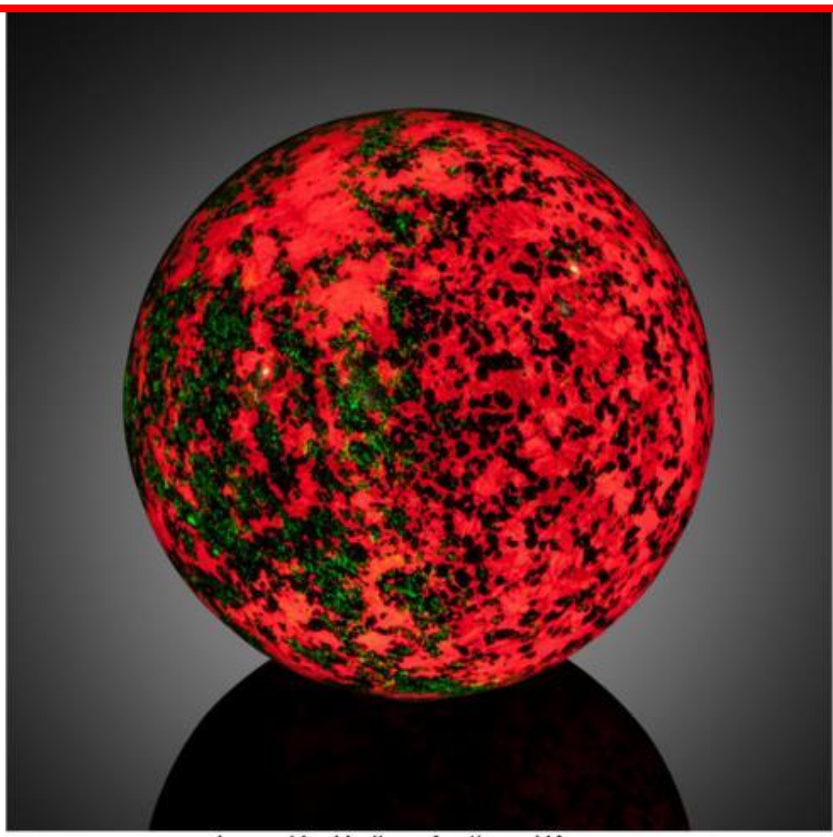
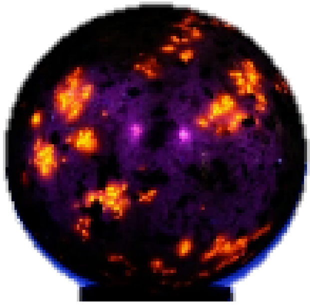
SEPTEMBER 2022



Calcite with minor Willemite, Sterling Hill mine

DIARY

September	3	10:00–14:00	Open to the Public Day – Rocks, gems, jewellery, mineral specimens to look at, chat about, swap, sell or buy.
	10	14.00–16.00	MEETING/ACTIVITY DAY - Details to be announced shortly.
October	1	10:00–14:00	Open to the Public Day – Rocks, gems, jewellery, mineral specimens to look at, chat about, swap, sell or buy.
	8	14.00–16.00	MEETING/ACTIVITY DAY - Details to be announced shortly.
November	5	10:00–14:00	Open to the Public Day – Rocks, gems, jewellery, mineral specimens to look at, chat about, swap, sell or buy.
	12	14.00–16.00	MEETING/ACTIVITY DAY – Make a jewel tree. To book see separate workshop newsletter.
December	3	10:00–14:00	Open to the Public Day – Rocks, gems, jewellery, mineral specimens to look at, chat about, swap, sell or buy.
	10	13.30 approx.	CLUB'S 60TH ANNIVERSARY SPITBRAAI - Save the date!



GREAT BALLS OF FIRE – FLUORESCENT SPHERES!

by
Peter Rosewarne

We last visited the subject of fluorescent minerals in the MinChat of May 2021. Surfing through past sales at Heritage Auctions for the Minerals in Art articles, I came across stunning images of fluorescent spheres that appeared to be made of some red-hot material or could be stars from other solar systems. They seemed to me to be worthy of a mini-article so here are some of the images that I have lifted, some from Heritage Auctions, with permission, and some from the internet. Nothing technical, just visuals.

