

# JULY 2022



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## DIARY

<b>July</b>	<b>2</b>	<b>10:00–14:00</b>	<b>Open to the Public Day – Rocks, gems, jewellery, mineral specimens to look at, chat about, swap, sell or buy.</b>
	<b>9</b>	<b>14.00–16.00</b>	<b>Members' MEETING/ACTIVITY DAY IS BACK!!! Join us for a fun minerals quiz.</b>
<b>August</b>	<b>6</b>	<b>10:00–14:00</b>	<b>Open to the Public Day – Rocks, gems, jewellery, mineral specimens to look at, chat about, swap, sell or buy.</b>
	<b>13</b>	<b>14.00–16.00</b>	<b>Members' MEETING/ACTIVITY DAY</b>

## Postscript to the Uranium Article of March 2022

by  
Peter Rosewarne

### Introduction

I finally got around to finishing *Digging Deep: A History of Mining in South Africa* by Jade Davenport (Jonathan Ball, 2013) a couple of weeks ago. Chapter 19, the last chapter, is entitled, *The Fission Factor*, and contains interesting information on uranium mining and its impact on local mining and the economy. This note is therefore intended to round-out the uranium article in the March 2022 MinChat and is based mainly on this chapter and some personal observations. Unfortunately, there isn't much scope for pretty pictures to go with this postscript.

### Background

The founder of modern geology in South Africa (SA), Dr AW Rodgers, produced a paper on radioactive minerals in SA in 1915 but as there was no commercial use or value for them at the time it was seen more as a curiosity than anything more important. Uranium was first discovered in SA by accident in 1923 when some heavy metal residue from the refinement of gold from the conglomerates of the West Rand was analysed and found to be uraninite. This was also seen as a purely academic discovery at the time, with no economic use for uranium but the discoverer, metallurgist RA Cooper, wrote a paper on the subject.

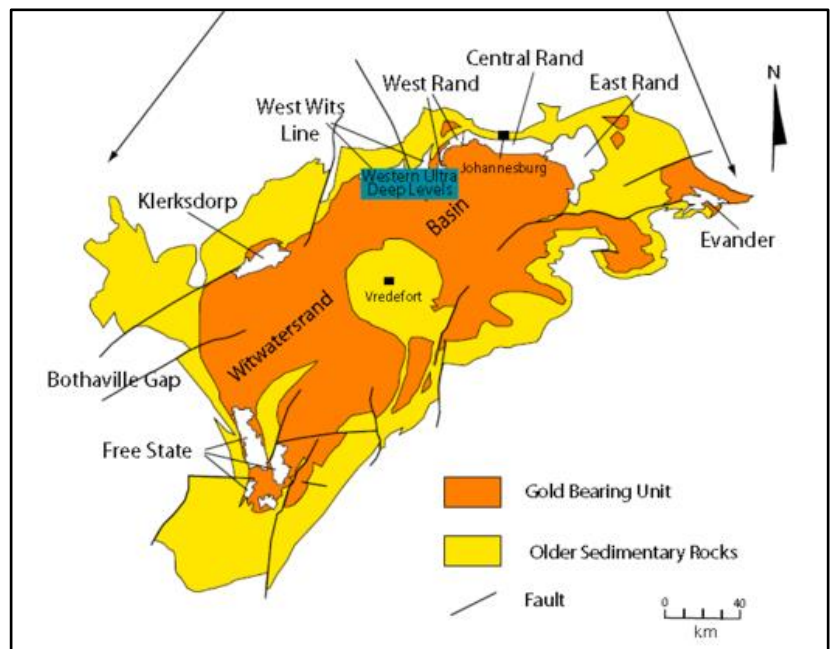
Once the potential of uranium for producing weapons of immense destructive power and for generating electricity became apparent in 1945, the three main producer and researcher countries of and into uranium set about identifying and securing all known sources world-wide. These countries were the United States, Canada and Great Britain and they formed the Allied-centric Combined Development Trust (ACDT).

