Website Newsletter of the Cape Town Gem & Mineral Club

MAY 2022

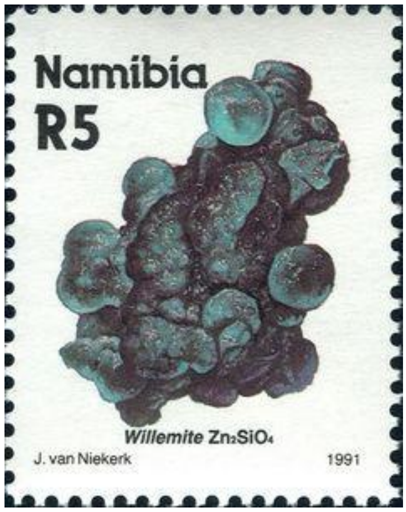
DIARY

May	***7***	***10:00–14:00***	***Open to the Public Day – Rocks, gems, jewellery, mineral specimens to look at, chat about, swap, sell or buy. MASKS MUST BE WORN IN THE CLUBHOUSE.***
June	***4***	***10:00–14:00***	***Open to the Public Day – Rocks, gems, jewellery, mineral specimens to look at, chat about, swap, sell or buy. MASKS MUST BE WORN IN THE CLUBHOUSE.***

COLOURFUL BOTRYOIDAL MINERALS REVISITED

by

Peter Rosewarne



Introduction

Due to popular demand, the article from mineral chatter #135 of March 2021 has been revisited, with some new colourful *botryoidal* mineral specimens that have since been added to the Rosey Collection. This might come as a surprise seeing as I tell everyone that I am downsizing my collection but, in this age of fake news, you can't always believe what people tell you 😊. The specimens are mine but the photographs were mostly taken by the dealers, hence the good quality of most of them. Nothing too technical in this article, mostly colour and form and a bit of descriptive text.

The term botryoidal refers to a mineral's habit or form and in this case its similarity to a bunch of grapes. If you want to get more technical, this habit can be further broken down into *mamillary* and *reniform*, but we'll stick with botryoidal for this article.

The Minerals

Smithsonite

One of my favourite mineral species is *smithsonite*, mainly because it comes in so many colours and forms, from large rhombohedral crystals to large aggregates of botryoids. It is a simple zinc carbonate, $ZnCO_3$, that forms in the supergene enrichment zones of primary lead-zinc deposits such as at the Tsumeb, Refugio and Kelly mines in Namibia, Mexico and New Mexico, respectively. It is especially well developed in ore bodies hosted in carbonate rocks where circulating hydrothermal solutions dissolved cavities and deposited replacement secondary ores, usually at the level of the water table, where pH conditions changed, which may be very deep, >1 000 m, and have stayed fairly static for a very long time. It is named after James Smithson who, in 1802, first differentiated between the minerals that were previously known as *calamine*, which he showed was a combination of *hemimorphite* (zinc silicate), smithsonite and *hydrozincite*. The Smithsonian Institute in Washington USA is also named after him.

The various colours are attributed to the presence of trace metals or substitution of metallic ions in the crystal lattice. Broadly speaking, yellow indicates the presence of cadmium sulfide (*greenockite*), pink the presence of cobalt and green, copper, whilst brown colours are due to iron impurities.

Figures 1 to 8 below show some colourful examples of botryoidal forms of this mineral.

Figure 1: Blue Smithsonite, El Refugio Mine, Choix, Mexico (Well Arranged Molecules)

Figure 2: Green Smithsonite from Toussit, Morocco (John Betts Fine Minerals)

Figure 3: Yellow Smithsonite, El Refugio Mine, Choix, Mexico (Weinrich Minerals)

Figure 4: Pink Smithsonite, El Refugio Mine, Choix, Mexico (Joel Arem Collection)

Figure 5: Yellow Smithsonite on Silver Smithsonite, El Refugio Mine, Mexico (The Mineral Gallery and Auction)

OK, so not all of these specimens are new; **Figure 6** shows a nice cuprian smithsonite that I sold to Crystal Classics in a moment of madness several years ago. I still get seller's regret ☹

Figure 6: Cuprian Smithsonite, Tsumeb (Rosey image)

Figure 7: Olive-green Smithsonite, Mina Ojuela
(John Betts Fine Minerals)

Figure 8: Smithsonite, The Kelly Mine, New Mexico, USA
(Weinrich Minerals, Rosey image)

Figure 8 is a specimen from the renowned Kelly Mine in New Mexico, USA, whose robin's-egg blue smithsonite is widely held to be the 'best-of' for this species. My modest specimen is hardly a world-beater but perhaps gives an idea of what really good examples can look like (see mineral chatter #135 for an example).

Hot off the press below is a specimen from Choix that I bid for on The Mineral Gallery Tucson Show Best Offer Auction that hasn't even been posted to me yet.
I leave it to dealer Kevin Ward to describe **Figure 9**, "*Lustrous specimen of lavender Smithsonite atop matrix! The botryoidal surfaces of this lovely specimen are basically flawless with no major contacts and a beautiful, pinkish-violet coloration. The lustre shimmers atop the rolling Smithsonite and lighter patches of coloration provide contrast and additional colour to this cabinet sized plate*." It is from the El Refugio Mine, Choix, Mun. de Choix, Sinaloa, Mexico.

