Fe$^{3+}$$_2$Si$_8$O$_{20}$(OH)$_4$, and Ferroaluminoceladonite K$_2$Fe$^{2+}$$_2$Al$_2$Si$_8$O$_{20}$(OH)$_4$, *American Mineralogist*, 82: 503-511. It was followed shortly thereafter by an abstract: (1998) *Mineralogical Record*, 29: 469.

That sounded familiar. We had another look at our green mud: it was ferroceladonite! We had spent 25 years desperately trying to get rid of a brand new mineral! Not only that, we’d had buckets of the stuff! The type locality, Hokonui Hills, Southland, New Zealand, didn’t have much, and we had been inundated with it for a quarter of a century! We couldn’t blame the ROM technician. She had said it was a mica, and it was. We just hadn’t thought to check further.

I’m not sure what the moral of the story is. It’s somewhere among: “don’t throw out the baby with the bathwater”, “we couldn’t see the wood for the trees”, and “there are none so blind…” Philosophically, I’m just putting it down to the fact that it was something else all twisted up in another of those “holes”—bubbles in the cold chemical soup of Mont Saint-Hilaire.
Thanks for taking the time to tell us about your mineral photography techniques – even with emails it can be hard work! Yes – and before I start explaining how I do my mineral pictures, I need to deal with two specific worries that I have. The first is that I normally write in German and in German I love to play with words – but sadly this is a challenge for me to do in English. So I will have to write this in a very serious style - and that’s a real problem for me - not the writing but the serious writing!

Your photographs are really classy – you obviously have an eye for setting up what you call a “high quality” photograph. That brings me to my second problem - the phrase “high quality” – with photographs that all depends on the point of view of the beholder. To me “high quality” means a picture with sharp crystals, a good depth of field and free of irritating blurry areas or distracting reflections. But does “high quality” mean a tiny 0.05 mm crystal filling the entire picture? In my opinion, if I can’t see the crystal with my scope then why take a photo of it? Unless it is for identification purposes.

Ulrich talks about how he takes such stunning mineral photograph to a very excitable and impatient editor.
You get really passionate about the quality of photographs! Yes I do - here I am on a rainy day in Bottrop-Kirchellen sitting at my computer looking at pictures on Mindat.org - and what I see does not improve my mood. Blurry “what evers”, ill-defined lumps that may be crystalline, black things on a black matrix. And inevitably - my favourite - crystals shot with a Luminar lens - but despite spending 500 Euro on the lens the picture is still out of focus and littered with unsightly reflections. That wakes me up – I will find my way to explain how to do it better ... and cheaper!

What’s a Luminar Lens? It was made by Zeiss in West-Germany in the 1960’s and it is a very good microscope lens which can be used with a bellows for mineral microphotography. The general disadvantage of microscope lenses is that they have a very, very small depth of field – for the Luminar it is around 0.02 mm. Historically it was the favourite with the top micro photographer until the Mitutoyo lenses came on the market. At the moment I’m playing around with three other microscope lenses, a Nikon Plan CFI, a Lomo 9 and a Swift, all with a 10 times standard magnification. But that’s a story for another time.

This mineral photography is beginning to sound ominously expensive! Well first off I suppose we need to ask “why take up a career as a mineral photographer?” A friend of mine would answer – “you have too much money, or you are crazy, or maybe both”. That inspires me to think about it a bit more. “OK, Ulli, we can discuss the crazy bit later - there is more than one answer and some of them I may not like!” But money does not need to be the reason as with a little thought we can find a cheaper way to do it.

Understanding how the brain sees things compared with a camera is a key to getting a good photograph isn’t it? In a typical optical system, for example your microscope, there is exactly one plane which is “in focus” and appears sharply defined. That is what is called the depth of field and it is the area around the correct focal plane, in which the eye cannot see the difference in sharpness compared with the central point of the focal plane. There is a difference, but the eye cannot detect it. To a certain extent, the eye, when connected to a human brain (if available) does some very complex data processing so as to make sense of what it is seeing. For example sometimes the eyes see an unfocussed object, but the brain interprets it so as to generate a sharp image from the data received by the eye. A complex situation!!!

And you believe in taking the microscope out of the equation? Yes, because cameras are incorruptible, they capture for you what the lenses and microchip see without the human brain in between – and we can begin to understand the disadvantages of taking photographs through a stereo microscope. The lenses of these microscopes are corrected to look with our eyes as they are connected to a brain. Everything looks fine, but in reality the image is much poorer than you think...or see. All those problems such as chromatic aberration, astigmatism, etc. which the brain can often discard are shown by our incorruptible camera without any scruples.

What with these and the problems with depth of field it’s all beginning to sound a bit hopeless! Thankfully help is at hand and certainly some of optical rules
on depth of field can be fooled - the magic words to achieve this are “multi-level combining” - better known as “photo stacking”. The normal technique for stacking images is to find the position, on which the camera shows you the first sharp focal plane of the subject of your photographic composition. You take the first shot and move the scope (or alternatively the object) a little bit closer and take the second shot. This will have a focal plane a little below the first one some areas of your object are now sharp while some of the previous sharp areas are now blurred. This is repeated until the lowest point of interest is in focus. Using a higher magnification gives a smaller depth of field which means you have to use smaller steps between each photo. In the real world a hand specimen might need 3 to 4 steps with an interval of 5mm. Then again a microcrystal of 2 mm dimensions might need 20 steps of perhaps 0.05 mm.

**And with the expensive microscope lenses or the Zeiss Luminar lens you mentioned earlier?** For these, steps of a few micrometres are necessary. If you cannot accurately achieve such small increments then the resulting image will not give the quality for what the lenses are so famous.

**What happens next?** As an example let’s take ten pictures and stack them using software such as CombineZP or Helicon Focus. What these programmes do is identify all the sharp areas of the 10 pictures and combine them into one composite image. The result is an image with a dramatically increased depth of field.

**So all I have to do is get hold of a stacking programme?** Not so fast David – don’t be so impatient! At this point, we need to think about some of the requirements for our photographic equipment. We need a good DSLR camera body, and a bellows to vary the distance between the camera chip and a suitable camera lens – this is how we vary the magnification and field of view. The camera lens needs to be a good one –
I’ll talk about that in a moment. We also need a method of moving the object (or the camera) by tiny distances, and all of this has to be mounted on a very stable stand.

The way I have achieved success is with a modified version of some good old photo equipment with a macro bellow mounted below and all mounted on a substantial stand which came from an old drilling machine. Martin Stolworthy had some useful ideas about these problems in BMS NL 94.

In the picture you will see my equipment in front.

OK! It is not really easy to see in all that junk on my table. It is a really good idea to clean it up before taking a photo, but that realisation came too late!

See this photo on  www.wagnerul.de/minerals/kamerasetup.jpg

There are a couple of important details we need to talk about with this setup. Yes – the first is the method of moving the object in minute increments. To achieve this I use a focuser designed for astronomical telescopes – it makes a lot of sense to use them as they have a 1:10 micro transmission. With my telescope-focuser I have calculated a minimum possible step size of 0.02 mm (20 micron). They can be found second hand for less than £100 (sometimes) – I paid £20 but that was not normal! A friend of mine uses an old stand of a scientific microscope - they have often a micro transmission focuser – which give a similar precision.

And then there is your lens – you really are enthusiastic about it! I am using one from an old Braun Paxette camera. The lens is called Katagon 2.8/50 and was used in Braun cameras in the 1960’s – these cameras cost around £20-£40 on eBay. The trickiest problem is to remove the lens from the camera – with some models the Paxette lens do not unscrew and you have to disassemble the camera. But it is worth all the hassle, because this lens is of outstanding quality. There is very little chromatic aberration (blue and magenta rings about reflections), hard contrast borders are rarely
visible, and the image sharpness from the lens very good. I have posted a picture of it on www.wagnerul.de/minerals/lense.jpg - the Katagon is the silver thing!!

**But I can use other lenses – particularly the old ones that I have hidden away in drawers all over the house?** Yes you can - a very nice macro lens is the standard Canon DSLR 18-55 mm lens. On eBay it is possible to get it for around £40. In reverse position (back to front!) using a suitable adaptor ring to attach it to the bellows it makes good pictures over a range from several cm down to 2 mm width of field.

Where can we see the standard of image you get with the Canon? Have a look at www.wagnerul.de/MINERAL/Katanga.pdf (beware, it is not a small file!) – all of these pictures were made using the Canon 18-55 mm in reverse position. The advantage of a zoom lens like the Canon 18-55 mm is that for every position of the zoom you get a corresponding “Field of View”. So at 18 mm you have perhaps 3 mm while at 55 mm you can reach 25 mm and more. Of course the field of view can also be altered by the distance of the lens to the camera chip – and that is where the adjustable bellows comes in handy.

**But a zoom lens is not the complete answer to the perfect picture?** A good lens with a fixed focal length will nearly always give you much better image quality. The different field of view can easily be achieved using the bellows. So with the Katagon I get a range of from 12 mm down to less than 4 mm across.