The two papers mentioned above were noted by the ACDT and metallurgical investigations were initiated by an American geologist in a mission deemed to be so top secret that the only person in SA who knew about it was the then prime minister, Jan Smuts. Results must have been seen to be favourable as Smuts was approached to sanction further work on extracting uranium from the Witwatersrand conglomerates. This time he enlisted the aid of the President of the Chamber of Mines and others were brought into the project and samples from selected gold mines on the West and East Rand were tested with a primitive Geiger counter. The results were very favourable although it was later found that the Geiger counter had produced exaggerated readings.

### Gold Deposits of the Witwatersrand Basin

Average uranium content of the conglomerates was nine ounces to the ton compared to five pounds to the ton from typical uranium deposits in the USA but the hard and costly work had been done by the mines in bringing the gold-bearing ore to the surface and milling it to slimes from which the gold was extracted. However, obtaining uranium from the left-over slimes proved to be difficult and the solution took much research to perfect. The process basically involved mixing the slimes with dilute sulfuric acid, agitation and the solution obtained clarified and passed to another section where it was precipitated and purified into yellowcake.

Two pilot uranium plants were set up at Blyvooruitzicht and Western Reefs gold mines under conditions of strict secrecy in 1949/50. This was due to the deteriorating relationship between the USA and USSR and the start of the Cold War and the nuclear arms race. Further plants were later commissioned at West Rand Consolidated Mine and the Daggafontein Mine on the East Rand. An initial 10-year contract was drawn-up for SA to supply the US with all the uranium output from these plants. Due to the heightened demand for uranium, a further eight plants were added in the 1950s. There is a lot more detail that could be added here regarding further developments of this programme but that is beyond the scope of this note.



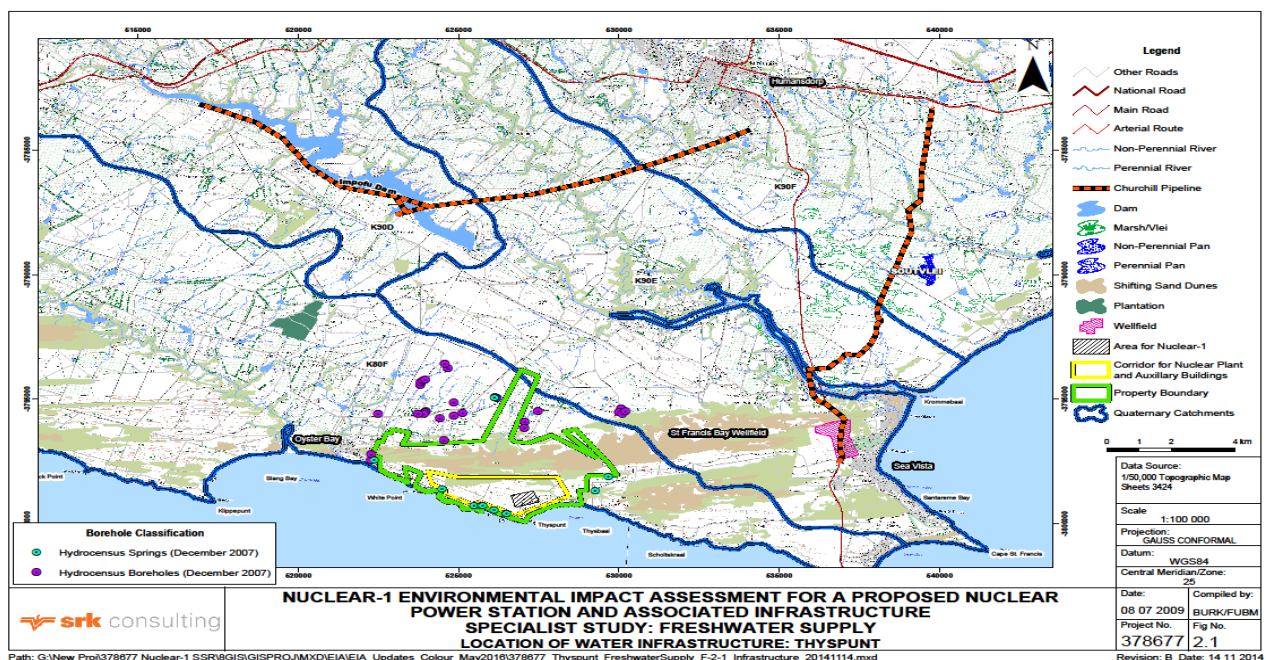
### Milestones in South Africa's Relationship with Uranium

