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Composite Elbaite Crystals with Smoky Quartz and Cleavelandite
© (Courtesy of Wilensky Exquisite Minerals)

DIARY

September	2	10:00–14:00	<i>Open to the Public Day – Rocks, gems, jewellery, mineral specimens to look at, chat about, swap, sell or buy.</i>
			<i>Watch this space!</i>
October	7	10:00–14:00	<i>Open to the Public Day – Rocks, gems, jewellery, mineral specimens to look at, chat about, swap, sell or buy.</i>

“FACETIPS – A Gem Cutter’s Notebook” by Duncan Miller.

The faceting articles published over the past few years in the Mineral Chatter have now been compiled into a single 128-page document. The pdf file is available for download from <http://ctminsoc.org.za/articles.php> for those interested in having all the articles together.

Famous Mineral-Specimen Producing Regions of the World - Part 1: Afghanistan

By Peter Rosewarne

Introduction

We've had the "best of", "famous mineral specimens" and "famous finds" so I thought it might be interesting to explore famous World-class mineral specimen producing *regions*. This topic could easily take up every Minchat until I can no longer tap out the keys so a) it will have to comprise brief descriptions and b) be broken up into specific regions/countries such as Africa, Afghanistan, the USA, etc. Even then, a country like the USA has so many world-class specimen-producing regions (44 sites listed in *American Mineral Treasures*) that it's not possible to do it justice in these articles so I am going to leave that country out.

In the same vein (no pun intended), do I cover African countries such as South Africa, Namibia, Morocco, or regions such as Otavi Mountainland (Tsumeb, Kombat, Berg Aukas) and Kalahari Manganese Field (N'Chwaning I, II and III, Wessels), etc? All regions eminently worthy of inclusion but most of you probably know more about them than I do, and have the iconic books such as Tsumeb, Namibia and the Kalahari Manganese Field on your bookshelves.

My casting vote, therefore, goes to more exotic locations, for initial articles at least, that might be less well known to readers, such as Afghanistan (Paprok, Sar-e-Sang), Mexico (Choix, Los Lamentos, Ojuela), Tanzania (Liliondo, Merelani Hills) and China (many unpronounceable areas/mines). I'm excluding Russia at this stage and, at the risk of upsetting the Taliban by glorifying pagan idols of wicked Western imperialist gratification, we'll start in alphabetical order with Afghanistan.

This article is mainly about colour and aesthetics, so technicalities are kept to a minimum, as usual, apart from under Geology. A few images are drawn from the Rosey Collection but these are so inadequate that mostly high-end specimens from 'participating' dealers and a museum are included to give a proper appreciation of the superb quality of specimens available from Afghanistan.

Afghanistan

General Information

First a bit of irrelevant geographical information but which might come up in a trivia quiz. Did you know that Afghanistan is bordered by six countries, Pakistan, Iran, Turkmenistan, Uzbekistan, Tajikistan and China? With apologies to those countries, it's therefore basically in the middle of nowhere.

According to Wikipedia, the country's natural resources include:

"coal, copper, iron ore, lithium, uranium, rare earth elements, chromite, gold, zinc, talc, barite sulfur, lead, marble, precious and semi-precious stones, natural gas, and petroleum. In 2010, US and Afghan government officials estimated that untapped mineral deposits located in 2007 by the US Geological Survey are worth at least \$1 trillion." A pretty impressive list, but for our purposes, we are mainly interested in pegmatite gem minerals such as elbaite, morganite, fluorapatite and spodumene.

Geology and Mineral Regions

This is a geologically young area characterized by the collision of the Indian plate northwards with the Eurasian plate which formed the Himalayas, of which the local Hindu Kush and Karakorum ranges form a part. The pegmatites of the northeastern part of the country are dated at c.30 million years old, the blink of an eye in geological terms. The positions of the various 'plates'¹ involved in the geological formation of the area are shown in **Figures 1a** and **1b**.



¹ According to plate tectonics, the Earth's upper c.100 km, the lithosphere, moves over the underlying semi-molten but denser asthenosphere, as a series of plates, with converging, diverging or slipping/grinding boundaries.

