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NEWSLETTER

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Tourmaline from Afghanistan

Figure1. Elbaite Tourmaline with quartz and microlite crystals. Photo by Federico Bärlocher

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In the month of March some bright pink tourmalines, crystals as well as faceted material, from Afghanistan had come for certification. The client did not give permission to photograph them for publication, we can understand. In fact, as a gemmologist it gives a different type of thrill to see spectacular crystals of tourmaline. This has been the inspiration to write this article. Fortunately our friend Federico Bärlocher sent the photographs of tourmaline crystals and the tourmaline mines in Afghanistan.

The large pink tourmaline crystal along with quartz crystal shown in figure 1 has been mined from the famous Paprok mine in (also called Papruk Mine; Paprowk Mine), in the Kamdesh District of the Nuristan Province (also known as Nurestan Province), in the mountainous regions of Afghanistan. The white crystals which look like blobs of cream on sides of the tourmaline crystal are quartz. The brown octahedral crystal is microlite, which is a new mineral of the pyrochlor group approved by the International Mineralogical Association (IMA).

Pegmatites and gem pockets

According to Federico Bärlocher who has visited the Paprok Mine in Afghanistan, the roads are through very narrow gorges and dangerous rocky trails. The weather conditions are also very extreme.

Figure2. Entire terrain is mountainous region having some of the world's best gem bearing pockets.
Photo by Federico Bärlocher

Figure3. People live in hutments above the tourmaline mine.
Tunnels lead into the gem bearing pockets.
Photo by Federico Bärlocher

The geological formations of the region are mostly made up metamorphic rocks like gneiss, quartzites and schists intruded by pegmatites. These pegamatites are in the form of veins and lenses and are rich in gem bearing minerals. Some of these pegmatite veins are very long, run almost for some kilometers and have some specific zoned regions which contain minerals like quartz, albite, microcline, muscovite, lepidolite etc. Large crystals of minerals like beryl, tourmaline and spodumene grow inside cavities in certain pockets of the pegmatite. The locals have become experts in locating such gem bearing pockets in the pegmatites. They dig tunnels to reach the gem pockets, these days large drills are used. Once the large crystals are located then smaller tools are used to scrape off the clay like material, even bare hands are used to remove the large crystals with caution. In Nuristan Province there are numerous such gem bearing pockets, and one can see the landscape is a mountainous region (figure 2) with tunnels dug deep into the mountain sides. The local people live in small huts near about the mines some times on the top of the mine as seen in figure 3.

Figure4. Tunnels dug deep into the precarious mountain sides. Photo by Federico Bärlocher

Figure 5 The miners at the mouth of the middle tunnel in Paprok. Photo by Federico Bärlocher

The miners huddle at the mouth of the tunnel. Often the food supplies and food are placed at the mouth. One can see the large drums of water outside the middle tunnel of Paprok mine. It is here that the famous “Rose of Asia” (figure 4) tourmaline was found.

Figure6. "Rose of Asia" from Paprok mine. Photo by Federico Bärlocher

At the 2007 Munich Mineral Show – known as "Mineralientage" the star of the exhibits was the amazing 'Rose of Asia', an undamaged Elbaite Tourmaline crystal from the Paprok mine, Nuristan, Afghanistan, weighing over 40kg. It was beautifully lit to show the deep reddish pink centre.
One can see the offshoots of tourmaline crystals at the base. It is indeed amazing to see that a single crystal grows so big whereas the smaller crystals struggle to crystallize and grow in different orientation depending on the ingredients remaining in the original mother liquor. Although the smaller tourmaline crystals may have formed later or may have nucleated later, they are nowhere near the large Rose of Asia with its inner glow, neither in size nor in colour.
Amongst humans sometimes there are towering personalities with their inner glow overshadowing in deeds and actions way above the ordinary.