Figure 9 (Kevin Ward image)

Malachite

This mineral doesn't need any introduction and is a stalwart of many a mineral collection and also as a decorative and semi-precious stone for ornaments and jewellery. A copper carbonate, $Cu(CO)_3OH_2$, it always occurs in shades of green often with very attractive concentric banding, especially in polished sections and botryoids. The example in **Figure 10** is of a specimen from the Mindingi Mine in the Democratic Republic of the Congo (DRC) which exhibits a lovely silky lustre. The specimen in **Figure 11** is from some one-of-a-kind examples from the Milpillas Mine, Mexico, which is featured in the September-October 2021 issue of the Mineralogical Record. If you haven't read it yet, get hold of a copy and feast your eyes on some of the best *azurite* and *malachite* specimens ever found.

Figure 10: Malachite, Mindingi Mine DRC (Weinrich Minerals)

Figure 11: Silky Botryoidal Malachite, Milpillas Mine, Mexico (Weinrich Minerals, Rosey image)

Chrysocolla

Chrysocolla is the most common copper silicate and is an oxidation product of copper sulfides. The example in **Figure 12 below** is from the Kambove Mine in the DRC which also has some dark green sprays of *brochantite*, a recent purchase from Rob Smith.

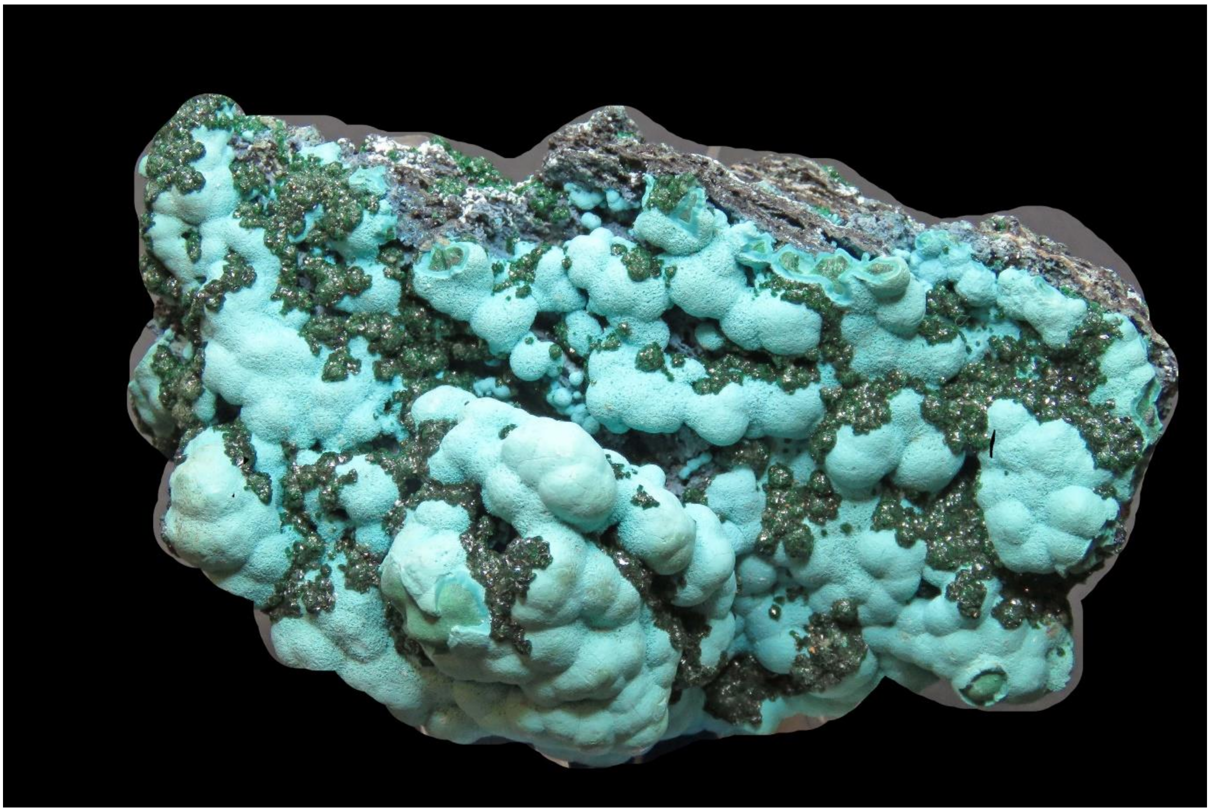


Figure 12: Chrysocolla with Brochantite, Kambove Mine, DRC (Rob Smith, Rosey image)

Shattuckite

Shattuckite, $Cu_5[(OH)Si_2O_6]_2$ is an alteration product of other secondary copper minerals and the specimen in **Figure 13** was traded for some Tsumeb minerals with Graham Harrison (Cape Minerals). It is from the farm Mesopotamie 504 near Khorixas in northwest Namibia. The shattuckite is coated with *chalcedony* and an overgrowth of later micro-crystals. The grey host mineral may be *chalcocite*.