**So which lens should I buy?** The best you can afford ... but that’s too simple. If you have no money, but you do have a lens from your DSLR camera, use this first. Play around with the different position (reversed/normal), with the different zoom settings and the other possible settings. If you can get a Katagon 2.8/50 lens my advice is - buy it, because this lens is worth every penny. But if you have an awful lot of money available, ask other people! I’ve no experience with awful lot of money! Two simple
rules – a fixed focal length lens is always better than a zoom and so called macro lenses are often not really a good idea. Some are, some not. A simple tip – check what the photographers on Mindat are using. I have done a lot of work with a range of lens – I would like to talk about those in another BMS article.

That’s a great idea – let’s book some space into NL 98! But back to your set-up. All we have to do now is string all the equipment together. That’s the next challenge – putting together the camera body, bellows and lens. I have bought a Canon macro bellow with the old FD-bayonet (the newer bellows with an EF-bayonet are too expensive to be my choice). However this does make connecting the camera to the bellows more complicated as I had to use an adapter ring from EF-bayonet on camera side to FD-bayonet on lens side. On the other end of the bellows you will probably need another adaptor ring to whatever fit the lens you will be using. Again Martin talked a little about this hassle in his article in BMS NL 94.

Can I take a photograph yet? No! Two things you need to learn for making good photographs are doing your homework and being patient! At this point, we now have fully functional equipment to take our photos. We can add different lenses for different width of fields and we can increase the magnification by moving the bellow. The camera itself is connected to the computer and set on manual mode. With the live view function we can see what happens on the computer screen and we can also take full command of the camera settings via the computer. All under control! Taking photos is now very simple!

Take me through it. Place the object on the focuser and adjust the bellow to get the first sharp picture and take the first shot. Now turn the 1:10 micro transmission dial on the telescope focuser a very little bit (for example a 1/16th of a whole turn - with experience it is possible to turn it by much less – perhaps down to a 1/48th or better) and take the next shot. After 10 or 15 shots, which are all automatically saved to the computer, we can stack the images. I normally need perhaps 30-60 seconds to take the whole set of images. Then the image processing software for the stacking process needs 2-3 minutes if I use CombineZP – with Helicon Focus it does the same job in 20 seconds with a markedly better quality. Perhaps another 5 minutes are necessary for the final image processing with Photoshop or GIMP.

Do some experiments with the number of pictures for the stacking. I normally do 20 or more shots. But this is not always necessary, because the number of stacked pictures depends on the depth of field and the magnification. If you take 20 shots and use only every second for the stacking, you will not really see a difference to the final stack image. Sometimes it is a disadvantage to use too many pictures because the differences between pictures are so small and the stacking software cannot handle this.

What about … David that’s enough for now, we need a drink! Next time we can talk about different lenses, particularly microscope lens, and about cropping to small FOV, and lighting and many other things to get a better picture.
Desmond’s Legacy

Peter Todhunter

Everyone will be aware of the floods that have afflicted much of northern Britain this last December. As there was the possibility of fresh material being exposed in dumps vulnerable to erosion, I took the chance over Christmas to visit one such site, Blencathra Mine in the Glenderaterra valley, near Keswick. I was in for a shock.

This mine has on occasions been confused with Glenderaterra Mine, which is approximately half a mile further upstream, and both sometimes are referred to as Brundholme Mine. The mineralogy at the two sites is very different, with Blencathra Mine being the more interesting. Over a number of years I’ve collected excellent micromounts of various lead and copper sulphates and carbonates, but also arsenates and unidentified bismuth secondaries. In addition to the usual primary minerals, acicular bismuthinite(?) occurs, closely associated with something like gersdorfite(?).

Blencathra Mine was a rewarding little site that largely escaped the attention of collectors and anyone who has been there is most likely to have found the cream to light brown pyromorphite to a few mm’s in size which was the most obvious and abundant secondary mineral present. Sadly, the dumps have been completely swept away by Storm Desmond, and there is no prospect of retrieving further material in situ from this location.

Having seen the devastation on the western flanks of Blencathra, I then visited Saddleback Old Mine on the eastern side. Thankfully this site has been well documented, as here too the mine dump has been completely swept away. The vein outcrop is if anything exposed over a greater distance then previously, but to date only shows lead mineralization. The interesting copper mineralization, mainly in the form of pseudomalachite, was restricted to the dump. The site currently looks like a
battlefield with thick beds of peat having slipped into the river or sheared away from the sides. One large lump has ended up blocking up to two-thirds of the adit entrance opposite where the dump used to be, and gaining access to the vein outcrop alongside the river was not easy.

I also had a walk around some of the sites around the Caldbeck Fells that I knew to be vulnerable to erosion but strangely, despite just being a few miles north of Blencathra, the area seems to have escaped largely unscathed.

To me what has happened at these sites only highlights one of the problems of imposing collecting restrictions – nature has no respect for SSSI’s or permit schemes, and can destroy sites in a matter of hours

**Food for thought**

Paul Monk

Regrettably it is quite a few years since I was last at a Micromount Symposium but I’m sure that the same topics of conversation crop up every year. One topic that I remember well was “How will my collection be dealt with eventually?” Over the years there have been several disposals via auctions both held nationally or within various societies but often the discussions centre on the desire to “donate my collection to a museum”. As a museum curator, I always felt a little uneasy with this and a recent personal experience is worth recounting.

A couple of months ago I was invited to assess some geological material that had been donated to a nearby museum. This museum, founded in 1840, is a small independent museum run by volunteers in a small town in the north of Scotland. It has a regionally significant archaeological collection. It also has an internationally recognised fossil collection of Permian fossil vertebrates. Indeed, one of these fossils is named after the town and photographs of the type specimen, which is in the collection, is often used in books and other publications. This part of the collection is supported by expertise from a couple of universities and the National Museum of Scotland.

The material that I was invited to assess was not in this category. It was a small (about 50 specimens) collection of fossils donated by the son of a recently deceased gentleman. The fossils were collected in Somerset many years ago. Remember, that this museum is situated to the north of the Cairngorms. Herein lies the dilemma for the museum.

Every properly accredited museum (although some are not) has to meet certain provable standards on a variety of issues, including collections care. The key policy that every museum must have is the Collections Management Policy. In a sense, this should be the “bible” that guides how the museum acquires and disposes of objects. It will define the limits of collecting including those categories of objects that the
museum will and will not collect such as the geographical limits of the collecting activities of the museum. I recently had to rewrite my museum policy in the light of a recent, local, major archaeological dig, so that the “time line” could be extended further back.

Back to the geological collection in question. When I looked at the accompanying paperwork, I was pleased see the words “these specimens may be used for any purpose that the Museum feels fit, including handling”. The fossils presented were in two categories, partial Jurassic bivalves and ammonites picked up from field surfaces, and a number of coal plant fossils from coal mine tips in the Radstock area. Only four of the coal specimens are of any real quality. They are clearly identifiable to species level. Two of them would display well if needed for that purpose. However, these fossils do not fit in with any other specimens that the museum has on display or has in its stores.

My recommendation was that the Jurassic fossils and most of the coal fossils were ethically disposed of by placing in a schools handling box or by sale as “pocket money fossils” at their front desk. I have left the four good coal fossils to the museum’s decision making process in the light of its “Collections Management Policy”.

The moral in this tale? It is becoming more and more unlikely that a museum would want a specialised collection due to lack of expertise, declining budgets, location, and collecting policy issues. So, it would probably be wise to enquire first about whether the designated institution would like a particular collection or ensure that, somehow, the prized specimens are returned into the collector’s world.

Moving the Mineral Shed.

Richard Bell

Earlier last year I thought it would be a good idea to move my mineral shed to a sunnier part of the garden. Little did I know what an ordeal it would be and that a two day job would actually take seven days to complete.

The shed was situated close behind the garage where “the sun don’t shine”. Consequently it was nearly always damp which had caused some additional problems. After preparing the base in its new location, the next job was to empty out the shed and since the weather was set fair for a couple of days the task commenced. It is absolutely amazing how much stuff can be crammed into a relatively small space 6x6x6 foot space but several hours later the shed was empty and ready to be dismantled. My dear old Dad had put the shed up one day many years ago while I was at work so I never got to see how he did it. However, him being the engineer that he was, it was certain that it would never fall down or be blown down in the wind. Now all I had to do was work out how exactly it had been fitted together.

Richard seeks sunnier climes for find his Tardis mineral shed only to find it has developed wet rot. Mineral curation good practice guidelines are eventually achieved despite the Mancunian weather.
Progress was slow, all the shelving had to be removed, then the door, and then all the bolts and screws that held it together had to be located and removed. This was easier said than done. The bolts holding the sides together weren’t too much of a problem, it was the screws attaching the roof and base to the sides that caused the difficulties. A normal screwdriver wouldn’t budge them and in fact a few of the screw heads were completely ruined in the attempt, it is then I remembered the “bit and brace” in my Dad’s old toolbox. What a fantastic tool! The screws were removed in an instant and the shed was dismantled shortly afterwards. It was then that the major problem was discovered.

Twenty five years of damp had meant that large parts were now rotten and would have to be replaced, this was not good news as the forecast was now for rain and all the shed’s contents were scattered around the garden. After some frantic gathering up of cardboard boxes of minerals, they were eventually squeezed into an already very full garage. When the rain had passed the task of repairing the rotten bits was carried out. About a third of them had to be replaced and it was at this point that the thought of just buying a new shed became tempting. However, sheds are not cheap these days so I persevered with the repairs and headed off down the road to B&Q to buy some replacement timber.