The Sterling Hill Mine, New Jersey, USA was highlighted as the fluorescent mineral capital of the world in the earlier article on fluorescent minerals and four of the spheres shown here are of minerals from that source. As you doubtless will recall or already know, bright red/orange represents *calcite* and green, *willemite* (**Figures 1**, **2** and **3**). The dark patches are probably non-fluorescent *franklinite*.

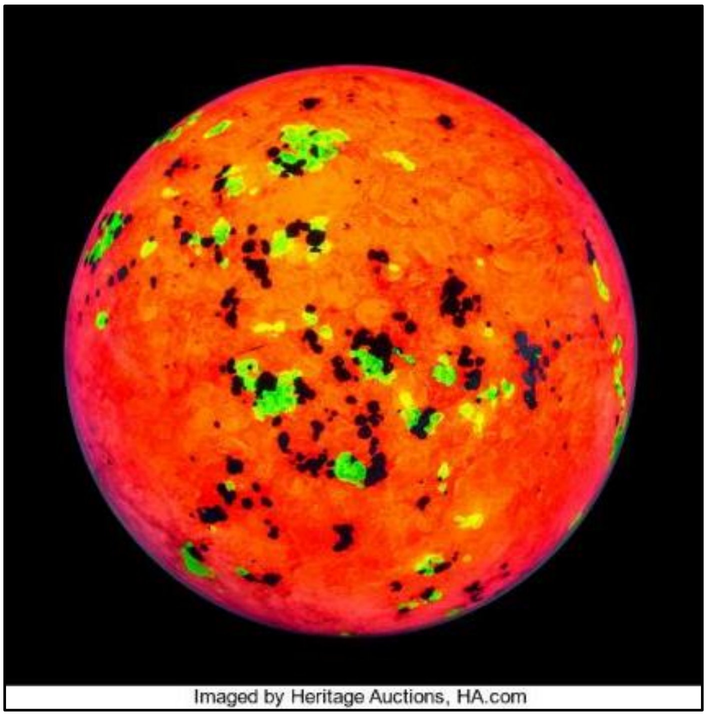


Figure 1: Calcite with Minor Willemite, Sterling Hill Mine

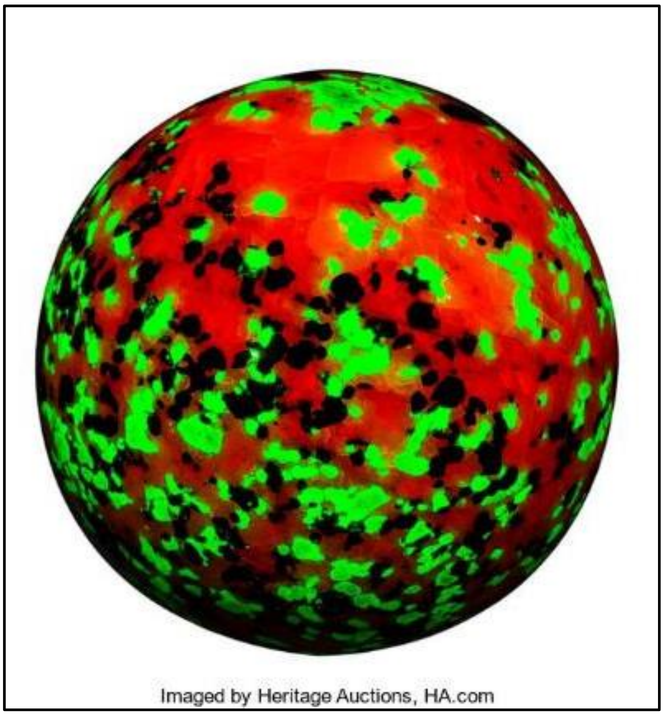


Figure 2: Calcite and Willemite, Sterling Hill Mine