Figure 13a: Shattuckite, Namibia
(Cape Minerals, Rosey image)

Figure 13b: Shattuckite, detail
(Cape Minerals, Rosey image)

Adamite

Adamite is a zinc arsenate and the specimen in **Figure 14** also isn't new; my wife bought it for me many years ago as a Xmas present and it is from the prolific specimen-producing Mina Ojuela in Mexico. To me, the mineral seems to be flowing like molten yellow-green lava over the *limonite* matrix. A classic.

Figure 14: Adamite, Mina Ojuela, Mexico
(Rosey image)

Figure 15: Prehnite, Cradock Area
(Shannon Pelham, Rosey image)

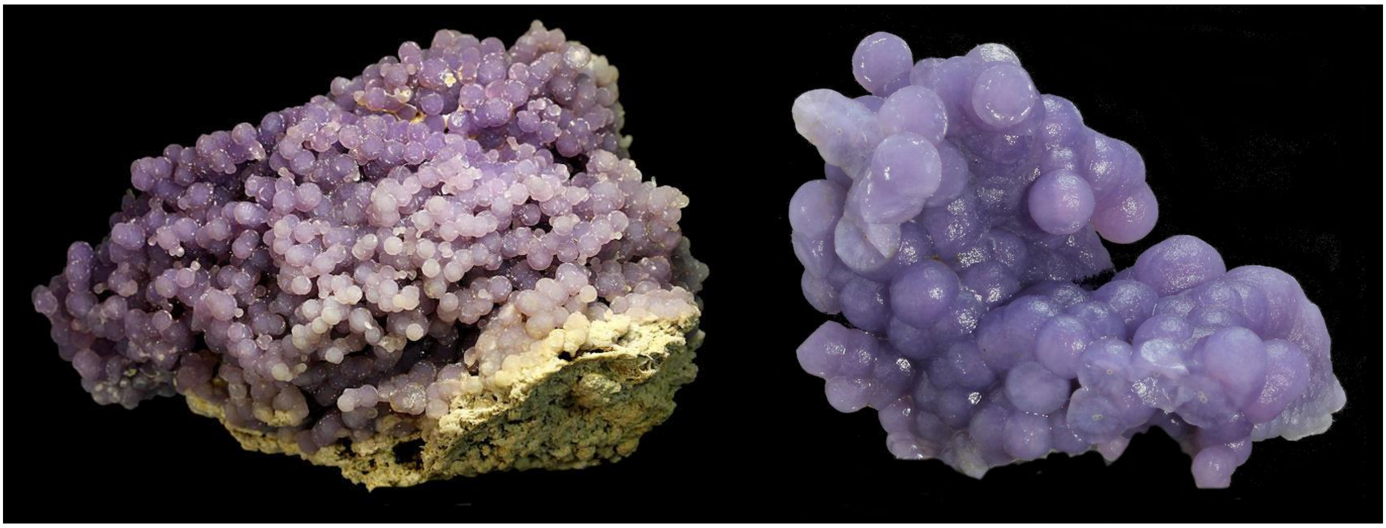
Prehnite

Another fairly recent acquisition I couldn't resist is this *prehnite* from the Cradock area shown in **Figure 15 above right**, courtesy of Shannon Pelham. Cradock is the type area for this mineral, which is a calcium-aluminium silicate, and is named after Hendrik Prehn who discovered it in 1788. It is usually associated with *dolerite* or *basalt*.

Concluding Remarks

So, there you have it, botryoidal minerals revisited, and some more colourful images to brighten up your day. The fact that minerals display such stunning colours and forms begs the question, why (apart from chemistry)? Because, for millions of years, in some cases hundreds of millions of years, they were mostly buried in deep hiding places where no light penetrated. And until a few thousand years ago there was nobody to unearth them from the depths of their stygian hiding places. Which begs the *anthropic principal* to answer the question of why are we here and why is the universe suitable for humans to develop from a primeval soup, evolve eyesight that detects light in the visible spectrum range and an appreciation for things aesthetic, such as **colourful** botryoidal minerals? Er, "Pass!"

Referring back to the Introduction, **below are photographs of an ultimate botryoidal mineral** resembling a bunch of grapes, grape *agate*/*chalcedony* (courtesy of Hummingbird Minerals) which I have on good authority is in fact a*methyst*. These examples are from Indonesia.



References

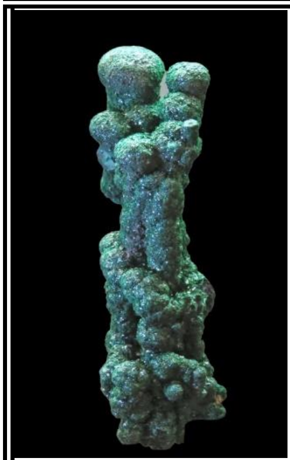
Cairncross, B and McCarthy, T (2015), *Understanding Crystals and Minerals*. Struik. Cape Town.

Hawking, S. and Mlodinow, L. (2010), *The Grand Design*. Bantam Press. London.

Hughes, T. Liebetrau, S. and Staebler, G. Eds. (2010), *Smithsonite: Think Zinc!* Lithographie No. 13. Lithographie LLC. Denver.