At last with the repairs complete it was time to put it all back together, again, easier said than done - especially when on one’s own. In this situation it is almost guaranteed that the wind will get up and it did proving that trying to bolt together two 6x6 foot wooden panels in a stiffish breeze is certainly a challenge. Eventually everything was put back together, sides bolted on and the roof and base screwed to the sides. It was now getting easier and the shelves were re-installed and the door put back on. After all the work it seemed sensible to re-felt the roof as well so that was another unexpected extra task.

Finally all the minerals went back in and it was job complete. Was it worth it? Yes it was, I now have a “nearly new” shed which I can get in and shut the door and it should be a lot easier to maintain in its new position. Thanks are due to Jeanette who helped with emptying, dismantling, sweeping up, tea/coffee making and laying on soothing balm when needed.
Purple haze in Folgosinho

David Roe

I fear I may have a reputation for going on holiday without doing my mineral homework beforehand – this has led to a series of phone calls to various mineral associates on the lines of “I have just arrived in Colorado - do you know any good topaz locations” or “I happen to be at Rhandirmwyn – can you give me the map reference of that quartz location”. In 2014 I did it in style. Meandering across inland southern Portugal I arrived at a wonderful Quinta das Cegonhas campsite run by a Dutch couple at the foot of the Estrella Mountains. I quickly realised that I had stumbled on a classy mineral collecting area – not only was there an impressive cabinet filled with apatites to 100 mm in the reception area but the entire site was decorated by ornamental crystals – going to collect water from the stand pipe only to find a 200 mm cross section quartz or (I measured it) a green apatite to 175 mm gives the game away – something mineralogical is afoot! The charming owner confirmed my suspicions and assured me that the site – known as Folgosinho Quarry (or more correctly Sitio do Castelo Mine) was well known and particularly enjoyed by Dutch micromounters – surely I had checked it out on Mindat before coming?

It appeared easy to find - “just turn off the Folgosinho road at the electrical tower”. And so on the last day in the area before the long drive back to port of Santander in northern Spain I arrived at the site clutching hammer to find a splendid tip covered with quartz (the village of Folgosinho on the top of the hill is remarkable in having cobbled streets and pavements made entirely of massive white quartz) - and even more remarkable - great seams of massive apatite. I had an immensely enjoyable afternoon in the balmy October temperature of 24°C but found only hints of mineral riches. Later that evening my campsite host patiently explained that she had actually said “turn left at the electric tower and down the track for a couple of kilometres”. I had managed to go to the wrong place!

I spent many a wintery evening cursing my disorganisation, slavering over the excellent Mindat mineral photos for the site and plotting my return. And so it was in late October 2015 end route from a folk music festival in the Algarve that I was welcomed back to Quinta das Cegonhas. What a wonderful area the Sierra Estrella Mountains is! Think Dartmoor granite tors and then put them at 6000 foot in autumnal warmth in the mid-twenties – I can see why discerning Dutch campers head for this campsite to escape the winter weather of northern Europe.

This time I got it right – down a fairly challenging farm track to emerge at the site instantly recognisable from the photo on the Mindat page. At first it is a bit overwhelming - a gigantic hill of quartz riven by apatite seams and a huge area of hillside covered by mine waste at a rather challenging angle. I was completely at sea with the alien mineralisation – it was reminiscent of Snowdonian quartz and Land’s End
granite – I found it difficult to get a “feel for it”. After four hours of highly enjoyable fossicking I was still struggling to get my eye in. Eventually I took home a bag of massive apatite chunks and after much debate (it was a hefty heavy lump), a football size boulder of black metallic stuff that refused to break up.

When I got it home the black boulder fell victim to a vigorous sledge hammering and … Wow! It broke open to reveal a metallic black matrix, streaked with golden orange and full of vughs of lurid purple, violet, lilac and pink botryoidal crystals. I had found myself a boulder of iron phosphates! Now I have never really recovered from a successful trip many years ago to Gravel Hills and the overdose of iron phosphates from there. I can well remember getting severe mental overload from the phosphosiderite, beraunite, strengite, strunzite, whitmoreite etc. Sitio do Castello is Gravel Hills on LSD – and it also resulted in me doing a crash course in phosphates – and without the superb information on Mindat I would have been hopelessly lost. I am still cracking through the material but there is purple to white strengite and phosphosiderite, yellow cacoxenite, stunning black nsutite (a manganese oxide) interspersed with strunzite and beraunite – all on a matrix which seems to be mostly massive triplite and rockbridgeite.

In an effort to make some sense of this plethora of phosphates I had to go back to basics on the chemistry. If I remember rightly we have the positive cations from either the divalent ferrous (Fe$^{2+}$) cation or more stable trivalent ferric (Fe$^{3+}$) and these have to neutralise the triple negative charged phosphate anion (PO$_4^{3-}$). Obviously the simplest combination is Fe$^{3+}$PO$_4$ – and with a couple of molecules of water of crystallisation we have phosphosiderite Fe$^{3+}$PO$_4$•2H$_2$O.

But hang on there is also strengite with the same formula! At which point we realise phosphosiderite and strengite are dimorphs – like calcite and aragonite – chemically identical, but with different crystal structures, orthorhombic and monoclinic respectively. I must admit I do not share the confidence of many of the Mindat contributors who seem very certain which is which – particularly as both range in colour from intense purple to colourless.
The next combination is again a simple one – three ferrous (Fe$^{2+}$) with two phosphates giving (again with a little water) vivianite - Fe$^{2+}_3$(PO$_4$)$_2$•8H$_2$O – although this is relatively rare at this site. So what happens if we have both ferrous and ferric cations – is there a stable combination such as Fe$^{2+}_3$Fe$^{3+}$ (PO$_4$)$_3$? The answer seems to be no. But the chemical trick of including the single negatively charged hydroxyl anion in the mix produces a whole series of ferrous/ ferric hydroxyl phosphates - feast on whitmoreite Fe$^{2+}$Fe$^{3+}_2$(PO$_4$)$_3$(OH)$_2$•4H$_2$O, with ferrous:ferric ratios of 1:2 - through to beraunite Fe$^{2+}$Fe$^{3+}_4$(PO$_4$)$_3$(OH)$_5$•4H$_2$O at 1:4 ratio.

This is all a bit boggling to a simple chemist like me so I had to make an Excel spreadsheet to do the calculations for me. It was at this point I realised something which I am sure all you phosphate enthusiasts realised long ago - whitmoreite, ferrostrunzite and metavivianite all have the same ferrous:ferric ratio - you have to watch the small print – those water of crystallisation molecules - whitmoreite has six while ferrostrunzite and metavivianite have eight. And the difference between these last two is - dimorphism again.

Just when one feels that one is sinking under a rising tide of mineral chemistry, in pops another variable. Divalent manganese is very happy to do business with any phosphates and hydroxyls that are lurking and as a result we get frondelite Mn$^{2+}$Fe$^{3+}_4$(PO$_4$)$_3$(OH)$_5$ which mirrors the ferrous cation of rockbridgeite Fe$^{2+}$Fe$^{3+}_4$(PO$_4$)$_3$(OH)$_5$. Of course in mineralogical reality this will give a ghastly continuous series of variable composition between 100% ferrous to 100% manganous which is conventionally shown by the formula (Mn$^{2+}$,Fe$^{2+}$)Fe$^{3+}_4$(PO$_4$)$_3$(OH)$_5$. Personally I find these situations thoroughly distasteful. When I was a research chemist I would have expected my supervisor to send me off with a flea in the my ear if I had wanted to publish a paper on a chemical that I had synthesised with such a variable formula, but obviously Mother Nature is rather more easy going.

Much of the material from Folgosinho is massive triplite which has not only the ferrous and manganous cations varying but also a hydroxyl which can be replaced by fluoride represented by the formula of (Fe$^{2+}$,Mn$^{2+}$)$_2$(PO$_4$)(OH,F). Sorting out my zwieselite from the wolfeite and making sure I did not confuse my triploidites with my triplites proved beyond my descriptive capabilities. Fortunately Frank Ince came riding to the
rescue with a composition diagram that not only explains the delightful complexities of these combinations but can also be used as a Christmas tree decoration.

![Composition Diagram]

Call me old fashioned, but I like a proper formula and a mineral I can stick a simple unambiguous label on. Give me copper sulphate $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ – I can cope with that! But mining for knowledge in the iron phosphate strata proved to be a lot of fun.

I do not often go into the nightmare area of black managanese iron oxides but one gorgeous and relatively common micro at Sitio do Castelo is nsutite $(\text{Mn}^{4+},\text{Mn}^{2+})(\text{O},\text{OH})$ and with its glossy black lustre often contrasting with purple strengite it can be stunning – a real treat for aesthetically challenged manganese oxide collectors.