SA has an interesting history of involvement with uranium from mining and selling it, to use in medical research and production of pharmaceuticals to development and decommissioning of nuclear weapons to construction and operation of a nuclear power station. These milestones are noted briefly below:



Pelindaba

- ✚ 1957: SA government signs a 50-year collaboration agreement with the USA which included the acquisition of a small nuclear reactor and supply of enriched uranium. A facility was set up at Pelindaba which went 'critical' in 1965.
- ✚ 1974: Decision taken to develop a limited nuclear deterrent capability. Six nuclear bombs are secretly built.
- ✚ 1976: Eskom announces the decision to build SA's first nuclear power station at Koeberg and the first unit is bought on-line in 1984 and the second in 1985, with a combined output of 1 800 MWe.
- ✚ End 1989: SA's nuclear arsenal is dismantled on the orders of president FW de Klerk as the threat of communism receded and the country sought to return to normalising international relations. SA remains the only country to have developed nuclear weapons and to have voluntarily dismantled them.
- ✚ 2010: Eskom submits EIAs for the establishment of new nuclear power stations ('Nuclear-1') at Thyspunt (near St. Francis Bay), Bantamsklip (near Pearly Beach) and Duynefontein (Koeberg).
- ✚ 2022: It is planned to extend the life of Koeberg by 20 years and possibly commission another two units on the same site and/or at Thyspunt (see map below, green polygon).



Proposed Thyspunt Nuclear Site (map in the public domain from the EIA)

### Concluding Remarks

I stand to be corrected but I don't think there has been a single mine in SA where the prime product has been uranium. It has always been produced as a by-product of mining of other metals, particularly gold on the West Rand and to a lesser extent copper at Palabora and some other mines. The nearest SA has come to mines exploiting uranium as a primary product has been in the Karoo near Beaufort West, as described in the uranium article of March 2022. Otherwise, it occurs at sub-economic concentrations in SA, and it is only when the cost of mining is supported by extraction of e.g. gold that it becomes viable to exploit it. With the cost of gas and oil rising dramatically with geopolitical tensions and war in Europe as of April 2022, could uranium be poised to make an unlikely comeback? It could be fourth time around for revival of the Ryst Kuil uranium deposits...

**Footnote:** My prediction above, made a couple of months ago, seems to be coming true. The following are some snippets I noted from an article on uranium that I read yesterday (25 May 2022).

Appetite and demand for U is building. Price has gone from \$28/pound to \$68 this year. Driven by renewed nuclear power interest and sanctions on Russia that previously supplied 35% of world demand.