Von Bezing, L. Bore, R and Jahn, S. (2014), *Namibia: Minerals and Localities 1*. Bode. Salzhemmendorf, Germany.

From the Cabinet of Curiosities



This month's curiosity is **Stalactitic Malachite** from the Kambove Mine in the Democratic Republic of Congo, a mine which produced gold prior to its main copper production. This exquisite specimen shimmers as if it is covered in metallic green glitter. Acquired from Rob Smith, who has boxes full of curiosities waiting to be discovered or rather rediscovered. And if you are ever stuck wondering which way up a stalactite or stalagmite goes, just reflect on this bit of wisdom; tites come down and mites go up. **PR**

Describe your own original curiosity and send it to us with a photo.

Facetips

LIST OF SMALL ITEMS FOR FACETING

Suppliers: Lipman – 65 Wale Street (easy parking) 021 424 3371
Goldsmith & Jewellery Supplies – Canterbury Square, 021 461 1663
Oberholzers – Spin Street, 021 461 7370
African Gems & Minerals, 076 665 1711

Carat balance (expensive, but Tanita is the best)
Alcohol lamp
Lamp wicks
Small brass vernier calipers
Gem display boxes
10× magnifying loupe (get a good one)
Metal gem tweezers (preferably with grooved grips)

Leeco brown wax
Jeweller's green wax for big stones (It's less expensive.)
Methylated spirits
Squeegee bottle for meths
Small knife or scalpel with blades
Lighter
Small butane torch and refill
Small can WD40
Small spray bottle for water/polishing mixture.

Paper towels
Plastic drain bucket
Plastic drain pipe
40 W round clear appliance bulb (from Claremont Home Appliances, Eagle Electric)
Plastic water jug
Black/blue Artline market (with chisel tip) to 'paint' facets
Ballpoint pen/pencil
Notepad
Nail brush
Baby oil/liquid paraffin for looking at rough in immersion bottle
Fine steel wool to clean contaminated laps
Detergent/baby shampoo to add to drip water

ooo0ooo

<u>Brukkaros Mountain</u> and Tses Barite Prospect

GPS Coordinates S 25°53’ 7" E 17°46’57“ by Gisela Hinder

The Brukkaros Mountain is situated in southern Namibia, between Mariental and Keetmanshoop. It forms a prominent landmark within the Nama plain, rising up to 1600 m above sea level (600 m above the surrounding plain of Precambrian to Cambrian Nama sediments) . A large dome-like structure with a central depression of about 3 km in diameter can be observed. The Gross Brukkaros Volcanic Field covers an area of about 25 km in north-south and 20 km in east-west direction. The Upper Cretaceous, approx. 75 mill year old, Volcanic Field consists of more than 100 dykes and 74 vents, mostly located on the dykes. The dykes have a radial orientation pattern with an intersection point at the southwestern boundary of the Balcony, a horst structure north of Gross Brukkaros, and Gross Brukkaros itself. The dykes have a width normally not exceeding 0. 5 m and a length up to 2 km.

Fig. 1 Brukkaros Mountain from a south-easterly direction

Fig. 2 Barite crystal

According to a paper from 1992 by K. P. Kelber, L. Franz, T. Stachel, V. Lorenz and M. Okrusch, the morphological features and the occurrence of volcanic and subvolcanic rocks in the vicinity led Janse (1969) to the interpretation that Brukkaros represented a volcanic crater. Later studies, e.g. Nicholayson and Ferguson (1990) supported a volcanic origin and postulated a cryptovolcanic event. The main part of the dome consists of quartzites and shales of the Fish River Subgroup (Nama Group) with a late Precambrian to Cambrian age. These sediments are intruded by several dykes and diatremes of the Gibeon Province with carbonatitic and kimberlitic compositions. The Nama sediments are unconformably overlain by a sequence of gravelly sandstones and mudstones of fluviatile and mass-flow origin (Brukkaros sediments). The whole pile has an exposed thickness of almost 300 m and dips towards the centre of the depression. Lenses of lake beds are intercalated within the sediments in the upper level of the Brukkaros sequence. These lake beds were first described by Miller and Reimold (1987) and form isolated bodies 100-500 m in diameter. In the central parts of these bodies a laminated fine-grained facies is interbedded with sandy, turbiditic deposits. At the edge, the lake beds are intercalated with fluviatile and mass-flow deposits. Fossil plant remains were found within sand- and mudstones in the central parts of the former lake bodies.

Fig. 3 Satellite image from Brukkaros Mountain

The investigation of the fossilized lake bed sediments revealed a well sorted, fine-grained sandstone, in which grain size varies between 60 and 200 mµ. Sedimentary layering is well defined by alternating quartz and clay mineral-rich beds. The grains of the sediment are poorly rounded and, in the case of feldspar, always angular. Besides quartz, clay minerals, and flaky carbonate grains, plagioclase and subordinate microcline are observed.

The feldspar content often exceeds 25% which classifies these rocks, in part, as arkoses. Accessories are opaque minerals, apatite, mica and tourmaline. Intergranular spaces are mainly filled with quartz and clay minerals, whereas carbonate is scarce. Based on preliminary evidence from Gross Brukkaros, as described here, the similarities of the three tapho-floras are the occurrences of wood, ferns, (?)dicots and seeds or fruits. The macrofossils of Brachyphyllum-type conifer shoots from Gross Brukkaros of presumably Cretaceous or post-Cretaceous age reinforce the scenario of a Podocarp-Araucarian coniferous forest during the Cretaceous-Paleocene (Coetzee, 1983; Dettmann, 1989:92).