There is one more wrinkle to the story – and it demonstrated my ability for cognitive dissonance. This is believing the absurd even in the face of overwhelming evidence - a common problem demonstrated by UFO enthusiasts and conspiracy theorists worldwide. It arose from the fact that phosphates also like trivalent aluminium - think wavellite $\text{Al}_3(\text{PO}_4)_2(\text{OH,F})_3 \cdot 5\text{H}_2\text{O}$ - so not unexpectedly with iron phosphates in the brew we get cacoxenite forming. In fact my lump was cemented together with this gorgeous yellow mineral. And this is where the cognitive dissonance came in: I have only rarely found cacoxenite – and the most memorable time was at Gunheath Pit where it was associated with wavellite and torbornite. And from that moment on, in my head, cacoxenite became an iron, aluminium uranium phosphate – and I firmly continued to believe this absurdity for the next 20 years.
So I was now sitting in my rock room with a Portuguese cornucopia of gorgeous microminerals impregnated with uranium in quantities that would give a nuclear weapons inspector a hot flush. Emergency radiation plans went into operation - I vacuumed the rock room every five minutes, washed hands every 10 minutes and took very shallow breaths in between the numerous cold sweats. The worst moment was later waking at the hour of the wolf and realising I could not get rid of any unwanted material on my fellow BMS at the 2016 grab table - in fact getting rid of it presented an insoluble moral conundrum – putting my local refuse collection operatives at risk was obviously not on. Chucking it into the River Erme, even though it was at full spate could cause havoc on Mothercombe beach this summer. So perhaps hurling off the cliffs at Nancekuke into the Atlantic adding to the Porton Down’s festering brew?

I tried to distract myself from this nightmare by trying to remember the formula of rockbridgeite and next morning read Dana’s mineralogy with bleary eyes. The fickle finger of fate decided that Dana should fall open at cacoxenite and with horrid fascination I read the description and then stopped bemused. How was it that my seventh edition copy, printed in 1944, just gave the formula as iron phosphate with no uranium (or aluminium – but that is a different story)? Surely they knew about uranium in 1944 – it was the time of the Manhattan Project! Disbelievingly I checked Wikipedia. They had the same extraordinary omission of uranium claiming that cacoxenite it was $\text{Fe}^{3+}_{24} \text{Al} (\text{PO}_4)_{17} \text{O}_6 (\text{OH})_{12} \cdot 17\text{H}_2\text{O}$ – and still I did not believe it. So on to Google which led me to a host of websites proclaiming the healing properties of cacoxenite quartz (if ever there was cognitive dissonance, then crystal healing takes the biscuit) until Mindat finally brought me to the reality of a uranium free cacoxenite. So I will be distributing Portuguese grab bags at the symposium!

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**Tom Levinson Donation**  In July 2014 Tom Levinson’s wife, Alison, contacted the BMS and Russell Society with the view of donating Tom’s mineral collection to raise funds. Martin Stolworthy asked me if I would collect and sort out the BMS share of the collection. The resulting sale and auction, plus the proceeds for the remaining material sold at Bakewell, raised approximately £600 for the BMS. It was encouraging for the future of mineral collecting in the UK that so many of the Bakewell specimens were scooped up by children. Many thanks to Alison for her kind gift.

Richard Bell

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**TSUMEB.COM now live!**  A website dedicated to the world famous Tsumeb mine and minerals was launched on 8th February 2016 at the Crystal Classics Open House Event in Tucson. The site is a repository for Tsumeb-related information with sections on its history, geology, mineralogy, people and bibliography. It’s superb.

*Contributor – Phil Taylor*
Tell us how you got into being a mineral dealer? It was all thanks to Martin Gale who was helping to organise a mineral show in Norwich. A dealer pulled out at the last minute and Martin asked me to fill in as he knew I had a lot of minerals from my own collecting and also I had the leftovers from a collection I had recently bought. And it was then that I realised it was a good way to get funds to improve my collection.

And you are still working as well? Unfortunately - or perhaps fortunately – yes. I am employed full time by the Royal Mail with my mineral dealing working around that.

Some people think of mineral dealers in the same breathe as bankers and hedge fund managers – what would you say to them? I only do it to better my mineral collection – not to earn a living, so it is fairly small scale with six mineral shows a year and also I place minerals with customers direct.

What got you started on minerals? My daughter Holly. She was interested in minerals and about 20 years ago I took her to see Dick Belson and after he had given her a selection of specimens he asked me if I wanted to go on a collecting trip – and when he told me it was not just collecting minerals but a social trip including scenery, food and beer I was hooked! The only problem is that to this day Holly says I stole her hobby.

And microminerals? I love looking at their crystal forms. At the moment my favourites are radio-actives but I also go for oddities like inclusions.

How do you go about being a mineral dealer – give us a feel for a typical week? No two weeks are the same – it could be sorting through old self collected material or finding out what goodies are in a collection that I have just bought. Then there is cleaning and labelling and trying to keep a list of everything. Roughly speaking I suppose I spend 20 hours a week on minerals and it is a 50/50 split between dealing and my own collection.

So you don’t load up the Landrover and head out for Uzbekistan? I love to do more collecting but I just don’t have the time.

Personally have you preferences for specific areas like Cornwall only or anywhere in the world? I'm a Tsumeb Man first of all, but then I love Cornish minerals and I've also got a thing about gold as well. And then I will go for a good specimen from anywhere in the world.
Are you personally a species collector or do you go for aesthetics? I'm not proud! I will collect anything and everything.

And what are your clients looking for? That's an interesting thought – probably a split of 60/20/20 between aesthetics, location and species.

Tell us about your top three mineral favourites. My favourite is cerussite – even though at first sight it is a plain colourless mineral I love it because there are so many different crystal habits. Then there is wulfenite because of its colour and variety of crystal types – especially from US specimens. And I am very enthusiastic about copper and lead secondaries – I find it fascinating how you can often find such a great mixture of associations and different species in one specimen.

How many mineral specimens have you got? It been very time consuming but I currently have boxed and catalogued more than 5,000 micros, another 5,000 thumbnails, 4,000 miniatures and finally “small cabinet” comes to another 1,800 - quite a few!

What projects have got you excited in the last few months? I have really enjoyed sorting through around 14,000 micros and thumbnails acquired from my very good friend George Fletcher. At the same time I am looking through the diary that George kept on his mineral collecting and mine restoration exploits between 1966 and 1983. It’s an incredible account of one man’s mineral activities. It is a very generous gift and legacy.

And after that? My next job is to give some attention to my gold collection which needs to be gone through to take out the duplicates.

What minerals have you drooled over recently? Anything I can’t afford!

What about your other enthusiasms? Would you believe stamp collecting?

And if we purloined a time machine is there a famous mineral dealer you would like to meet. Can I cheat and ask for two very different people? Sir Arthur Russell and Richard Barstow – though it would be probably best if it was organised so that they didn’t meet each other. They were such different people - but what location knowledge they must have had.

And which historic mineral site would you travel back to? I’d love to have been at Tsumeb in the glory days and also the Frieberg mining district when it was going full tilt.

Do you want to get a last word in? Yes – I really want to thank Dick Belson for introducing me to this fascinating hobby (and way of life) all those years ago.
You decided you needed a purpose built Rock Room? When it became clear that we were in danger of being killed by a rock fall in our own lounge, the microscope had taken up permanent residence on the dining room table and the conservatory resembled a warehouse with boxes of rocks piled up to the ceiling, we knew it was time for a purpose built rock room. The only problem is I now realise it needs to be three times the size!

So what did you do? It takes up three quarters of the garage space, so the front quarter still has ‘garage type’ stuff in it. We had a ceiling put in and a stud wall built with a door to gain access through the existing garage door at the front and it already had a side door into the garden beside the house. I also wanted the floor insulated and raised above the concrete to eliminate as much damp as possible. I decided that it needed central heating, which means I can happily spend a few hours in there, without myself or the minerals freezing!

What's it look like now it's finished? Most of the room is taken up with 10 and 15 drawer filing cabinets for the many thousands of micros. There are also larger wooden drawers for small and larger cabinet specimens and shelves along the back wall to take flats and boxes full of specimens. There is a large desk, (out of shot behind the white IKEA drawer units) that sadly is just stacked with more boxes, but the intention is to eventually free up this space and have a permanent photographic set up and a microscope out all the time. The walls are brick with cream and grey masonry paint. The main light is from a fluorescent strip and natural daylight through the garden door.

**New and Tidy!**
Let's get down to practicalities - how do you do your rock cracking? I have a sturdy manual rock cracker that I've been using for about 20 years with great success, though I sometimes wish I had a hydraulic one as I don’t have the strength I once had! Otherwise I still like to give rocks a good whack with a lump hammer and hope for the best! I've also found that pincers are really brilliant for trimming excess matrix to fit specimens in boxes.

And what do you use to look at the results? I use two microscopes. One is an old stereoscope I bought from Eddy Foy when I first got into micromounts twenty or so years ago. The other is a Dutch Novex trinocular scope that I use most of the time. I originally bought it with a webcam and adapter with software to rig up to a laptop to view and photograph the specimens. I never did get on with the software and it went back in the box. I've since discovered the software no longer works with any of the equipment I now use.

And for light? I have been using Russian fibre optic lighting with a blue daylight filter (great for photos) but that recently died (I need to get a soldering iron out for that one!) and often resort to these small LED or halogen desk lamps. Actually, I won a Hampshire Micros light in the last BMS Symposium Auction (thanks Sheila Harper!), that is pretty good!

