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Anong Kanpraphai-Peretti climbs out from a 40m vertical shaft of the Bawmar sapphire mine in West Mogok. On her back is a 3D camera system recording the treacherous ascent of Dr. A. Peretti from his studies underground. She is the first camerawoman in the world to film underground sapphire mining with a 3D camera. The 3D film was shown in a GRS seminar during the September Hong Kong Jewellery & Gem Fair ([www.gemresearch.ch/news](http://www.gemresearch.ch/news)).



# GRS expedition to the Mogok ruby, sapphire and spinel mines

By Dr. A. Peretti



The Mogok Valley in Myanmar (Burma) is home to some of the world's most coveted gemstones but only a few outsiders have ever forged a way into this region. GRS (Gem Research SwissLab), however, has kept a presence in the area for two decades. During this time, GRS has accumulated the most comprehensive gemmological data on spinel, as well as ruby and sapphire found in the region.

## Unprecedented access

GRS had been monitoring the Mogok Mines since 1994. This has allowed us to collect valuable data during numerous field trips to the region. Only very recently has Mogok opened up to a select few gemmologists. Through a series of complicated permit procedures, GRS gained access to every single important mine in Mogok. These expeditions target the location of the most important source of Pigeon's Blood ruby, which up until this time had remained off-limits to outsiders.

The mine for this rare ruby deposit is accessed solely by three 100m vertical elevator systems (total 300m vertical depth). A huge marble mountain fitted with sophisticated and complex elevated transportation

*Dr. A. Peretti adjusts a 3D movie camera with a high-watt LED light on a Burmese miner. The lightweight mine worker climbs about 100m vertically down the shaft of the Kadotthat mine to record various tunnels for GRS in a 30-minute project. He was able to capture mining conditions within a marble mountain yielding the world's most important Pigeon's Blood rubies of the past two decades.*



Studying the most productive sapphire mine in the Mogok Valley (Bawmar in West Mogok) revealed that these sapphires are slightly over-dark and were originally formed in moonstone layers. The mining area has been transformed into a desert due to extensive surface and underground mining, but reforestation and mountain slope-stabilisation projects have been spotted to counter this erosion



Deep within a marble mountain at Bawpadan, west of Mogok, Burma (Myanmar), Dr. A. Peretti descends the last 30m down an excavated tunnel to study the origin of Pigeon's Blood ruby. They are found in distinct layers of grey marble within a complicated geological formation of marble. To reach this mining spot, three elevator systems had to be utilised. The ruby is located 900 feet below the surface

(commonly seen in South African gold mines) was an unexpected sight at this ruby deposit. The elevator system guides miners to a large number of vertically inclined shafts created for ruby mining.

#### Distinctive geology of the deposit

The mountain itself consists of folded marble rocks interspersed with compositional layering. Because the ruby is only found in certain layers, mining is both costly and extremely difficult. Just one ruby turned up during GRS' tunnel exploration, underlining the extreme scarcity of these stones. It appears that this traditional key deposit will soon be mined out. The daily production of rock crushing, washing and sorting at the site seemed forlorn, and mirrored the look on the miners' faces.

#### New site confirmed

Anticipating that the earlier primary mines were expiring, a marble mountain further east of Mogok at Dattaw mine has commenced operation. GRS discovered that its team was the only group of foreigners allowed into the mine up until this date; and indeed, inspection confirmed that another huge primary mine will begin ruby production again. As with other such mining efforts, these are risky operations with no guarantee as to the size or quality of ruby that will be produced.

By contrast to mining in the mountainous Mogok region, a chain of large-scale open pit mines could be observed along the entire Mogok Valley, stretching from west to east over a 30km span. The strategic mines positioned at previous sites have been inspected numerous times by the author since 1994. Previously, hundreds of so-called square-foot mines (small narrow vertical shafts descending into the gem-bearing layers) were present. The marble hills have been dug out and washed down to the surface. Debris from those mines has since been obscured by vegetation. Beforehand, labour was conducted with minimal equipment. But today, the entire landscape is awash with heavy machinery. While the quest to locate gemstones has become increasingly costly, the concentration of gems in that terrain has decreased significantly due to past mining activity, which depleted the more accessible deposit layers.

#### Pricing and supply

Going forward, the expectation for private enterprise and governmental joint ventures will be that less quantity is produced with more expensive rough. A recent visit to a local Mogok auction confirmed this premise. An array of gems was offered, but noticeably absent were extremely large, expensive sapphire



*Gemstone production at the During Taung mine in West Mogok revealed the size, quality and colour of currently mined spinel, sapphire and ruby by Dr. A. Peretti and local gemmologist-GRS consultant known in the Mogok valley as 'Ko Pauk' (Ngwe Lin Tun). The area is being re-mined after centuries of mining here. The production revealed fine gemstones, but mining efforts involved use of heavy equipment and removal of the entire landscape bordering the marble mountains; transforming a former paradise into a desert*

and ruby. A 4.5-carat ruby rough sold for \$50,000. The 2.5-carat ruby (not Pigeon's Blood colour) would yield \$20,000 per carat after cutting. Over the years, GRS has kept pace with market values and trending patterns of spiking prices arising from a scarcity of good stones. Similar price hikes are mirrored elsewhere in mining areas around the world. However, the robust Burma-origin provenance has propped up demand for these stones even though they are rarely found nowadays.

### Emerging individual mining efforts

Currently, over a thousand small-scale private mine owners are awaiting their mining licences. This private initiative will hopefully re-energise sustainable small-scale mining efforts as that which occurred in the past. The Mogok Valley boasts a magnificently rich cultural heritage, resplendent with pagodas, mosques and churches. It is a multicultural, multilingual exotic locale fuelled by a single goal for everyone – to find the most beautiful gemstones in the world.

Vigorous efforts should be implemented to guard this Valley of Gems by designating it as a Unesco World Heritage site before it is too late. Ethical and sustainable mining of these deposits would guarantee their existence for more than just another decade. The author and his fellow colleagues in the field of gemmology are strongly pushing for that to happen. Please join us in supporting this.

*Dr. A. Peretti is CEO and founder of GRS Laboratories, with labs in Switzerland, Thailand and*



*The difficulties of finding Pigeon's Blood ruby are realised when the geology of the primary ruby mine at Bawpadan is studied. Dr. A. Peretti interviews engineers and geologists at the mining site to determine if the ruby-bearing levels are folded within the mountain in multiple steps; totally back-flipped (isoclinal in geological terms) and following large-scale open folds (anti-synforms). The ruby layer is so scarce that only one ruby was spotted upon inspecting the rocks and was extremely difficult to follow and locate within the mountain. This results in extremely expensive and risky mining operations with a complicated network of tunnels*

*Hong Kong. He regularly conducts expeditions to the world's most important ruby and sapphire mines including the remote Kashmir sapphire mines in the high Himalayas. Peretti holds a PhD in Earth Science (specialisation in Geology and Mineralogy) and is one of the world's still practicing gemmologists with over 25 years of experience. He is renowned for his adventurous field-gemmology films, books and numerous scientific publications. **JNA***