## Minerals in Art

by  
Peter Rosewarne

### Introduction

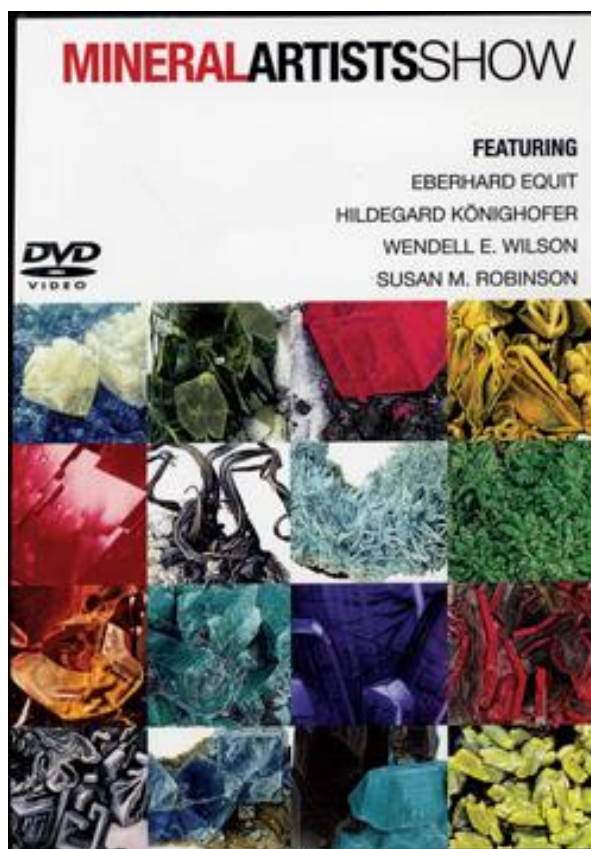
The subject of this month's Minchat article is a bit like the one on postage stamps – where do you draw the line (pun intended) as there is so much material to choose from? This article covers art in the form of stand-alone paintings only and in this regard, a number of collectors are apparently having paintings done of their favourite specimens (pers. comm. Dona Leicht, Kristalle). The medium used by the artists featured here ranges through acrylic, oil, watercolour, gouache and coloured pencil and the styles from lifelike to impressionist to crypto.

Searching through the Internet there is a plethora of images and information on minerals in art with some stunning images out there. Prior to the invention of colour photography in the 1890s lithographic/painted images were the only way of depicting mineral specimens for dissemination to the scientific community and in those days, there was no Internet for the masses.

At the Tucson Show of 2010, a Mineral Art exhibition was held **(see image to right)** featuring four of the leading mineral artists, Wendell Wilson, Susan Robinson, Eberhard Equit and Hildegard Könighofer. In many cases, the paintings were accompanied by the actual specimens depicted. Rocks & Minerals features a mineral artist in each edition. The Mineralogical Record has an online Museum of Mineral and Mining Artworks containing hundreds of lovely images of minerals in art. We will look at some of the remarkable paintings by these and other artists in the next section.

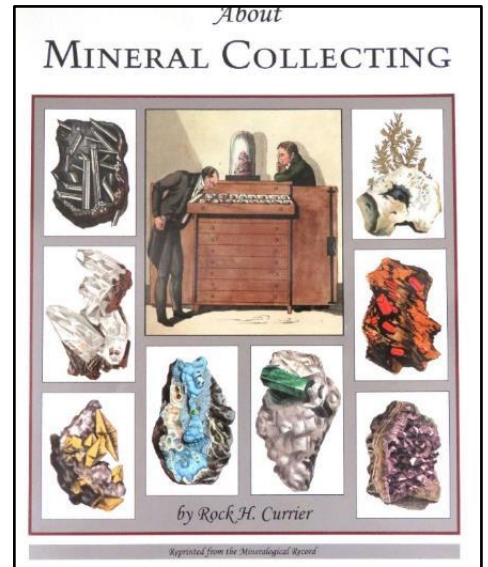
**Many thanks to Wendell Wilson, Steve Sorrel, Jake Harper and Heritage Auctions for their generous agreement for inclusion of some of their copyright works in this article.**

**The Art and the Artists** The earliest featuring of minerals in art was in their use as pigments in paint, with minerals such as *azurite*, *lazurite*, *hematite* and *orpiment* being used to make blue, red and yellow paints for example. Prehistoric cave paintings dated at about 40 000 years old include hematite pigments. However, this article is on the visual aspect of minerals in art and a pantheon of some of the remarkable images out there so let's get stuck in. There's minimal text as the pictures mostly tell the story and don't need embellishment from me.