You dabble with the mystic arts of mineral photography? Photography is a love/hate thing. I love it, but am never satisfied with the finished results. Mainly because I lack the patience to set up the shot. I've tried many methods through the microscope, using T2 rings and connectors and ultimately find myself resorting to the old Nikon Coolpix 950 using the ‘point, shoot and hold your breath’ method. Sometimes this method even works! Basically time is my enemy. I simply don’t take the time it needs to devote to practicing these skills and improving on them sufficiently to encourage me to do more! As for stacking..... the nearest I get to that is with boxes of rocks! (see pic above)

Are you a Blu tacker or black box and stick person? I'm always impressed by the beautifully mounted and presented 'proper' micromount. They can be a real work of art. I've even attempted it myself on occasion. Using various bits of wood; doweling; toothpicks; plastic, even a cats whisker (yes, really! – naturally shed from kitty’s sweet face). However, mounting stuff ‘properly’ is very time consuming and quite honestly, who can be bothered? Particularly when you've just broken up a tray full of material that needs boxing. It's mineral tack all the way for me (or occasionally glue if the matrix is a bit earthy or fragile).

Where you keep your minerals - before and after? Minerals live in lots of places in our house. Freshly collected ones I like to wash the excess dirt off (if necessary) as soon as I get home, before my body seizes up. Otherwise they go into the outside shed until ready to break. The rock breaking happens in the kitchen (yes, I have a very understanding partner who has me well trained to clear up after myself) and then the specimens are boxed and labelled at the dining room table alongside the
microscope. The minerals are then usually moved out to the rock room. At least that’s the plan. Sometimes they find a semi-permanent place in the house. Larger specimens may also find themselves in one of several large display cabinets in the dining room or conservatory.

Your favourite part of micromounting?
I really enjoy the ‘thrill of discovery’. Whether it’s ‘in the field’ or in the kitchen! After I’ve broken up a big chunk and there’s that flash of colour in a vugh. The first time I look at it under the microscope and……WOW! Yeah. That.

And your least favourite?  Cataloguing. It basically doesn’t happen. I lost the will to live after number 479.........The collection runs into many thousands by now, of material I have either collected, swapped, bought or had passed on to me as surplus material from other collectors (knowing how little I manage to get into the field now) and for which I am always grateful!

How much time a month?  Not as much as I would like – work gets in the way, but a few hours a week, sporadically.

While you are mineralising do you listen to music?  Always! My music tastes are quite eclectic. I will listen to everything from Puccini to Punk. Though not usually at the same time. Right now I’m listening to a 2 hour session of dance (electronic house) instrumental live from Ibiza! Tomorrow it may be the ‘people’s soprano’ - my friend Rebecca Newman, or even Bollywood! Like I said - “eclectic”.

You are a real music enthusiast aren’t you?  Yes! In the dim and distant past I have variously played the violin, keyboards and drums, have been a DJ, sung in bands and choirs and still occasionally compose random stuff on the PC, so not surprisingly music is ever present with the minerals.

What have you been looking at recently?  Weardale Fluorite - of course! But other than the Greenlaws material I have also been looking at complex sphalerite crystals on pyrite found at Hampstead Farm Quarry in June 2015. They are particularly large and lustrous for the locality, found in one of the phreatic caves that occasionally open up in the quarry (from the same area that the fluorite was found in the late 1990’s).

And in your spare time?  I’ve also been researching some unusual species associations in Pakistan Granitic Pegmatites and the apparent misidentification of the
rare beryllium phosphate, väyrynenite: $\text{Mn}^{2+}\text{Be} (\text{PO}_4)(\text{OH,F})$ found with hydroxylherderite and tourmaline on albite with rutile and topaz. Mike Rumsey (NHM) and I have been looking at the paragenesis and although visually the light pink colour and crystal shape are indicative of väyrynenite (no, we can’t pronounce it either) the initial chemical analysis surprised us by throwing up a much longer and more complex formula. So it needs further testing. A delightful puzzle that’s kept us both on the hook for about a year!

Anything else that might be of interest such as a stuffed moose on the wall? No stuffed Moose. But I do seem to be sharing the Rock Room with a small colony of mini wasps. I’m hoping they set up home elsewhere in the Spring…..

Meanwhile, I’ve been asked to photograph a lovely pale blue ajoite for use in a book on Minerals of Arizona and a separate article in Rocks and Minerals Magazine. It’s a micro somewhere in the Rock Room! Now, what music goes with that, I wonder?

Curator’s Corner: The BMS Reference Mineral Collection

Trevor Devon

I am at last able to report significant progress in the use of the Reference Collection by BMS groups around the country. Following the publication in the last Newsletter of a list of “ready-made micromount meeting mineral sets” and a good discussion at the Symposium, I have been fairly inundated with requests. Four themed sets have been loaned to regional BMS groups for viewing meetings and two more requests are in the pipeline. In addition, I have responded to a request from Manfred Seitz on behalf of the Munich Micromounters for reference specimens from the Merehead Quarry. I was surprised how few specimens (baryte, cerussite, chloroxiphite, crednerite, goethite, hydrocerussite, mendipite, mimetite, paralaurionite & rhodochrosite) we had in the BMS Reference Collection and was left to wonder whether someone out there among the membership might be able to contribute some new specimens?

With the increased interest in these BMS sets, John Hall has kindly volunteered to revisit the older sets and review the specimens and reading notes. We have yet to receive any specific comments on the individual specimens sent out for viewing, but should we receive any new information that will be incorporated where appropriate in revised viewing sheets. Such activity would be most welcome and will help bring the collection more to life, rather than just an archive. From the accounts so far received
from the regional groups’ viewing meetings, the sessions have gone well, with some positive feedback on the good quality of the specimens and the viewing notes.

One outcome of a viewing at the Norfolk group was the initiative by Martin Stolworthy to photograph the specimens. Coincidentally in a separate note in this Newsletter Walter Veldsman has proposed we set up a collaborative programme within BMS to photograph the whole collection; gets my vote! If you wish to contact me; my address is Pern Farm, Meres Lane, Cross in Hand, Heathfield, East Sussex, TN21 0TZ, phone number 01435 873898, email trevordevon@madasafish.com.

**In Praise of Ores**

David Green

Ore specimens lie near the bottom of most collectors’ desirability scales. In comparison to the well crystallised specimens that make up the majority of collections, they have limited visual appeal and are usually relegated to the "don't really know what to do with it" boxes in the garden shed. Most of us have boxes like that somewhere in the collection! One such in my own collection was accumulated with the intention of making polished blocks for reflected light microscopy. It seemed like a good idea at the time, but is probably in the near-infinite range of possible futures that will never be explored. More likely than running a four minute mile or being elected to parliament, but ...

Last week I was sifting through the box and a specimen of gold ore looked worthy of attention. The accompanying label noted that it was from Colorado. A heavy egg-sized lump with massive chalcopyrite, flecks of pyrite and specks of gold in dark sulphide-rich quartz, the whole surface covered in a dark goethite encrustation. I hadn’t looked at it before and with a few minutes to spare decided that this was as good a time as any.

The specimen is a vein section measuring 65×40×30 mm; just right size to make a polished block that shows both edges. On closer inspection perhaps three quarters of the piece seemed to be ore-bearing vein, and a lot of what I had taken for very dirty chalcopyrite appeared to be gold. The specimen was so dirty it was hard to tell just what was there so it went to soak in the hope that some of the grot would wash off.

The next morning revealed a vein section containing abundant cubic pyrite, a little massive chalcopyrite and some very dirty galena in quartz-goethite matrix. Rich dendritic masses of gold were abundantly exposed over about a third of the surface! This posed an interesting puzzle. Was there a way to figure out roughly how much gold was there? Or to put it in a more scientific manner, is it possible to produce a reliable estimate of how much of a very dense mineral there is in a matrix that is much less dense. One way is to visually estimate the amount of each mineral in the specimen and use the volume and the density of each phase to work out the masses present. But that invites error: gold is commonly found as thin high-grade smears on

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As the “Red Top” newspapers might proclaim
“Our Dave goes for gold”
specimens, which have low-grade interiors.

A more reliable method, which looks at a specimen in its entirety, is an appeal to Archimedes' Principle: an object immersed in a liquid is buoyed up by a force equal to the weight of the fluid that is displaced. It has numerous applications, one of which is the measurement of density.

In mineralogy, density is commonly represented by the letter D (or d); but physicists tend to think of it as the Greek letter ρ, (rho), which otherwise gets very little use in typography; and with apologies to mineralogical colleagues, that is how it is written here. Starting from first principles, the density of an object is calculated by dividing its mass by its volume:

$$\rho = \frac{m}{V}$$

It is written in SI units as a number kilograms per cubic metre, but neither of these units is convenient for objects on the scale of a mineral specimen. So grams per cubic centimetre are used here.

Roughly, as this is simply a "back of an envelope" calculation, the density of quartz is 2.6 g/cm³, chalcopyrite is 4.2 g/cm³, pyrite about 5 g/cm³, galena is 7.6 g/cm³, and gold is about 19 g/cm³. These numbers are subject to a bit of variation, but will do for our purposes.