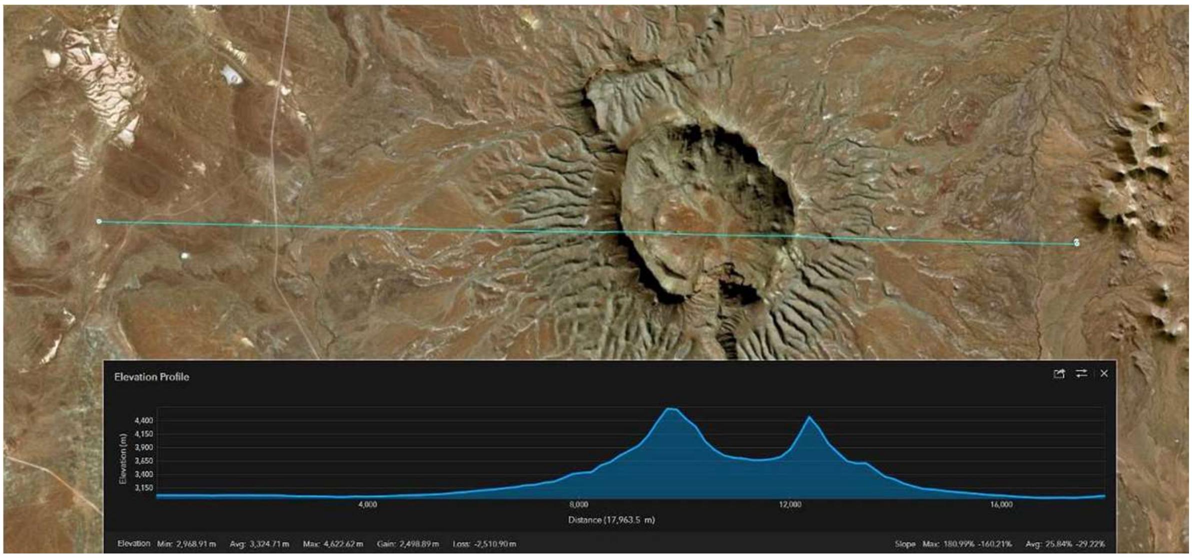


Fig 4. Satellite image from Brukkaros Mountain and elevation profile, provided by Dr. J. Barrett

Using criteria developed during studies on sociological and ecological characteristics of present-day vegetation, it is possible to distinguish two different plant communities at Brukkaros. Mesophilous conifers represented by Brachyphyllum sp. grew in drier habitats at a greater distance from the waterside, in contrast to hygrophilous horsetails and ferns. These preferred the vicinity of a water body or a more groundwater-saturated soil. Rayner et al. (1991) suggested a seasonal temperate climate with 'cool' winters and substantial rainfall.