Figure7. Note the uniform of miners outside the tunnel in Paprok. Photo by Federico Bärlocher

Figure 9. Miner at the mouth of the middle tunnel in Paprok . Photo by Federico Bärlocher

Figure8. Miners have no age bar in Paprok mine . Photo by Federico Bärlocher

In the hydrothermal phase of the pegmatite these large tourmaline crystals have formed inside cavities of the mother rock where there was enough space for proper development of individual crystals. The growth must have been extremely slow giving rise to off shoots of smaller tourmaline crystal along the sides of the large crystal. The crystals are prismatic structures, well formed ideal structures for teaching crystallography. There are vertical striations on the surface of the tourmaline crystals. The Paprok tourmaline crystals have milky white blobs of quartz crystal. The single reddish brown octahedral crystal is microlite as seen in figure 2 and figure 10.

Figure 10. (Other side of the crystal in Figure2) Elbaite tourmaline with white quartz crystal on the surface with a single reddish brown octahedral crystal of microlite seen on one side. Photo by Federico Bärlocher

What is microlite?
Microlite is a pyrochlor mineral which occurs as euhedral, untwinned, octahedral crystals small in size, occasionally modified by rhombododecahedral faces.
The crystals are pale yellow to reddish brown, sometimes emerald-green and transparent; the streak is white, and the lustre is sub-adamantine to resinous. It does not fluoresce under ultraviolet light. Mohs' hardness is 4½–5, tenacity is brittle. Cleavage is not observed; fracture is conchoidal. The specific gravity is 6.160.
The mineral is isotropic, R.I. = 1.992. It forms in the hydrothermal phase on the surface of the tourmaline crystals.

The colouration one can see is zoned indicating that the concentration of the chromophores responsible for the colouration was depleting as the crystal grew in size. The zoning is perpendicular to the vertical c-axis. In some cases new chromophores types have come up giving rise to different colour. The well known blue cap tourmaline is due to this variation in the chromophore concentration. The blue colouration is due to iron. The reddish pink colour is due to chromium with some percentage of manganese.
The zoning in the colouration is gradual and not sharp indicating the slow depletion of the transition elements responsible for the colouration. The material we tested in our laboratory had pink colour with R.I= 1.618-1.639 and specific gravity= 3.04. Strong dichroism was observed. Microscopic inclusions noted were two phase inclusions, large cavities and growth tubes filled with liquid. Characteristic trichites were also rampantly observed. Fluorescence was slightly chalky.

Figure 11. Elbaite blue cap tourmaline from Paprok mine of Afghanistan.

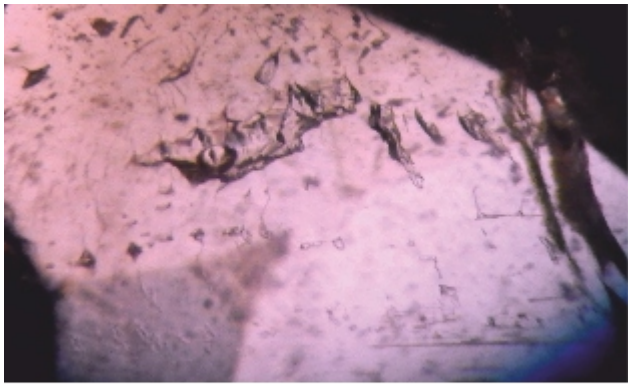


Figure 12. Two phase inclusions with large cavity in tourmaline.
Photo by PangemTech Staff

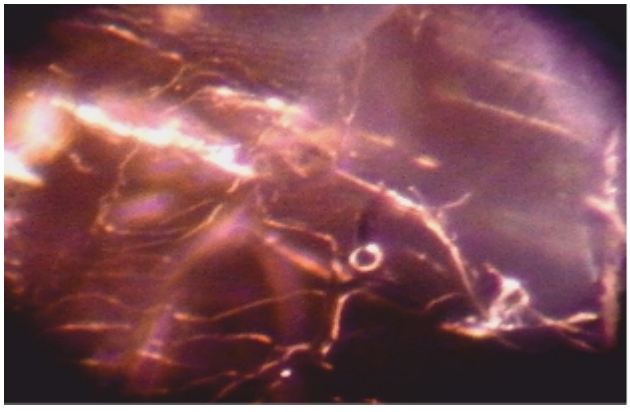


Figure 13. Fluid inclusions and trichites observed in tourmaline.
Photo by PangemTech Staff