It is easy to measure the density of a specimen by finding its weight in air, and the weight of water it displaces (which also gives the specimen's volume). Postal scales were used for the measurements that follow; more accurate electronic balances are readily available for small sums on the internet, but an accuracy of about 1 g is sufficient here. The mass of the specimen was measured as 210 g and the mass of water it displaced 30 g, dividing the two produces a convenient round-number density of 7 g/cm³.

Rather than complete the calculation using these figures, it is worthwhile writing a formula for the mass of gold present. Density is mass divided by volume. And the mass of the specimen is the mass of gold plus the mass of matrix. So:

$$\rho_{\text{specimen}} = \frac{m_{\text{Au}} + m_{\text{matrix}}}{V_{\text{specimen}}} = \frac{\rho_{\text{Au}} V_{\text{Au}} + \rho_{\text{matrix}} V_{\text{matrix}}}{V_{\text{specimen}}} = \frac{\rho_{\text{Au}} V_{\text{Au}} + \rho_{\text{matrix}} (V_{\text{specimen}} - V_{\text{Au}})}{V_{\text{specimen}}}$$

Condensing the subscripts and rearranging:

$$\rho_s V_s - \rho_m V_s = \rho_{\text{Au}} V_{\text{Au}} - \rho_m V_{\text{Au}}$$

and therefore the volume of gold is:

$$V_{\text{Au}} = \frac{V_s (\rho_s - \rho_m)}{\rho_{\text{Au}} - \rho_m}$$

And gives a simple equation for the gold's mass

$$m_{\text{Au}} = \rho_{\text{Au}} \frac{V_s (\rho_s - \rho_m)}{\rho_{\text{Au}} - \rho_m}$$
All these quantities are known except the density of the matrix, which must be estimated. This can be done by estimating the amount of each matrix phase present, and for the specimen in question produced a value of $\rho_m = 4\pm0.5$. The advantage of a formula is clear, as it is easy to see that the main source of error in the calculation is in the term subtracting the density of the matrix from the density of the specimen. Feeding the numbers into the equation, the mass of gold present is $114\pm16$ g, about half the mass of the entire specimen!

At first this seemed surprising; I guessed, without any calculation, that the specimen was at most 15% gold by volume. But 20% gold is all that is needed to account for half the weight, (assuming the matrix does not contain a lot of very dense sulphides). The calculation is a reflection of the fact that a relatively small volume of a very dense mineral can account for a lot of weight.

If this story has a moral it is perhaps that things are not always as they seem. Even quite dull and dingy looking specimens in the "don't really know what to do with it" box can provide entertainment. And the next time I see a box of ore specimens at a mineral show, I will take the time to have a careful look through it!

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**Vitamin C revives again**

Just a quick note about Vitamin C. I have found that goethite can be removed by prolonged boiling in a Vitamin C solution, without boiling it takes literally months of soaking in the stuff. Galena (and possibly other sulphides) are attacked, while malachite is reduced to copper with boiling. Wulfenite that has been oxidised orange-brown can be freshened up to give brighter and more lustrous crystals but I would keep the process to a minimum – I am guessing that repeated treatment would eventually start to damage the crystals. However associated pyromorphite/mimetite is unaltered.

The Vitamin C can be absorbed on these matrices and getting the residue back out can be time consuming - over time the specimen starts to develop a brown skin which simply dissolves away in water but this may need to be repeated a number of times depending on how 'spongy' the matrix is. I had some nicely crystalline plumbogummite from Roughton Gill which was a pale sea green colour but coated with a thin skin of goethite. So I boiled it in a Vitamin C solution which revealed a classic cobalt blue plumbogummite - much better than anticipated. So – it can be time consuming and always needs some caution but with the right specimen the results can be spectacular.

*Contributor – Peter Todhunter*
Homemade LED light box

My first serious problems with 50 cycle light flicker came to a head after installing a Dino Light sensor on to my microscope. Despite the anti-flicker system built in to the dyno light software – nothing seemed to eliminate it. I had been talking with a friend in Germany who had built several prototype LED light boxes but still suffered the same problem even after spending a lot of money on so called stabilised LED drivers. Yes they seem fine to the naked eye but under high magnification it still posed a problem especially when trying to do a stack shot.

The first attempt at my small LED light box, a plastic container with the bottom sawn off gave encouraging shadow free results especially on micro specimens. The interior of the container was spiral wound with a strip of self-adhesive 5600k LED strip found on eBay and a simple diffuser made from wound up architects’ tracing sheets. The breakthrough came when I tested the unit on a 12 volt DC battery source; the smooth current of course solved the problem of flicker.

Stage two was the design of a much larger unit manufactured from an offcut of 250 mm diameter underground drainage pipe. The internal surface was roughed up and a clear plastic primer sprayed on. A hole was drilled near the bottom to allow the feed wire to exit, (my five metre led strip came already wired with a fly lead), and the self-adhesive strip was carefully wound until all used up. A quick tip – it helps to warm the tape and pipe to improve adhesion. The Pound Shop provided the plastic Tupperware type diffuser and strangely the poor quality of the cloudy plastic worked to my advantage and provided a perfect shadow free light with no hot spots. The adjustable stand was manufactured from offcuts from the scrap box and granny’s old flat iron provided a heavy stable base. The battery box holds eight AA batteries and was fitted with a plug to enable it to be used on either light box as required. The batteries have been used regularly for over three months on both lights and power consumption seems minimal.

Contributor   Peter Trebilcock
Notes from the Duchy
Rob Selley

Wheal Hatchet
In the early part of January this year my friend Nick Pettett was over on Wheal Hatchet, an old mine which later worked under South Roskear. He was doing a mine search looking for the two known shafts, - Footway and Hollyhock, both marked on the mine plans. Wheal Hatchet was at work in the 1700's. The area of interest was on a yard, which used to be the parade ground, next to the old Territorial Army buildings along North Roskear Road, Camborne. Nearly the whole area was covered with mine waste between two and three foot deep. In the first strip he dug there was a lot of hard greenstone which sometimes had massive garnet veinlets, some massive sphalerite in quartz and occasionally, in the killas, there were traces of cuprite, but all grown in. Also Nick had a quartz/killas rock with massive galena in it. On the second day he found Footway Shaft and about three foot to the side another shaft not on the plan. Both were sunk through decomposed greenstone. You could see the marks on the walls where it had been barred down along with a couple of hitches cut in. Everything being dug out was mine waste but there was not a great deal in it.

We did have some chalcedony show in a couple of rocks which fluoresces blue. One interesting thing from the fill was a big quartz rock which had been used as a mortar stone. On the fourth day he found Hollyhock shaft at the other end of the site, a big shaft nearly five meters square and filled. There used to be a bungalow on top of it and it was interesting to see the footing like a bridge across the shaft. At this end there was colour showing, mainly malachite in thin sheets. In one lump I brought home I had some brochantite, langite and chalcophyllite. I also had anatase in one lump of quartz/chlorite. For the amount of waste it was hard work finding anything.

Sheila’s Fizz – vauquelinite
Sheila Harper

Late in 2015 my other half, Steve, was watching ‘World at War’ on the TV. I’d been busy elsewhere and slopped into the room to where the sherry was kept. I got side tracked by what was showing on the TV screen – a wartime picture showing the Rue de Vauquelin.

Ah vauquelinite! From Greystone Quarry, Lezant, funny stuff, I couldn’t get a jizz for it until Chris Jewson gave me a micro of said mineral. A lot of what we found looked like mucky khaki insect droppings if I remember rightly. I had never really done any research on this mineral so over the New Year I have been on a very interesting journey and it first took me to Paris … but only via the web .... poo. I eventually found out that the Rue de Vauquelin which had started my journey was in Dieppe and the ‘World at War’ programme was about the failed ‘Dieppe Raid’ in 1942 when many of the allied forces lost their lives.

I decided to follow up on that Rue de Vauquelin street sign which had caught my eye and so ‘Googled’ Rue de Vauquelin and up came ‘The BSHS Travel Guide to Scientific Sites’ put together by Charles Tanford and Jacqueline Reynolds. The front page featured the ‘Institut Curie, Paris’ - not what I wanted - but I read the article and at the bottom of the page was information about the Curie’s original laboratory, on the Rue de Vauquelin. It was where Marie and Pierre had discovered and purified radium. Quoting the authors - the Curie’s worked “in the most wretched, cold laboratory imaginable in the basement of the Ecole Superieure de Physique et de Chimie”. Interestingly in the Institut Curie where Marie later worked, her laboratory and office have been turned into a museum. Unfortunately much of the technical equipment used in the early research had to be dumped as it was so contaminated with radioactivity.

This reminded me of when I was at Technical College and my class was told about a house in Clerkenwell, London, an area famous for clock makers. Here women used to paint watch faces with ‘luminous paint’ – highly radioactive as I am sure you know. The stuff got everywhere - even between the floor boards. Whether this is true or not – the house was sealed up – the words used were ‘wrapped up’ and may be it is still there today.