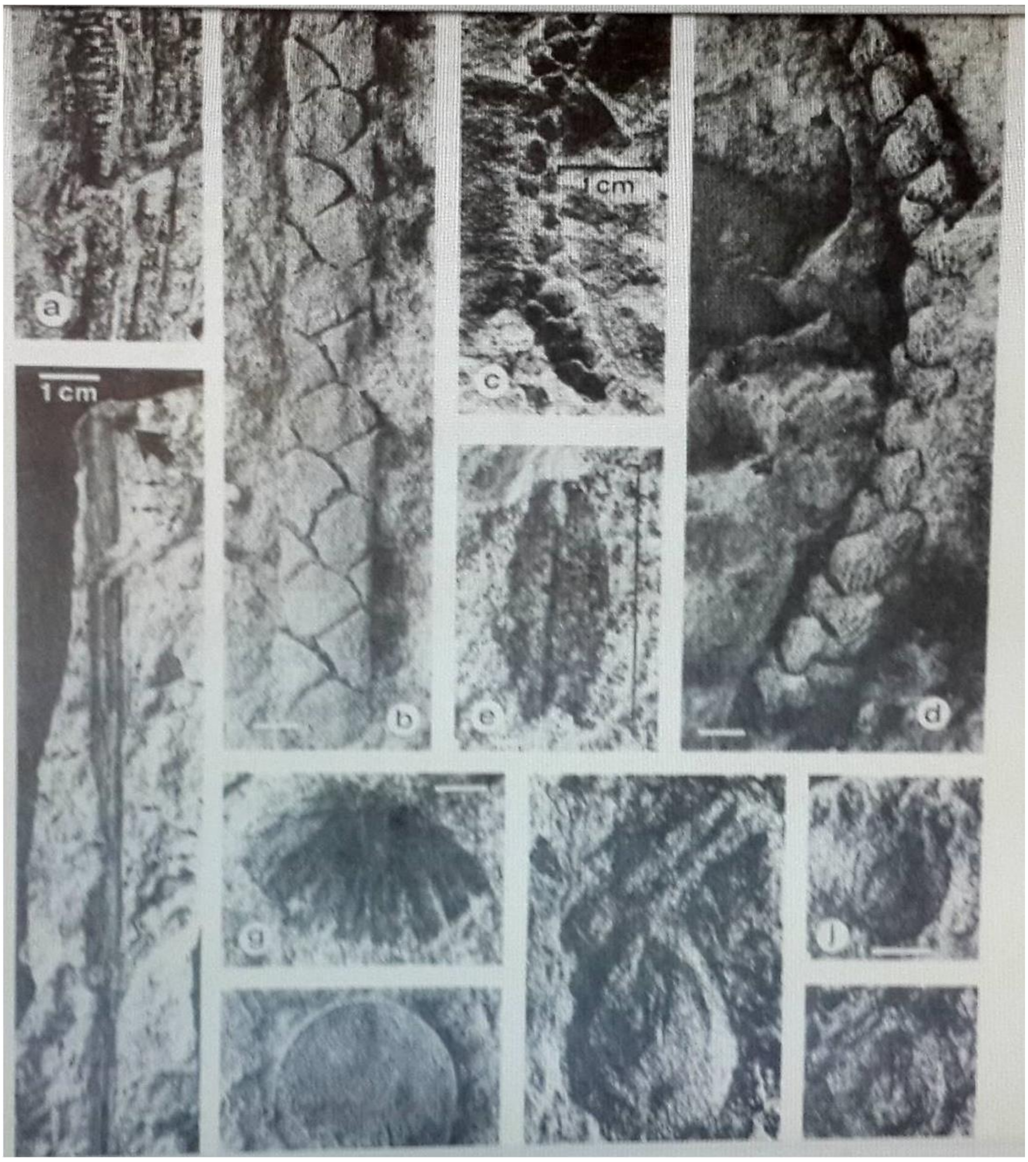


Fig. 5 Image from K. P. Kelber, L. Franz, T. Stachel, V. Lorenz and M. Okrusch, 1992; showing wood fragments from Brachyphyllum sp. and isolated leaf scars of fern trunks

Tses Barite Prospect

The Tses Barite Prospect is situated about ?? km to the east of Mt. Brukkaros on the eastern flank of a small hill. According to the small miner Oom (uncle) Adam Christian, barite specimens have been extracted at this locality at least since the 1970s. Other mineral occurrences on the north-western flank of the Brukkaros Complex, yielded pale amethyst crystals and Nb-rich brookite as small (< 0.5mm) green crystals, found in a dyke like body, barite, goethite and limonitic material (WERNER AND COOK 2001). Since I have some interesting barites from the Tses Barite Prospect already in my Rosh Pinah Geo Center and still having contact with Oom Adam, I was delighted to hear that they had found some new specimens of barite near the previous diggings, some on matrix as clusters of several crystals and single crystals.

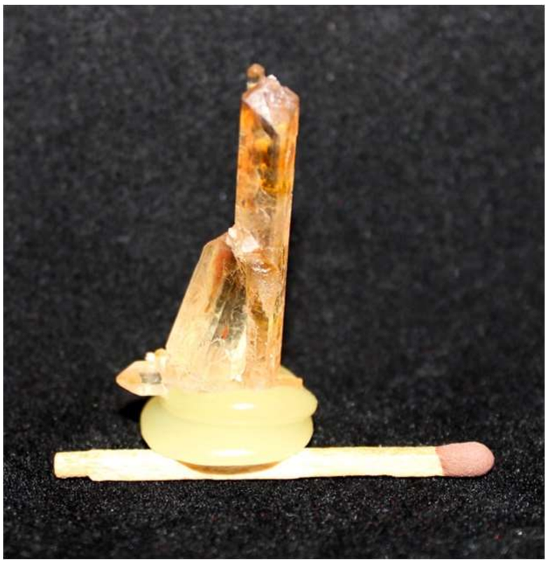


Fig. 6 Small dark honey coloured barite from an older find

Fig. 7 'Candle barite' with a whitish coating ?. The crystal is yellowish grey under the coating, note the tip of the crystal

Fig. 8 'Candle barite'

Fig. 9 'Candle barite' without coating

A trip to the Brukkaros was planned on the 23rd of March 2022 with a stay over in Bethanie and leaving for the diggings the next morning. The scenery along the gravel road fom Bethanie to Berseba was beautiful after the good rain the whole area had received.

Fig. 10 On our way to Mt. Brukkaros, the little town of Bethanie is located in the plain