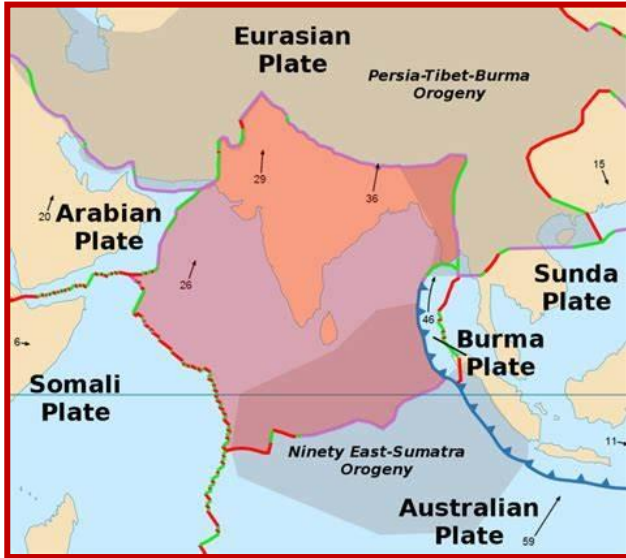


Figure 1: Asian Plate Tectonics (Wikipedia)

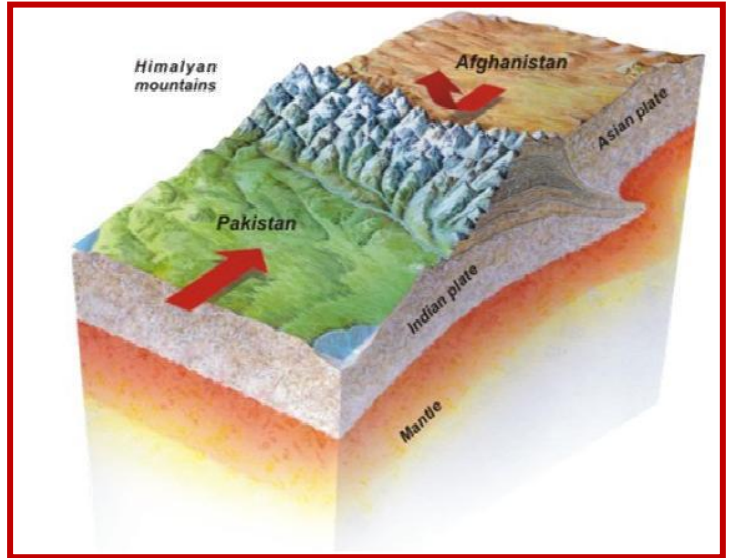


Figure 1b Cross-Section of Asian Plate Tectonics (Internet image)

Best producing sites include Mawi, Pech and Paprok in the northeast and Sar-e-Sang to the north. Artisanal mining has been going on in the latter area for centuries, but collector-grade specimens from the first three areas only started reaching western markets from about the 1970s. The mineral collecting season is usually short because of the harsh winter weather in this mountainous country, with peaks up to 6 000 m. The pegmatites are mostly located in very remote areas only accessible on foot and then the pegmatites are usually exposed in high, vertical cliff faces into which the miners have tunneled using basic methods. Invasion by Russia and then the US push against the Taliban complicated access and it is apparently dangerous for foreigners to visit the mining areas, which are shown on **Figure 2**. Some images of the mining areas are shown in **Figures 3** (the white areas being spoil material) and **4**.



Figure 2: Google Image of Some Pegmatite Areas in Afghanistan



Figure 3: Satellite Image of the Paprok Mining Area



Figure 4: Mine Workings at Paprok (Peter Lykberg photograph)

World-class collections such as the Smale and Wagner collections are replete with elbaite, morganite, and kunzite specimens from Afghanistan. The crystals of elbaite from Afghan pegmatites rival the “best of” from e.g. Minas Gerais, Brazil, and a cursory glance at page after page of superb specimens in *The Mineral Record* of September-October 2017, Afghan Pegmatites, will leave the reader in no doubt about this. The image in **Figure 7**, from the cover of that issue, gives an idea of the treasures to behold within.

The Minerals

Images of elbaite, kunzite, hiddenite, fluorapatite, lazurite and morganite are shown on the following pages with minimal text to interrupt the beauty on display. A comment about the origin of colour in pegmatite minerals is apt at this stage. The most common is substitution of a cation for an essential ion in the crystal lattice, e.g. iron or aluminium substituting for silicon in quartz. Such ions are called chromophores. Different valence states of the same ion can also cause colour changes, e.g. Mn^{2+} causes a pink colour whereas Mn^{3+} causes a deeper red colour. A second cause is radiation, which in pegmatites, comes mostly from the radioactive isotope potassium 40 which is present in potassium feldspar. However, this latter effect is very weak and takes hundreds of millions of years to produce strong colours. Given the very young ages of Afghan pegmatites, colours are usually pale, e.g. in smoky quartz. We'll start with elbaite in **Figures 5, 6 and 7**.