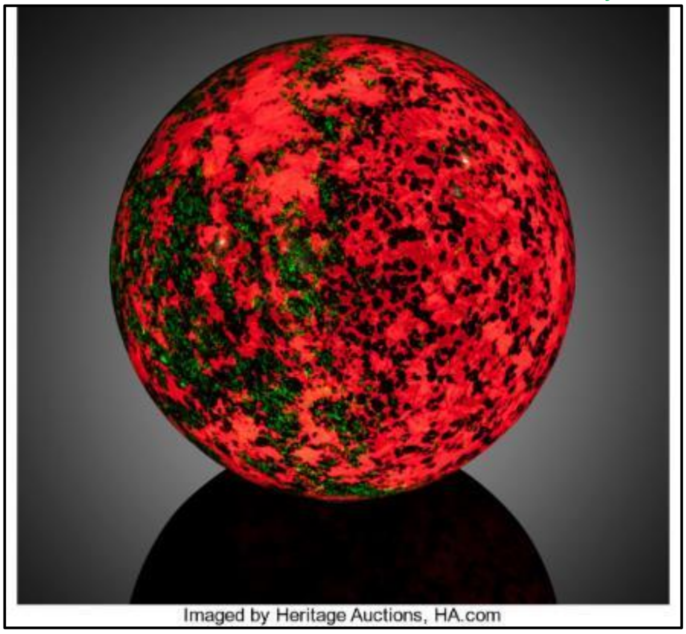


Figure 3: Calcite with Minor Willemite, Sterling Hill Mine

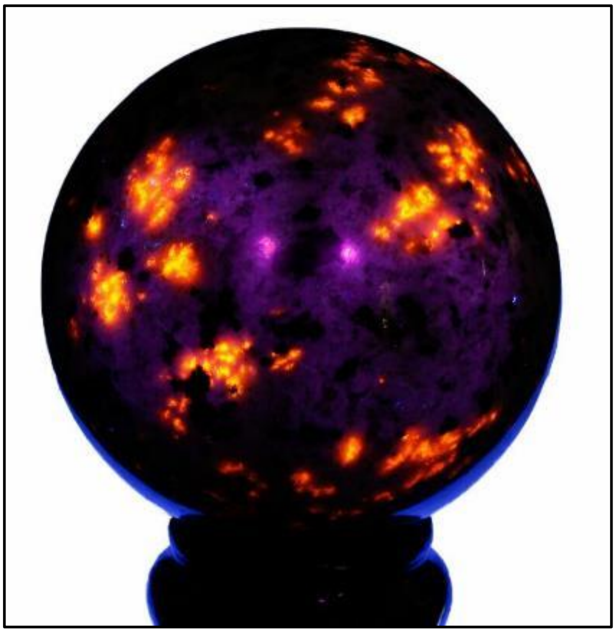


Figure 4: Yooperlite®, Michigan

Along the way I have learned about a rock called *Yooperlite®*, which is new to me, a *syenite* containing fluorescent *sodalite*, a *feldspathoid*. It was discovered in 2017 along the shores of Lake Superior in Michigan, USA by local man Erik Rintamaki who owns the trademark. The sodalite fluoresces yellow (**Figure 4**).

In **Figure 5** below we have a fluorescent *fluorite* sphere (Tozour Family) whose provenance I don't know but it is very attractive.