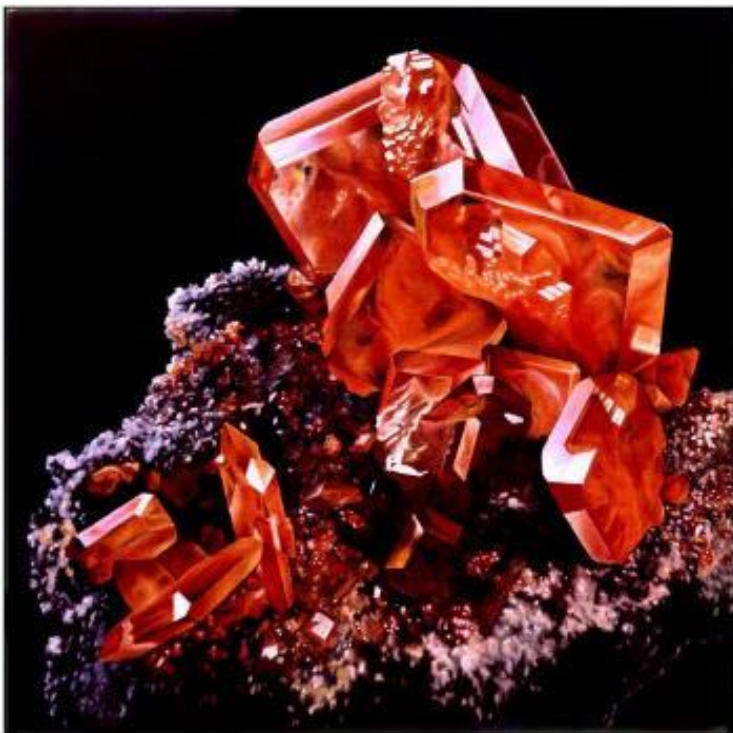


We start with what are early paintings in the chronology of this artform and it shows in the generally 'subdued' and somewhat dull, at least to my eyes, reproductions/styles. A commonly used technique was *chromolithography*<sup>1</sup>. An example is The Mineral Record supplement, 'About Mineral Collecting,' by the late Rock Currier, the cover of which is reproduced in **Figure 1**.

**Figure 1: About Mineral Collecting, Cover**



Moving on to more contemporary mineral art, many of you will have heard of Wendell Wilson, the Editor-in-Chief of The Mineral Record, but you may not know that he is also a renowned artist. Below are just a few of his wonderful paintings - Even better than the real thing? **See Figures 2 and 3**. The *mimetite* in **Figure 4** is from a find at Tsumeb Mine in 1971 and these specimens represent the 'best of' in the world for this species, with crystals to 2 cm, and the specimen depicted is in the collection of the Smithsonian Institute.



**Figure 2: Red Cloud Mine Wulfenite (oil on canvas)**



**Figure 3: Benitoite and Neptunite (watercolour)**

<sup>1</sup> Basically, colour lithographs



Figure 4: Tsumeb Mimeticite (oil on canvas board)

Some lovely paintings by Jake Harper of Earthquest Minerals, California, are shown in **Figures 5, 6 and 7 below.**

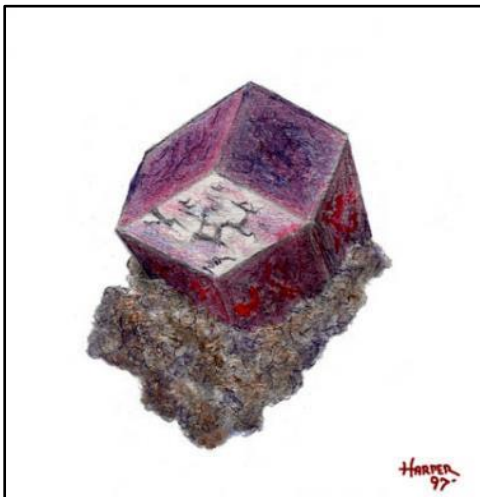


Figure 5: Almandine Garnet



Figure 6: Bunker Hill Pyromorphite



Figure 7: Elbaite

**Figures 8, 9 and 10 below** are by Steve Sorrell and are striking renditions of famous minerals. These are watercolours, gouache and water-mixed oils on black backgrounds.