Fig. 11 Water everywhere

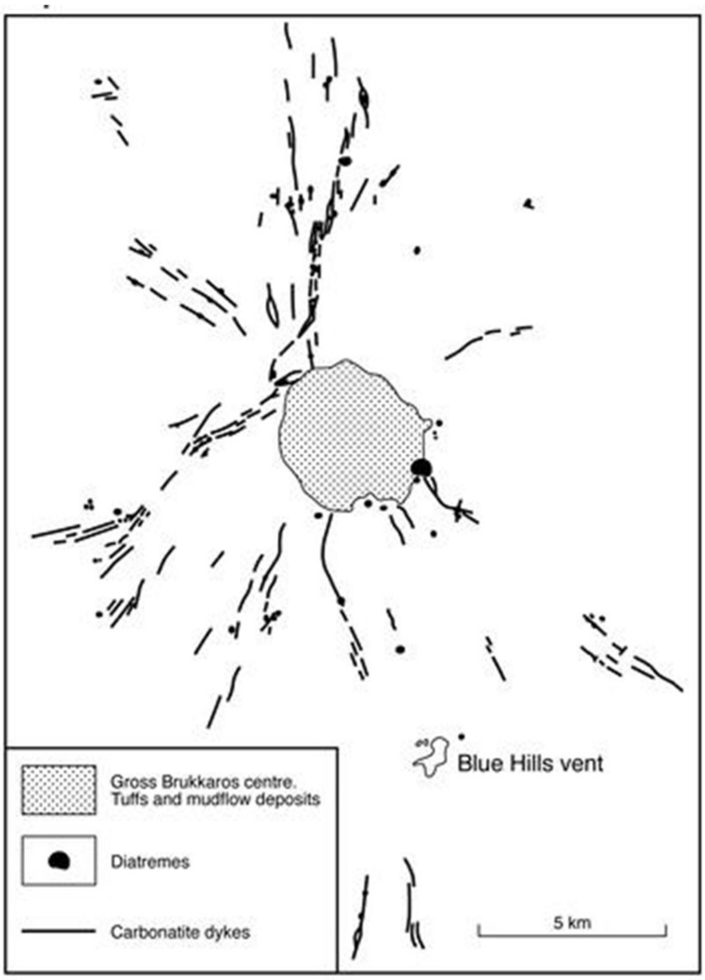


Fig. 12 Sketch showing the Gross Brukkaros Volcanic Center, vents and the radial orientation pattern of the carbonatite dykes (provided by Dr. J. Barrett)

The origin of the Ba-rich solutions could be two fold. Carbonatitic liquids were released with the emplacement of the carbonatite intrusions and dykes in multiple phases, reacting with quartzo-feldspatic wall rocks of the Fish River Subgroup sediments and altering them into fenites. High concentrations of Ba (0.3 wt%) in the fenites are probably taken up from the alkaline-carbonatite fluid.
There is also the possibility the Ba was leached from country rock like the Fish River shales (shales have a high Ba content) when the alkaline intrusions were emplaced (info provided by Dr. J. Barrett)

Carbonatites and alkaline-silicate rocks are the most important sources of rare earth elements (REE) and niobium (Nb), both of which are metals imperative to technological advancement today and in the future.

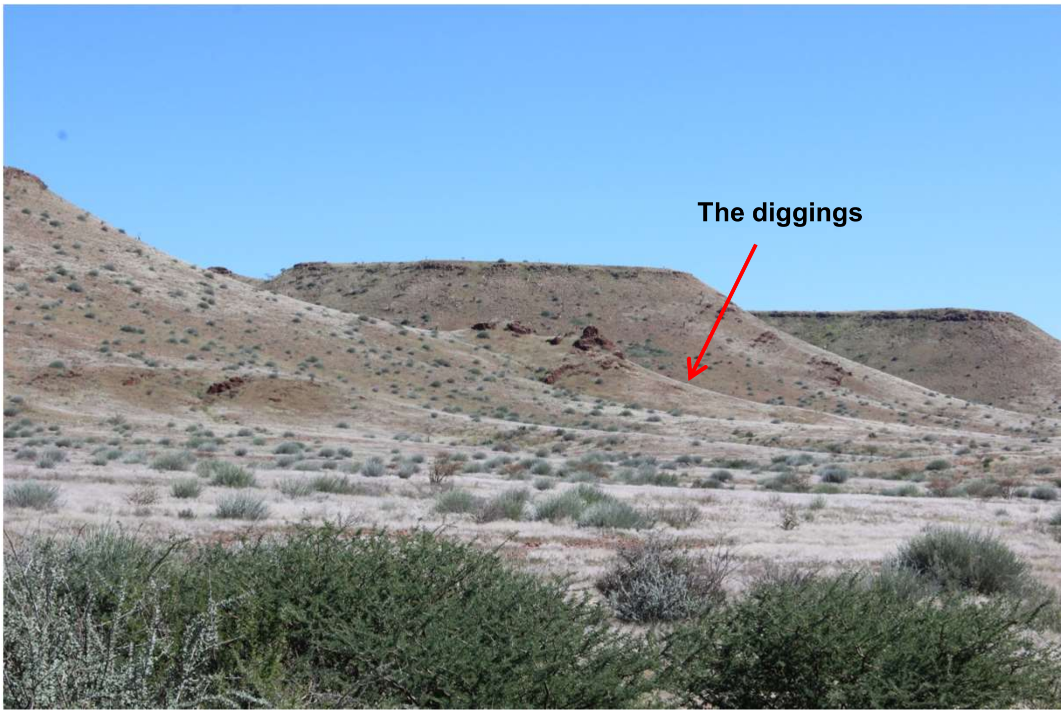


Fig. 13 The location of the barite diggings in flat lying sediments of the Fish River Subgroup