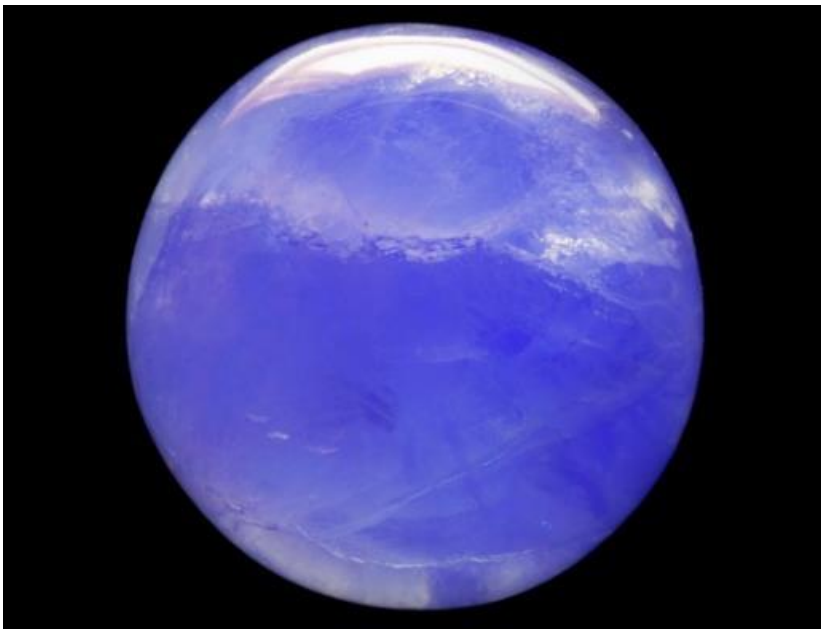


Figure 5: Fluorescent Fluorite Sphere

Next up in **Figure 6 below** is *hackmanite*, the violet or pink variety of sodalite, which you will remember Jo Wicht highlighting as a Curiosity in MinChat of December 2021. This is from the famous alkali igneous complex at Mont Saint-Hilaire in Canada (434 species and 66 type minerals). It also fluoresces yellow; hackmanite not Mont Saint-Hilaire.

Figure 6: Hackmanite, Canada

Nothing to do with spheres but only Långban in Sweden and Tsumeb have more type minerals. You read it here first 😊.

And we finish where we started, at Sterling Hill Mine, with a calcite sphere in **Figure 7** that, appropriately, looks like the setting sun.

Figure 7: Calcite, Sterling Hill Mine, USA

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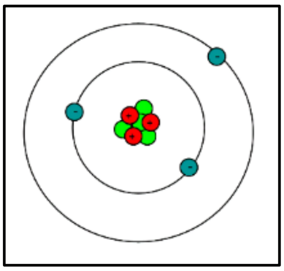
Lithium – Just How 'Green' Is It?

by Peter Rosewarne

Introduction



With the uranium article in a previous MinChat we looked at the 'heavy' end of the periodic table. With *lithium* (Li) we are at the 'light' end as it is the third-lightest element with an atomic number of 3. Only the gases hydrogen and helium are lighter. To illustrate just how light in weight Li is, try picking up two identical appliances but one with a conventional battery and one with a Li battery. I did this recently when choosing a lamp to tide me through load-shedding. When I picked up a box with the Li powered lamp, I thought it was empty it was so light (and it wasn't even switched on).

OK, all well and good but why Li you are asking? Well, for one it is touted as the answer to the green energy transition and helping to combat climate change, a topic that is increasingly dominating the news. It is used to make batteries for electric vehicles (EVs) for instance, which are supposed to be one of the cornerstones of the green energy revolution and the fight against climate change. But there's a conundrum – extracting Li from raw materials isn't a green process, far from it. This information, contained in an article in Business Day on 31 May 2022, piqued my attention as I am sure it just has yours too. Plus, some of the key minerals that contain Li are found and mined in South Africa, and many of you will have visited the areas where they are found so this article has general and specific interest.

Background Information

First a bit of technical and background stuff and then onto minerals, especially those with a South African connection. Li isn't green, it is a silvery white colour and is very reactive, similar to *sodium*, and has to be kept in mineral oil when in its elemental form. It is at the forefront of the green energy push because of its use in batteries for e.g. EVs. But here is the rub: extracting it from its main sources is not a green process. The main sources are underground brine lakes in Chile and rocks containing the Li *pyroxene*, *spodumene* ($LiAlSi_2O_6$) and recycling of Li batteries. Some other familiar minerals containing Li are *lepidolite mica*, *elbaite* and *sugilite*. Apart from *sugilite*, these minerals are mainly found in alkali-granite pegmatites.