Figure 8: Spessartine on Smoky Quartz, Tongbei, China



Figure 9: Wulfenite, Mexico





Figure 10: Sweet Home Mine Rhodochrosite on Quartz and Tetrahedrite

Figures 11 and 12 are paintings by the late Eberhard Equit of *azurite* on *malachite* from Tsumeb and *rhodochrosite* from the Sweet Home Mine, USA.

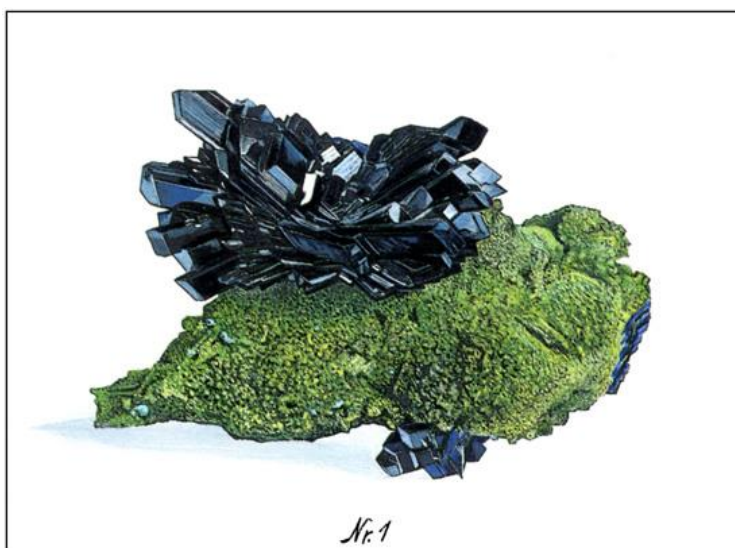


Figure 11: Azurite on Malachite (watercolour and coloured pencil) Figure 12: The Sno-Cone (watercolour and coloured pencil)



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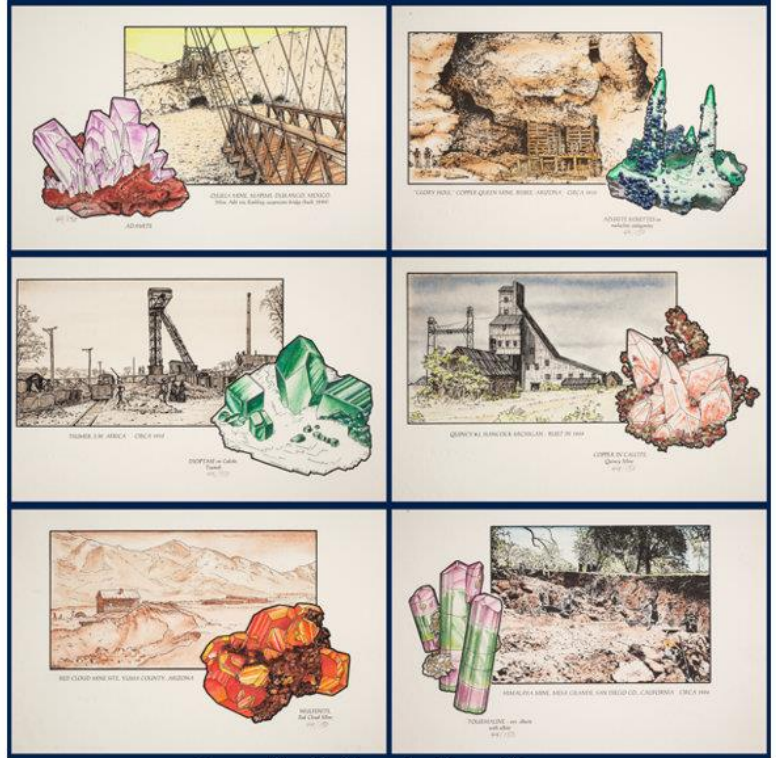
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Left. Figure 13a: Fluorite with Barite and Sphalerite, Elmwood Mine, USA  
Right. Figure 13b: Fluorite with Barite and Sphalerite: Actual Specimen

And now for something completely different; an Impressionist-style acrylic painting in **Figure 13a** by Dallas artist JD Miller of *fluorite* on *barite* and *sphalerite* from the Elmwood Mine, USA (courtesy of Heritage Auctions). Looks like the barite is hugging the fluorite - It could be by van Gogh? The painting and specimen (**Figure 13b**) apparently sold for \$125 000 in 2014 (c.R2 million in today's money...).