Elbaite



Figure 5: Composite Elbaite Crystals with Smoky Quartz and Cleavelandite², Paprok (Courtesy of Wilensky Exquisite Minerals)

² A crystal habit of albite rather than a separate mineral species



Figure 6 left: Multi-coloured Elbaite Crystal with Smoky Quartz, Paprok (courtesy of Crystal Classics)

Figure 7: Elbaite with Smoky Quartz and Cleavelandite, Paprok (courtesy of Collector's Edge Minerals)



Figure 8: Elbaite, Pech, Kunar Province (© Elliot/Fine Minerals International)

Fluorapatite

Fluorapatite is a less common mineral in these pegmatites but when it does occur it comes in stunning mauve crystals on contrasting white feldspar and smoky quartz, as shown in Figure 9.

Figure 9: Fluorapatite Crystals on Quartz and Feldspar, Mawi (courtesy of Crystal Classics)



Spodumene

Kunzite is the pink/mauve variety of spodumene and excellent crystals are well represented in the pegmatites, indicating late enrichment with *lithium*. The colour is due to manganese ions in the crystal lattice. **Figure 10** is a combo with quartz, feldspar and elbaite while **Figure 11** takes the quality up a few notches with a 42 cm tall single crystal.



Figure 10 left: Kunzite on Feldspar and Quartz with Elbaite (courtesy of the Mineral Gallery)

Figure 11: Kunzite Crystal, Konar Valley (©Koshlop/Fine Minerals International)

Hiddenite is the green variety of the pyroxene, spodumene (and for completeness, triphane is the yellow variety) and a nice gemmy crystal is shown in **Figure 12**. In this case, the green colour is imparted by chromium ions. The yellow gem variety of spodumene is called triphane and a stunning example is shown in **Figure 13**.



Figure 12 left: Spodumene var. Hiddenite (ex The Rosey

Collection)

Figure 13: Triphane Crystals (© The MIM Museum)

Morganite

Morganite is the pink variety of beryl, the colour caused by traces of manganese. Examples are shown in **Figures 14** and **15**, the latter on quartz and muscovite.



Figure 14 left: Beryl, var. Morganite Crystal (ex The Rosey Collection)



Figure 15: Morganite Crystal on Quartz and Muscovite, Nuristan (courtesy of The Mineral Gallery)

Scapolite

Scapolite is a complex sodium-calcium-aluminium silicate with sulfate, carbonate and chloride and occurs in metamorphic environments as at Sar-e-Sang, along with lazurite, as shown below. Although located north of the pegmatite areas described above, these rocks are related to the plutonism during the Himalayan orogeny. A nice mauve crystal is shown in **Figure 16**.



Figure 16: Scapolite Crystal (ex The Rosey Collection)

Lazurite

Lazurite crystals are found at the famous Sar-e-Sang site in a metamorphic rock called a skarn, as shown in **Figures 17** and especially **18**.



Figure 17 left: Lazurite on Diopside with Pyrite, Sar-e-Sang (ex The Rosey Collection)



Figure 18: Lazurite Crystals from Sar-e-Sang (courtesy of Crystal Classics)

Concluding Remarks

Late-stage emplacement of granites into the tectonically active collision zone between the Indian and Eurasian plates has given rise not only to the highest mountains on Earth but also to one of the World's best gem/specimen-producing pegmatite areas, northeast Afghanistan. Metamorphic rocks to the north host minerals such as scapolite and lazurite. A thought to take away from this article is that the images shown herein are merely scratching the surface of the wealth of fantastic mineral specimens that have been unearthed in Afghanistan.

When I hold a mineral specimen from Afghanistan in my hand, I marvel at the possible route it travelled, from a pocket in a tunnel in a remote cliff-face at up to 6 000 m altitude, along treacherous footpaths to the nearest 'road' then perhaps to Peshawar to be auctioned as part of a 'lot' and thence to a dealer in Europe or the USA perhaps and finally via FedEx to Cape Town. If I had been in Kabul when the US pulled out of Afghanistan in 2021 and people were scrabbling for places on evacuation planes, I'd have been imploring the marines to take me and my Afghan mineral collection first; everyone else could take their chances!

The next mineral producing region we'll take a look at will be Mexico, with aesthetic minerals of interest including smithsonite, wulfenite, azurite, legrandite and mimetite.

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'Participating' dealers/collectors:

Crystal Classics; The Mineral Gallery; The Rosey Collection; Fine Minerals International; The Mim Museum; Wilensky Exquisite Minerals



This month we have a blueberry, walnut, and date cake with fondant icing.



Thanks, Robert

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