Li brines are found in underground lakes in the so-called Lithium Triangle of Chile-Bolivia-Argentina. The brine is pumped to the surface and then needs to be left to evaporate in shallow ponds for 12–28 months (**Figure 1** Google Earth image). An example of such an enterprise is shown in **Figure 2**. A favourite trivia quiz question is, "What is the only man-made structure that is visible from space?" Answer: Great Wall of China, but surely these ponds would be too?

Figure 1: Atacama Desert, Andes, Brine Ponds and Salars

Only about 50% of the available Li is recovered by this method and it uses lots of water in one of the driest places on Earth, the Atacama Desert of Chile, hardly a green process. Local wildlife such as endangered flamingoes are at risk as water levels drop in the Salar de Atacama, an extensive natural salt-lake, due to this groundwater abstraction.

These salars are an integral feature of the Altiplano of Chile and a photograph of a relatively small one I visited in 1994, Salar de Michincha, at an altitude of about 4 500 m, is shown in **Figure 3**. The line of volcanos in the background are active and mark the border with Bolivia. There are sulfur mines on some summits.

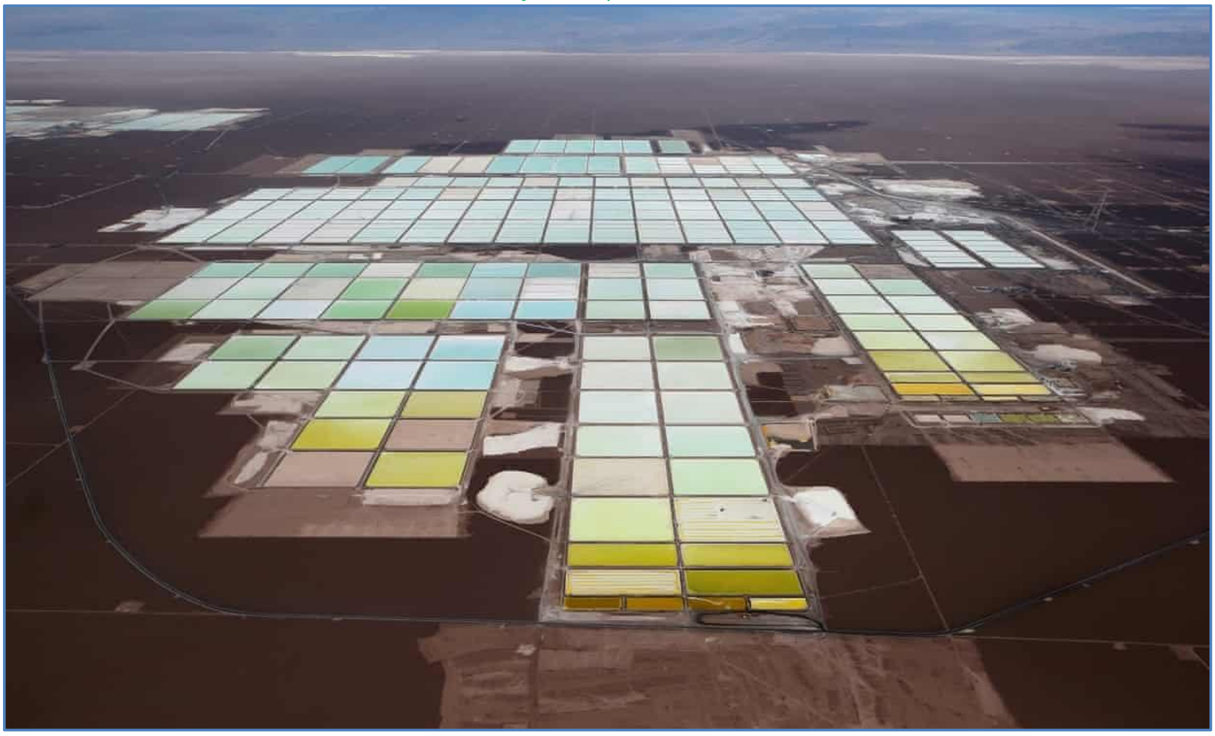


Figure 2: Brine Evaporation Ponds, Atacama Desert, Chile

Figure 3: Salar de Michincha, Chile

Hard-rock mining of spodumene occurs on a large scale in Australia and on a small-scale in the Steinkopf-Vioolsdrift-Henkries Triangle in the Northern Cape. Spodumene contains about 3.6% Li.