The formula for vauquelinite is $\text{Pb}_2\text{Cu}(\text{CrO}_4)(\text{PO}_4)(\text{OH})$ – a lead copper chromate. Who was the mineral named after? It turned out Vauquelin was a French man born in 1763. He started his working life as a laboratory assistant to a pharmacist and gradually moved up in to the world of analytical inorganic and organic chemistry. Some of his research was done with kidney stones. It seems these were very easily available! He discovered chromium in 1797, extracting it from Siberian Red Lead (Crocoite).
The most comprehensive information about vauquelinite from Greystone Quarry available to me was published in the UK Journal of Mines and Minerals in 2004. (Famous British Mineral Localities: Greystone Quarry, Lezant, Cornwall. N Elton, D Green, J Hooper & S Weiss. UK JMM 24, 2004, pp 9-28). I finally got round to reading the article and was pleased to see that the vauquelinite found at Greystone Quarry is a first British occurrence. This pleasure was a little spoilt by the fact that the Maurice Grigg specimen analysed from Greystone Quarry turned out to be an intermediate between vauquelinite and fornacite (the arsenate analogue of vauquelinite). They are members of the brackebuschite group of minerals and apparently vauquelinite is also closely related to molybdofo Richardson and the authors recommend that vauquelinite specimens from Greystone Quarry deserve further research.

As many of you know my Steve and I ran mineral collecting holidays in Cornwall for many years. The first mention in my records, of any mineral containing chromium found at Greystone Quarry was in October 1990 when I make a note in the schedule to look out for crocoite, lead chromate, and millerite, nickel sulphide. I had previously found millerite on a Russell Society trip but no crocoite. Eventually in 1998 I find in my records that vauquelinite was being found and I have a specimen or two from then. I guess it was turning up before then but it wasn’t common knowledge. As for crocoite it has so far eluded me ….. but who knows what is lurking out in my rock shed.

Tomato Tray Tales

Harry Critchley

The village of Caldbeck is named after its river the Cald Beck, although the locals still tend to call it ‘Back O’Skidda’ as it is dominated by Skiddaw towering above to 931m. Other fells in the district are Blencathra, High Pike and Carrock Fell - all over 2000 feet. The area is one of the more remote and lesser known parts of the Lake District, yet boasts some outstanding scenery and the best, less frequented, walking in
the Lake District. Mining in the Caldbeck area began in the 13th Century with a ‘hey day’ in the 17th century when it was said that they were “worth all England else”.

The "Roughton Stone" in the churchyard of St Kentigern’s is a 19th Century mill stone used in mineral treatment and is a memorial for all those who worked in the mines of Roughton Gill over 400 years and who were buried in the churchyard. (For more information see www.caldbeckvillage.co.uk, from where this image is taken.)

In 2000 the Lake District National Park Authority (LDNPA) adopted a mineral collecting policy based on the view that the ‘fragile and finite’ nature of the mineralogical and archaeological resources of the Calbeck Fells required protection. The policy currently applies to the LDNPA’s property on the Calbeck and Uldale Commons and also the part of the Calbeck Common owned by the Dalemain Estate. There are variously designated red, amber and green zones within which different conditions apply, and these are specified in the Code of Conduct for Mineral Collecting on Calbeck and Uldale Commons. One of the ‘conditions for collecting’ is to publish information on any findings of the mineral collecting; something the BMS Editor will always be very pleased to do!

So which Tomato Trays did I select this time? It was from a trip to Sandbed and Driggith in May 1998, a couple of years before the licensing scheme came in. Mike Leppington led the trip and it was a fine day! The tray contained some blue green botryoidal bayldonite, as usual from here, hydrozincite, smithsonite, quartz, baryte and some pale green crystals (after consultation with Mike this was identified as adamite) all from Sandbed. From the open cut at Driggith we had had found some of the usual translucent green pyromorphite/mimetite though this seemed to me at the time to be getting scarcer. Then as the day wore on we extended our walk to up to Drygill. As time was limited when we got there I had only picked up some mimetite and its variant, campylite with some manganese minerals occurring as occlusions in quartz. Mike, as usual, managed to find some yellow plumbogummite. We were quite late getting back to the car but it was well worth it.

As I unpacked the tray I was thinking of the days when we spent weekends staying in Heskett Newmarket, walking all over the fells collecting, with the evenings spent in the local hostelry quaffing the real ale from the micro-brewery there. I understand that the Norfolk group did this on a regular basis and had quite a reputation amongst the locals at the time!
The next tray moved us to the other side of the Lake District at Kinniside Mine, near Cleator Moor. This tray was collected on a trip in April 1996 and it contained some reasonably good specimens of green pyromorphite and Jackstraw cerussites. We were hoping to go underground here but we could not get permission in time.

As you can see the TT productivity is down quite considerably this time but there is a good reason. We had a month at the end of 2015 in Tasmania attending the Joint Australasian Mineralogical Society’s annual conference held partly in Launceston and partly in Zeehan. Since our return I have been processing the minerals found on the five days of collecting plus those from the two days at the Zeehan mineral show. We brought twenty nine kilos of self-collected material back with us, along with quite a bit of material exchanged or bought over there, and I have still a couple of kilos to go before I can start on more old time tomato trays.

Sorry! I should, however, be back to the straight and narrow next time.

Branch News - Meeting reports

Future dates for your diary

You will always be welcome at any BMS Branch Meeting. So why not check if there is one during your next holiday or collecting trip and give yourself an extra treat by meeting up with other BMS members from “foreign parts”

Devon & Cornwall Branch

Meetings are held in the Long Room, Liskeard Municipal Offices, 3/5. West Street, Liskeard PL14 6BW. We start around 1 pm. and aim to finish by 5. Parking is available just 100 yards from the venue in West St Car Park. Entry £1.50, includes refreshments. Do please come and join us if you are in the area, we can guarantee a friendly welcome, a ‘scope to use and minerals to view. For further details please contact Chris Jewson on 01872 560687 or chris@jewson1694.fsnet.co.uk

Next Meeting: Saturday 5th March. 2016 dates 4th June, 10th Sept, 10th December.
December Meeting Report  
David Roe

Martin Ellam brought a pre-Christmas Cheer to our meeting with his rather flamboyant Xmas jumper and festive spirit continued as David Roe unpacked his Christmas parcel from Father Christmas who was dressed up as Peter Trebilcock. David had acquired a handsome Cornish Rock Cracker which was greatly admired and a debate on its unusual design features ensued – there was a general agreement that it would be welcome in many micromounters’ stockings. Peter demonstrated his home built LED light (see Tech Tip in this issue) and then produced some gorgeous gemmy apatite specimens with siderite from Fowey Consols which were distributed amongst the attendees. Avril Woodburn, Nigel Hoppe, Chris Jewson and Sheila Harper contributed more than a few micromineral specimens to the afternoon’s proceedings with Rob Selley acting as identification mentor and moderator on any resultant queries. All agreed the afternoon was a splendid festive treat – and parking was free.

Sussex Branch

The meetings are from 7 pm. to 10 pm. and take place in the Redwood Centre, Perrymount Road, Haywards Heath. Meetings are free and built around various themes chosen by members and make good use of the BMS Reference Collection specimens. Members’ latest mineralogical finds and unidentified specimens etc. are also most welcome for viewing/discussion. Refreshments are served for a nominal charge. Contact John Hall on 01444 415066 or jahall116@gmail.com for more information. Next Meeting: Friday 11th March, 14th October 2016  Themes: TBA

October Meeting Report  
Theme: Worldwide Arsenates
Reporter: John Pearce

There is nothing like a volunteer and at our last meeting Trevor Devon offered to organise the next session based on arsenates from his collection. By May he had identified 200 specimens and made a start on organising and describing them based on John Hall’s format used for our study evenings. However all the good intentions to complete the task evaporated and it was 4 o’clock on the afternoon of the meeting that the ink finally dried on the paper.

Trevor wrote a general introduction which reflected his background as a chemist:

“The arsenates (containing the AsO₄ anion) are fairly widespread as secondary minerals, having formed from primary ore minerals or rocks that have been subjected to near surface oxidising conditions. These conditions often lead to hydroxy (OH) salts and/or water of crystallisation.

The metallic arsenates (e.g. copper, iron, aluminium, magnesium, nickel, zinc, cobalt, cerium and uranium) are generally quite colourful, ranging from yellow, pale brown, orange, red, purple, blue and green. For some reason there is a wider abundance of copper arsenates – perhaps the widespread distribution of copper, or the possible chemical affinity of copper for the arsenate anion.

In going “worldwide” you will probably spot that certain sites turn up quite frequently, notably: Clara Mine in Germany, Laurium Mines in Greece, Majuba Mine in Nevada, USA, Ojuela
Mine in Mapimi, Mexico. In the UK, Cornish and Cumbrian sites feature most strongly for arsenates”.

Trevor produced 10 trays of approximately 100 arsenate specimens organised into: Mimetites (lead chloro arsenates); adamites (zinc arsenates); olivenites (zinc copper arsenates); conichalcites; agardites (copper cerium arsenates); copper arsenates; copper hydroxy arsenates; iron arsenates; erythrites (cobalt arsenates) and other arsenates. Most of the specimens were well known to us, but Trevor threw in a few more obscure ones such as the rich pink cobaltkoritnigite, zdenekite, karibibite, tsumcorite and sainfeldite.

He also included on occasion more than one specimen from the same location showing how different their appearance can be. The pink coloured cobalt arsenates were outstanding and the single specimen which caught my eye was a cluster of very lustrous light blue scorodite crystals on top of dark green balls of cornwallite. Superb!