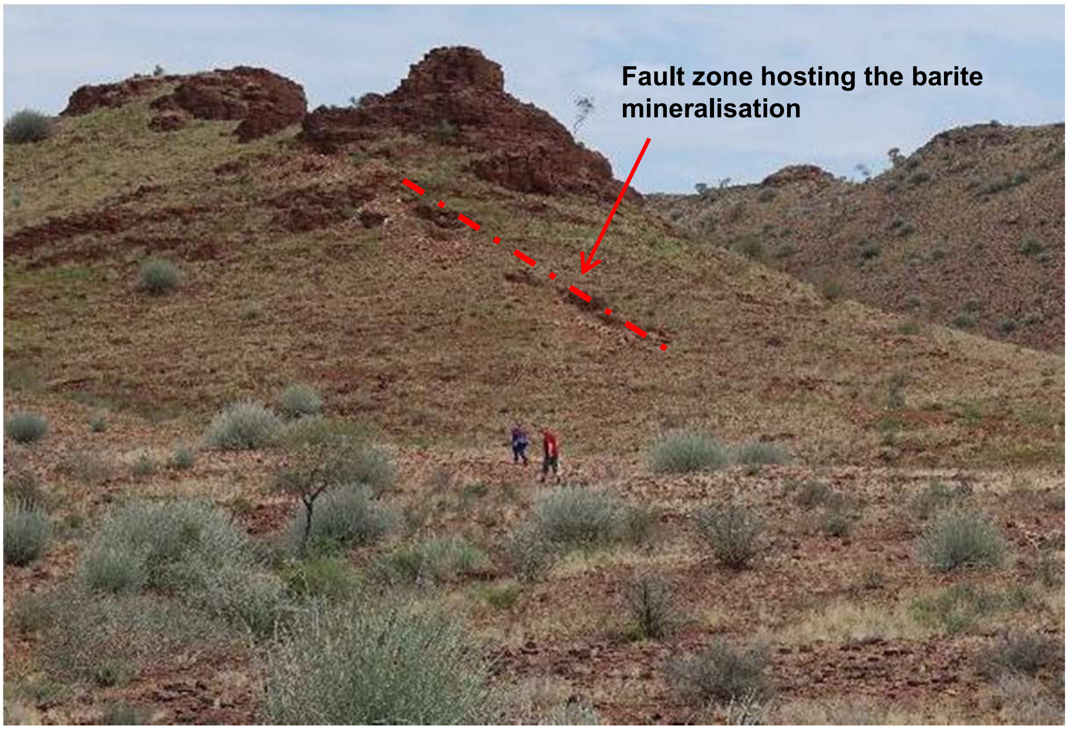


Fig. 14 Closer to the location of the barite diggings in flat lying sediments of the Fish River Subgroup, photo by R. Bast

Fig. 15 The trenches dug by Oom Adam and another small miner, photo by R. Bast

Fig. 16 At work extracting barite crystals, photo by R. Bast

Fig. 17 Barite crystals lining the side of the fault zone, photo by R. Bast

The barite crystals occur in a fault zone running more or less NW-SE, cutting through the strata almost vertical. It is suggested that late stage metasomatic fenitization probably introduced the Ba leached from the carbonatite. Barite is quite a mobile element and can go into solution and re-deposited as crystalline barite in stringer zones (information and diagram provided by Dr. J. Barrett).

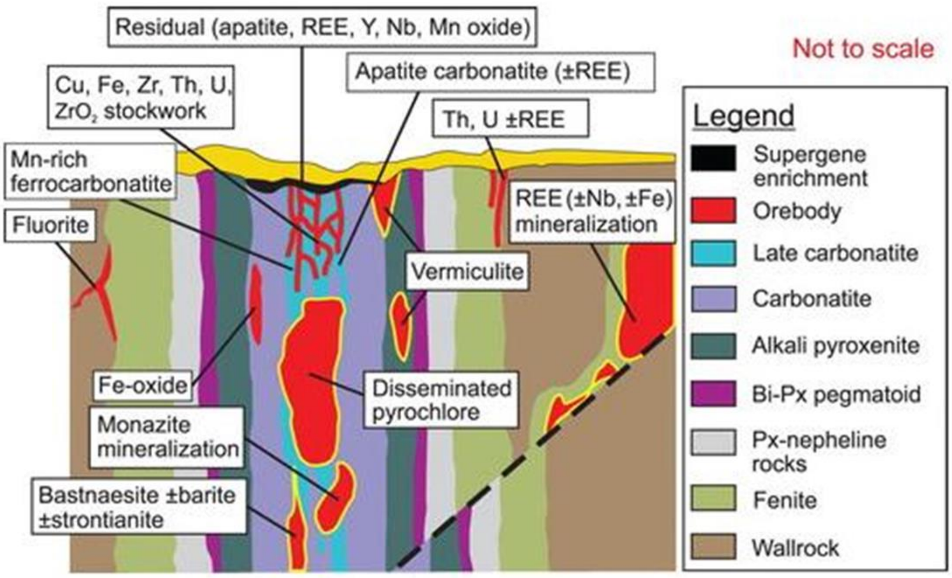


Fig. 18 Schematic distribution of barite, other elements and REE in a carbonatite

Barite Gallery






Author's details: Gisela Hinder, Rosh Pinah Geo Center, Cell: 00264 813780008, gisela.hinder007@gmail.com