Li had no commercial uses until the late 1950s when the USA started stockpiling it for making hydrogen bombs. Apart from batteries, uses for Li include drugs for treating bipolar disorder. I used lithium chloride as a tracer to determine the origin of a spring near Villiersdorp in 1991 to settle a water dispute, not realising that I was a pioneer of the green revolution.

Lithium Minerals

OK that's the background info out of the way so let's get into the Li minerals of interest to the collector and of local origin. The pegmatites of the Northern Cape between Vioosldrift, Steinkopf and Henkries (**Figure 4** Google Earth image) contain spodumene and lepidolite, along with feldspar, quartz and muscovite and accessory minerals such as beryl, scheelite and tantalite. Landmarks such as Spodumene Kop 1 give an indication of what is found there.

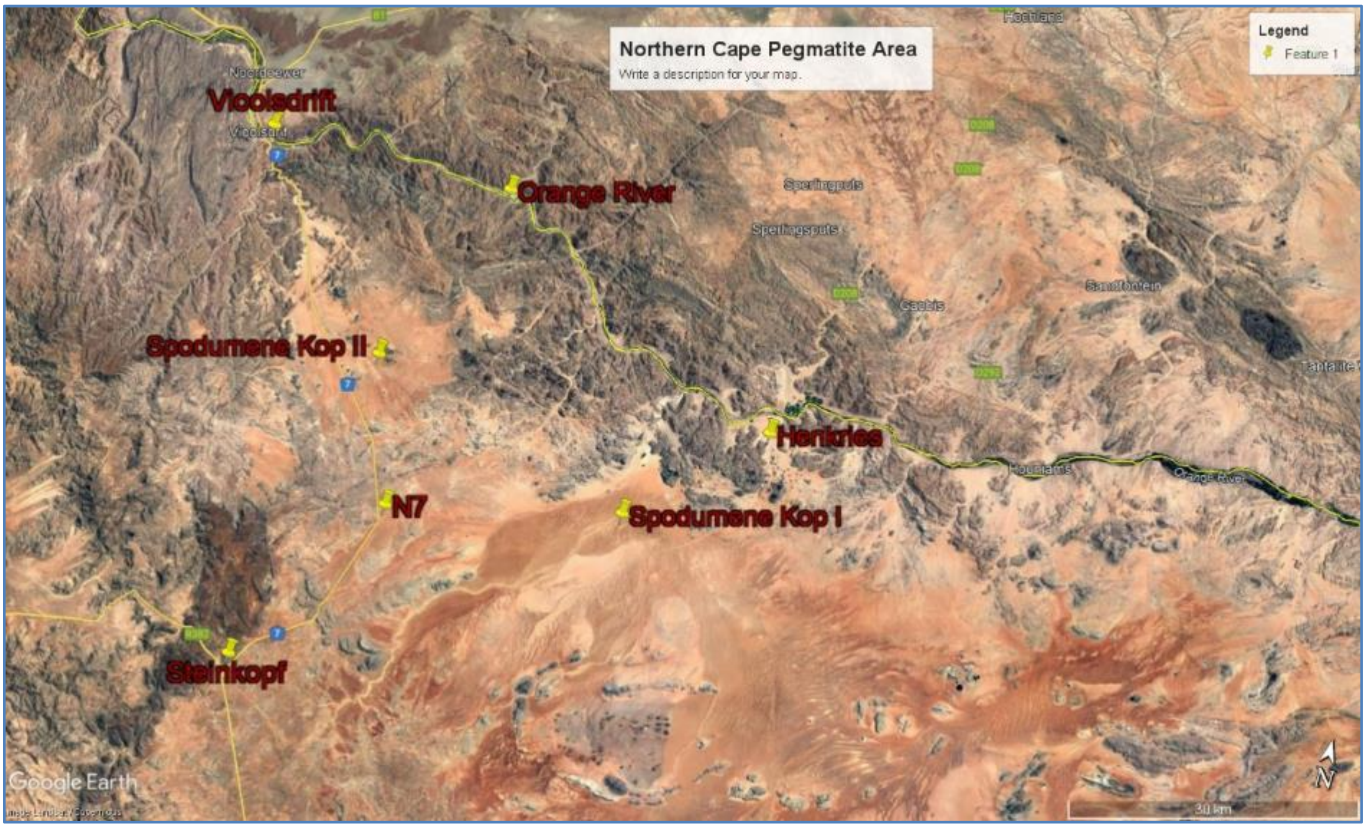


Figure 4: Northern Cape Pegmatite Area

I went fossicking there in 1988 with a fellow geologist and we collected many specimens of spodumene and lepidolite. The spodumene comes in massive form and small to large crystals and is pinkish-mauve in colour, as shown in **Figure 5**. It's a poor-quality photograph but gives a good idea of what this spodumene looks like. As I recall, it was a bit surreal walking on all the pink/mauve waste around the mine.

Figure 5: Spodumene Crystal Aggregate, Northern Cape

Figures 6 and **7** show the gem forms of spodumene, *kunzite* and *hiddenite*, respectively, from Afghanistan in this case as these gem varieties are not found in South Africa. **Figure 8** is of 'colourless' spodumene (the photo gives it a greenish tinge), also from Afghanistan. The lilac/pink colour is due to manganese and the green colour to chromium. These gems exhibit a strong *pleochroism*[1] along the *c*- or long axis which, in the three figures below, is diagonally across the figure.

[1] Exhibits a change in colour when viewed down different crystal axes

Figure 6: Kunzite Crystal, Afghanistan (10 cm)

Figure 7: Hiddenite Crystal, Afghanistan (8 cm)

Figure 8: Spodumene Crystal, Afghanistan (12 cm)