The 12 members present greatly enjoyed looking at Trevor’s selection and appreciated the notes that accompanied them. We learned a lot. Thanks Trevor!

North West Branch
Meetings are every two months, on Saturday afternoon except in September and October when we have them on Monday afternoon. All meetings are held at Harry’s in Blackrod. We decide the next meeting date at the end of each meeting. If members from other branches are in the area PLEASE get in touch (chcritchley@uwclub.net), we will gladly use your visit as an excuse to plan another meeting!

December Meeting. Reporter: Christine Critchley

The theme was ‘Favourites’ and members were asked to bring specimens of favourite mineral, site, colour, story. David Hardman brought a tray containing Broken Hill micro specimens including raspite, hydrozincite, carminite, mimetite, corkite, bustamite, segnitite, silver and anglesite. Richard Bell had some recent acquisitions from Cornwall, Derbyshire and the Caldbeck Fells which included a very nice Roughton Gill hemimorphite. David Green came with a ‘description’ of deep purple fluorite crystals from a recent find at Boltburn, Weardale which compared very favourably with fluorite from other sites in the area from ‘much older days’. Keith Snell reported on recent collecting at Buckden Gavel Mine, Wharfedale,
Yorkshire where finds have included not only the usual hemimorphite but also an unknown amorphous silicate yet to be identified. Harry Critchley had a tray of swap minerals from his recent trip to Tasmania and this led to a discussion about a specimen from Tom’s Quarry, Kapunda, South Australia of gordonite, or was it minyulite?

The jury is still out on this but the query did lead to even more discussion around ‘How do we really know what we have got?’ This linked in with one of the talks at the Tasmania Symposium devoted to ‘Have you or have you not got it!!’ by Prof Pete Williams who is currently at Western Sydney University but is also a lifelong member of the Russell Society. Both here, and in Tasmania, the conclusion was that unless the individual specimen has been analysed we do not really know what we have in our collections. A sobering thought.

Keith S and David G then led a discussion on mineral identification methods and a wish list of ‘instruments’ which would be needed for such a study. Discussions continued over a serving of pizza and donuts.

### Midland Branch
We are now a group of some 18 members and we meet around four times during the winter. Meetings are held at Roy & Mary Starkey’s home, 15 Warwick Avenue, Fringe Green, Bromsgrove, Worcestershire, B60 2AH, 01527 874101

Next meeting: 3rd April Theme: practical workshop on the photography of micro and hand specimens.

### January Meeting: Theme: “Ladles of soup and slag”
Reporters Roy Starkey and Adrian Wyatt

Ten of us attended – Bob Bucki, Ron Gibbons, Neil Hubbard, Frank Ince, Maria Justamond, Doug Morgan, Jane Randle and Adrian Wyatt plus hosts Roy and Mary Starkey. As is usual with the Midland’s meetings we had set a theme, and this time it was minerals of North Wales. We enjoyed browsing through a fine selection of micros, including anatase from a variety of localities, brookite, apatite, fluorite on sphalerite from Halkyn, exotic species from Benallt Mine, gold from the Dolgellau area and anglesite in a bewildering variety of habits from Parys Mountain. A more general natter ensued and then a second round including themed sets from the BMS Collection “Curator’s Choice” followed on,
supplemented by a box of Scottish minerals from the previous meeting for those who had not been able to attend. Mary and Roy provided yet another lunch break treat of leek and potato and/or parsnip and pear soup together with warm bread rolls. They were so delicious seconds were called for!

At our previous December meeting a conversation on slags had resulted in Doug Morgan volunteering to give a presentation on the subject, and he came equipped with a beautifully illustrated PowerPoint presentation and a selection of hand specimens. Enthused by the prospect of this, Bob Bucki had very kindly agreed to go hunting for some specimens from a tip used by Albright and Wilson to dispose of waste from their former phosphorus plant near Oldbury. Doug had made a thin section of this material some fifty years previously and was keen to get some more material. Well, Bob came up with the goods, and Doug has gone away a “happy bunny”.

Doug’s talk was entitled ‘For the love of slags’. He began by outlining the iron making process from the early days of the bloomery furnace up to the modern hot air blast furnace. Slides of the various slags that were formed were shown including fayalite, mineralogically known as olivine. The slag produced by the submerged carbon arc process, running at 1700°C, resulted in some amazing micro-sections showing pseudo-hexagonal twinning. Under cross polarisation the crystals appeared multi-coloured with matching zones in yellow, pink and blue. The audience erupted with cries for copies to make wallpaper! Members were encouraged to pay attention by humorous commentary including digressions into how iron was cast into ‘pigs’ and why Doug’s neighbour had a large hole in his boundary wall!

Yet another anecdote revealed the reason why an oil fired steel cupola furnace almost seized when the slag became too thick to tap off. Doug had come to the rescue and found the slag was mullite, a high alumina-silicate. Eventually, after raiding the nearby houses for all the jam jars and bottles that could be found and throwing them into the furnace, the slag became more fluid and the charge was saved. When the owner was told that there was too much aluminium in the charge he admitted that any seized pistons had not been removed from the scrap car engines which had been melted down.

After a look at a nickel slag, Doug’s finale was a description of his Sega cone test to determine the grade of clay required to stem the flow of iron from a furnace. A picture of the resulting test material: a refractory brick with four cones of dark clay
collapsed randomly over two white alumina clay bases had an astonishing resemblance to two Can-Can dancers. This resulted in him advising the cupola operator to stop using clay from the graveyard!

Members applauded Doug’s efforts and were ushered into the kitchen to take tea. The kitchen table rapidly became laden with slag samples for everyone to examine, including a polished section of magnetic oxide bloomery slag. Bob showed his collection of high phosphorous slag from the old blue rock quarry in Oldbury and Doug identified crystals in a steel slag brought in by Adrian to be melilite.

Finally, to wrap the meeting, Roy gave a brief presentation showing photos of the newly refurbished building at the Lapworth Museum, and outlined some of the planned new displays. The Museum is planned to re-open in June 2016.

Thanks to Mary and Roy for hosting and to Doug for a super talk giving members an insight into his love of slags! Members said their good-byes and departed, no doubt determined to find out more about their new found interest in metal silicates!

Norfolk Branch
We meet at a local church hall on the outskirts of Norwich. Normal club times are every first Tuesday of the month, and included in that are the micro meeting nights which are usually two or three times a year. We normally find that all the club members attend on the micro nights, as of course it is mineral related, and there are always interesting discussions on the topics listed for a particular micro evening.

Next meeting: 5th July Theme: crystal variations from BMS reference collection

February Meeting: Theme: BMS Reference Collection - Caldbeck Fells
Reporter Richard Belson

12 members met for the evening at our usual venue in Norwich, complete with microscopes and some of the members’ own specimens. We had borrowed 48 specimens from the BMS Reference Collection from the Caldbeck Fells in Cumbria and this provided a good representative selection of various minerals from many of sites in the area. Martin Stolworthy had very kindly offered to take photograph the specimens to show as a slide show, against the description of each specimen that had previously been written by John Hall of the Sussex Group. Martin’s photography facilities are fairly basic; a Nikon Twist Body 4500 camera plus bellows/and or microscope with his own adaptation for lighting. A couple of the specimens were under 0.5 mm in size and it proved difficult to get a decent photograph, so where possible he took images of his own specimens - and used some of David Green’s photos to replace the specimens that were minute.

On the evening all the specimens were laid out in order given in John’s listing and then we had a slide show of the specimens which included images of the collection sites. During the slide show several pertinent questions were raised and answered (hopefully) correctly. After the slides the specimens were viewed on the microscopes and any further questions answered and, where practical, the points raised by the
questions on various specimens were elucidated by a repeat viewing of the relevant slide. All in all it was a productive and enjoyable evening, as always photos are never as good as looking through the microscope, but with an audience it certainly enhanced the way we discussed and looked at the specimens.

There will be a CD of the Caldbeck slides provided to the BMS for any group to use in conjunction with John’s mineral list, courtesy of Martin Stolworthy.

BMS Field Trip to Drakelands Mine

Unfortunately I have had my request to visit Drakelands (Hemerdon) turned down on this occasion. The response says that they are proud of the mine and want people to see it but at the moment all senior staff are needed to ramp up production. {The letter goes on to suggest making another attempt later in the year which I will do for either a Friday or Monday – let me know if you are interested at crinnis@btinternet.com}.  
Contributor – David Ifold

As always – many, many thanks to everyone who has contributed material to this Newsletter and to our eagle eyed proof readers – John Pearce, Frank Ince and Norma Roe - who always perform speed proof reading miracles. I am the proud owner of any remaining errors. And a special thanks to our printer Robin Mundy of Perry Print in Chard who in addition to achieving a superlative colour reproduction in the printing also does the Newsletter distribution.

The next BMS Newsletter should be in June 2016 so the copy deadline is  

1st June 2016

– but anything received before the deadline makes it so much easier to plan.

Please send all contributions for the next Newsletter - preferably in electronic format by e-mail, to david@d-roe.freeserve.co.uk It is best if the photographs are attached as separate jpeg files and less than 1 Mb.

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