Another angle on minerals in art is provided by **Figure 14**, which has six mines as backgrounds to some of the minerals they are famous for. These watercolour paintings are by US artist Carl R. Bentley and depict, from top left clockwise:

- Ojuela Mine (Mexico)/purple *adamite*,
- Bisbee Mine (USA)/*azurite* on *malachite*,
- Quincy Mine (USA)/*copper* in *calcite*,
- Himalaya Mine (USA)/*tourmaline*,
- Red Cloud Mine (USA)/*wulfenite* and
- Tsumeb Mine (Namibia)/*diopside* (Courtesy of Heritage Auctions).



Imaged by Heritage Auctions, HA.com

**Figure 14: Famous Mines and their Minerals**



Moving out of mainstream mineral art to what is apparently known as 'clip art' the picture in **Figure 15**, EtherRock, sold for \$1.3 million in August 2021. This is a brand of *crypto-collectibles*. Not to my taste, especially at that price.

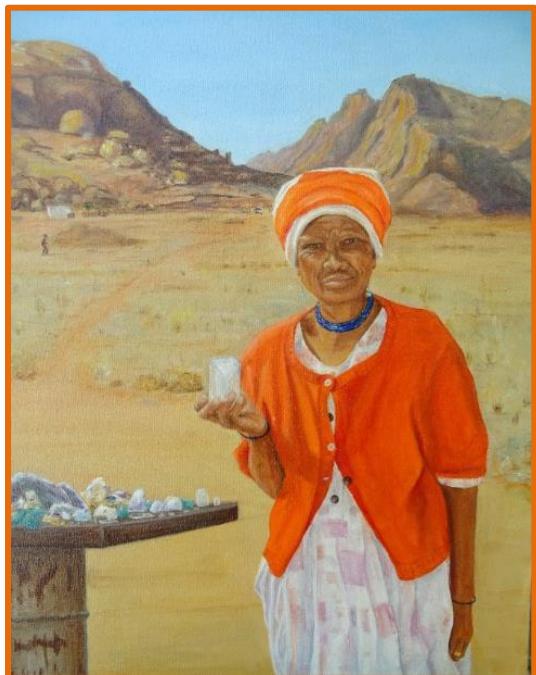
**Left. Figure 15: EtherRock Clip Art**

I couldn't resist including the image in **Figure 16**, a 'geological chart' from 1893, because of the colours, although it isn't really mineral art *per se*.

**Right. Figure 16: Geological Chart from 1893**







And to finish off, a lovely painting by our very own Jo Wicht, “The Topaz Seller”, (with permission!), a scene from somewhere near the Spitzkoppe, Namibia (**Figure 17**). Many of you may have bought *topaz*, *fluorite* or *schorl* from her (the topaz seller, not Jo!) in the past.

Left. **Figure 17: The Topaz Seller** (oil on canvas)

### Concluding Remarks

This has been a whirlwind tour around the subject of minerals in art and hardly does the subject justice but at least gives you a taste of what is available. Beauty is in the eye of the beholder, and I have been swayed by personal preferences in selecting images to include here. So, do yourself a favour and Google ‘Minerals in Art’ and sit back and enjoy the amazing images out there. Or log onto The Mineral Record’s website and browse their online Minerals and Mining Artworks Museum.

Finally, thanks again to all the artists who gave permission for their wonderful works to be illustrated in this article

To end on a light-hearted note, here’s a whacky example of mineral art by Jake Harper...