The lepidolite that we found was of a sort of granular habit, as shown in **Figure 9**, associated with spodumene. A 'book' of lepidolite crystals from Brazil is shown in **Figure 10**.

Figure 9: Granular Lepidolite and Spodumene, N. Cape

Figure 10: Lepidolite Crystal 'Book,' Brazil

Figure 11 shows a cutting in lepidolite mica in southern Namibia photograph kindly supplied by Jo Wicht.

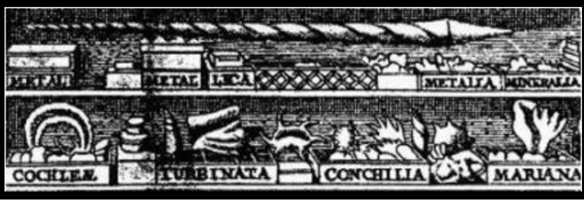
Figure 11: Cutting in Lepidolite Mica, S. Namibia

If there are any available, it might be worth buying up some claims on those Northern Cape Li pegmatites because there is a shortage of Li to meet the growing green agenda. And if you use solar power and minimize water usage you could run a truly green operation. One problem is transport; the nearest railhead is at Bitterfontein about 250 km to the south, but you could use EVs to transport the spodumene there. Anyone keen on partnering in a bankable feasibility study?

References

Business Day (2022), Red flags over lithium mining from green vehicles. Annie Lee. Bloomberg.

From the Cabinet of Curiosities



This month's curiosity is **Coloured Dune Sand** from Chamarel, Mauritius. This is a relatively small area of dune sands formed by tropical weathering of basalt, which has removed the soluble silica minerals and left behind iron and aluminium oxides. There are seven colours present namely, red, brown, violet, green, blue, purple and yellow. The seven colours represented in the tourist souvenir bottle I bought on the island in 2003 don't quite match this list but may have faded over the years (**Figure 1**), although the colours remain true at the site despite torrential rain and extremes of temperature. Apparently, if you mix the sands up, they will eventually separate out again into their various colours, presumably due to differences in specific gravity. The site is shown in an internet photograph in **Figure 2**. **PR**

Figure 1 left: The Seven Sands of Chamarel, Mauritius **Figure 2: Chamarel Coloured Sands** (Internet image)

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