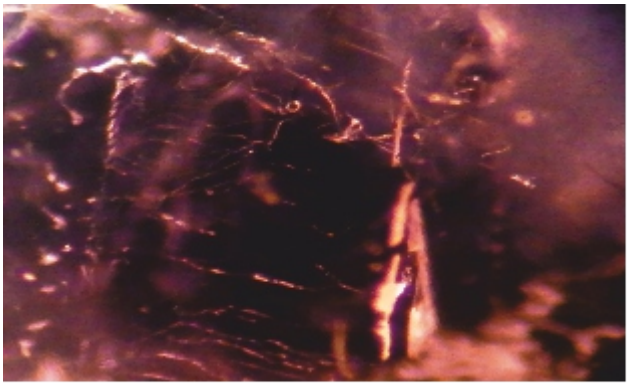


Figure 14. Fluid inclusions and trichites in tourmaline.
Photo by PangemTech Staff

References:

Bowersox G.W. (1985) A status report on the Gemstones of Afghanistan. Gems & Gemology, Vol. 21, No.4, pp 192-204.

Dunn P.J. (1974) Gem spodumene and achroite tourmaline from Afghanistan. Journal of Gemmology, Vol. 14, No.4, pp 170-174.

Fuchs G., Matura A., Scherman O. (1974) Vorbericht über geologische und lagerstättenkundliche Untersuchungen in Nurestan, Afghanistan. Verhanglungen Geologische Bundesanstalt, No.1. pp 9-23.

Leckebusch, R. (1978) Chemical composition and colour of tourmalines from Darre Pech [Nuristan, Afghanistan]. Neues Jahrbuch fur Mineralogie Abhandlungen. Vol.133, No.1, pp 53-70.

Forthcoming Conferences on Gemmology and Diamonds involving ICGL members

June 27th and 28th 2015

Gemmological & Jewellery Conference

In Athens, Greece

Organized by ICGL Member:
George Spyromilios, Independent Gemological Laboratory, Athens, Greece
Sponsored by: **OGI Systems, Certiline , HRA Group**

July 6th to 9th 2015

66th De Beers Diamond Conference

At the University of Warwick, United Kingdom

ICGL member presenting poster
Jayshree Panjikar, Pangem Testing Laboratory, Pune, India

August 21st to 24th 2015

1st International Jewelry Industry Forum,

In Kuala Lumpur, Malaysia

Organized by International Consortium of Gem Testing Laboratories (ICGL)
& Gemologist Society of Malaysia (GSM)

Person representing ICGL: **Ms Sumarni Paramita, Adamas Gemmological Laboratory, Indonesia.**

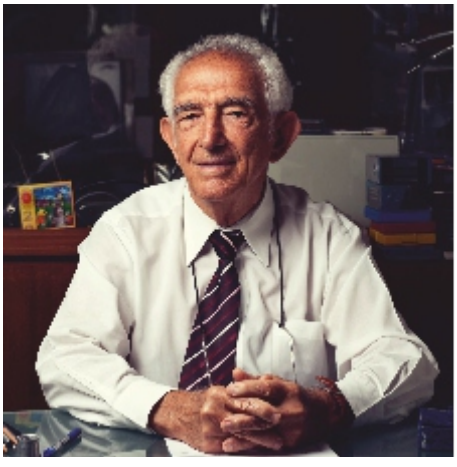
August 26th to 30th 2015

34th International Gemmological Conference

In Vilnius, Lithuania

Persons attending and presenting from ICGL:
Tay Thye Sun, Elisabeth Strack, Masaki Furuya, Jayshree Panjikar

Introducing Regular Member 008:



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What Standard Gem Testing Equipments do You have: Microscope, polariscope, refractometer, spectroscope, specific gravity scale, electronic gauges, dichroscope, colored stones filters.

What Advanced Instruments do you have: UV-Vis-NIR spectrometer, Raman spectrometer and we recently bought one FTIR but we will only get it after May.

Have you published or presented papers at conferences/magazines/seminars? Yes

Are you a Member of a Gem Trade Organization? AGA, NAJA (USA), ABGA, IBGM, AJORIO (Brazil)

Are you giving lectures and educational programs to trade? Yes. We give classes on PUC-RJ (Is a university in Rio de Janeiro) and we give courses about colored stones ID and grading and diamonds ID and grading.