“Bob knew that it might be unwise to collect in an active hydrothermal cavity”.

### References

- Currier, R. (2009), *About Mineral Collecting*. Reprinted from the Mineralogical Record 2008-2009. Tucson.
- Heritage Auctions (2014), *Nature and Science Auction: Fine Minerals, Gems and Lapidary Art*. Dallas.
- The Mineral Record (2010), *May-June 2010*, Vol. 41 #3. p275-277. Tucson.
- The Mineral Record. *The Mineral Record Online Museum of Minerals and Mining Artwork*. Tucson.



## From the Cabinet of Curiosities

This polished slab of rock was removed from an exploration shaft sunk near Eersteling (Limpopo Province). It consists mainly of gold-bearing arsenopyrite and black tourmaline (green in thin section), with a white quartz vein. Visible gold is found in the sample and has a 5% silver content. The tourmaline, for once, is not present as eye-catching crystals, but it does host arsenopyrite crystals which are frequently twinned.

The rock formed part of the Pietersburg Greenstone Belt, and the arsenopyrite is found in pods associated with quartz veins, quartz-tourmaline intergrowths and chert bands. The zone of sulphide mineralization is often richer in pyrrhotite than arsenopyrite.



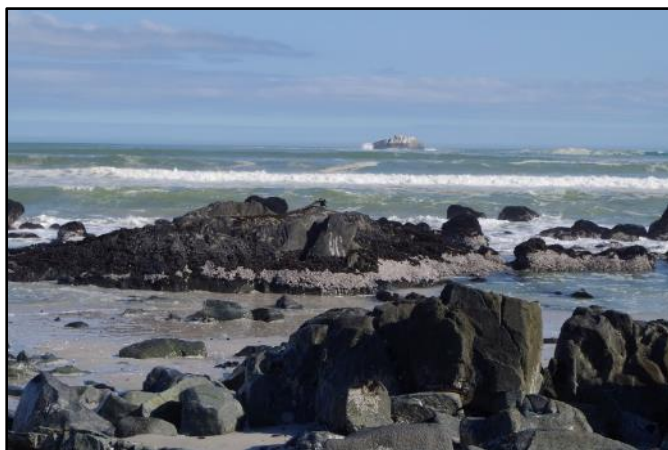
Scale 100 mm across

**Thanks, Lesley!** Describe your own original curiosity and send it to us with a photo.

## THE ROCKS OF YZERFONTEIN

Duncan Miller

Yzerfontein village is built on and around a rocky promontory on the West Coast, about 70 km north of Cape Town. On a clear day Table Mountain is visible in the distance to the south, and Dassen Island closer by to the west. The rocky shore is dramatic, cut by deep gullies, and north of the town there is the pristine Sixteen Mile Beach, stretching all the way north to the Langebaan Peninsula. But apart from the scenery, and Rosemead Artisanal Bakery, a visit to Yzerfontein is justified by the outcrops along the coast. These are various dark igneous rocks, crystallised from a magma that intruded deep into the crust some 535 million years ago, in a succession of pulses to form the so-called Yzerfontein Pluton. This multi-phase body solidified slowly to produce medium- to coarse-grained rocks ranging in composition from gabbro, through monzonites, to syenite. These are quite distinct in appearance, chemistry and mineralogical composition from the well-known Cape Granites, although they are thought to be the product of the same continental collision and mountain-building event in the assembly of the Gondwana supercontinent. To download Duncan's illustrated description and read more about these fascinating rocks [click here](#). (This is a safe link.)



**View left. Yzerfontein seen from near the harbour looking northeast, with the dark rocks of the Yzerfontein Pluton exposed along the coastline**

**View right. The rocks of Rooipan se Klippe, also known as Gabbro Point, the northernmost exposure of the Yzerfontein Pluton, with Meeurots in the bay**



**A view of Schaapen Eiland, south of Yzerfontein Point, accessible only at low tide because of a tidally flooded channel below the car park**



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