Figure 20: In western Zacatecas State, miners dig shallow trenches (indicated by the arrow) along the base of a hill in search of opal. They follow iron-oxide-filled fractures cutting a rhyolite welded tuff. Photo by P. Megaw.

opal is unknown). Nevertheless, a study of these three faceted samples at the School of Mines in Nantes showed that their radioactivity was not dangerous. Their dose rate was measured with a Canberra Inspector 1000 instrument (NaI detector) for approximately one-half hour. The samples were measured together (total weight ~4 ct), yielding a dose rate that fell within background levels of 0.052–0.065 µSv/h.

This new Mexican gem, currently marketed as 'Electric Opal', is a rare example of opal-AN that is thick and transparent enough to be faceted. Usually such material is cut into flat cabochons, such as 'Satin Flash Opal' from Utah. It is also one of the rare gems that is almost exclusively coloured by luminescence.

Emmanuel Fritsch (Emmanuel.Fritsch@cnrs-imn.fr)
Institut des Matériaux Jean Rouxel
CNRS, Team 6502, University of Nantes, France

Tyler Spano-Franco
University of Notre Dame, Indiana, USA

Peter Megaw
IMDEX Inc., Tucson, Arizona, USA

References

Moore T.P., 2014. What's new: Tucson show 2014. *Mineralogical Record*, **45**(3), 345–375.

Ostrooumov M., Fritsch E., Lasnier B. and Lefrant S., 1999. Spectres Raman des opales: Aspect diagnostique et aide à la classification. *European Journal of Mineralogy*, **11**(5), 899–908, http://dx.doi.org/10.1127/ejm/11/5/0899.

Quartz with Radiating Fibres, Sold as 'Trapiche' Quartz

Rock crystal is well known for containing a wide variety of inclusions. However, it is rare for these inclusions to create interesting optical effects.

During the 2014 Tucson gem shows, dealer German Salazar (Bogotá, Colombia) had some interesting tablets of colourless 'trapiche quartz' from Colombia. He stated that the quartz was found in 2011 in the Boyacá and southern Santander Departments, about 300 km (190 miles) north of Bogotá by road. Artisanal miners produced ~300 kg of quartz crystal clusters, but only 6 kg showed the optical phenomenon, which is restricted to areas near the base of the specimens. The optically interesting areas were not visible from the outside of the specimens, but only after they were sawn in a direction perpendicular to the c-axis of the quartz crystals. The tablets were cut from phenomenal portions measuring 10–45 mm in diameter and up to 40 mm thick, so large amounts of quartz had to be processed to find the areas of interest.

Salazar kindly donated a 25.18 ct tablet to Gem-A, and it was examined by one of the authors (MSK) for this report. The hexagonal cross-section was cut perpendicular to the main c-axis of a quartz crystal, and was polished as a slightly domed cabochon (Figure 21, top). It exhibited very fine and slightly curved fibres (presumably hollow) that extended radially from a nearly inclusion-free central part of the quartz crystal (Figure 22). A closer look with the microscope revealed that these fibres were not continuous, but rather 'dotted'. They emerged in bundles from a slightly milky zone (presumably due to sub-microscopic hollow fibres) at the spiky interface with the relatively clean core.

The fibres appear to represent growth channels that formed perpendicular to the growing prism faces (parallel to the growth direction), similar to the so-called comet structures seen, for example, in corundum (Gübelin and Koivula, 2008). Much less probable is that these features are hollow remnants of dissolved fibrous minerals that originally grew syngenetically with the prism faces of the quartz crystal. It was not possible to identify any mineral phase within these fibrous structures by Raman microspectroscopy. The irregular and spiky interface between the fibrous quartz and the nearly inclusion-free core may be due to an initial episode of deep natural etching by a corrosive fluid. This would have then been followed by a second stage of quartz growth that was intensely disturbed by growth perturbances, resulting in the fibrous channels.

The radiating structure of this quartz is particularly noticeable when viewed in cross-polarized light (Figure 21, bottom). Although this pattern is reminiscent of the trapiche growth phenomenon shown by some minerals (e.g.

Figure 21: This 25.18 ct tablet of quartz shows a fine radiating fibrous structure (top), which is particularly noticeable when viewed between crossed polarizers (bottom). Gift of German Salazar; photos © L. Phan, SSEF (top) and by B. M. Laurs (bottom).

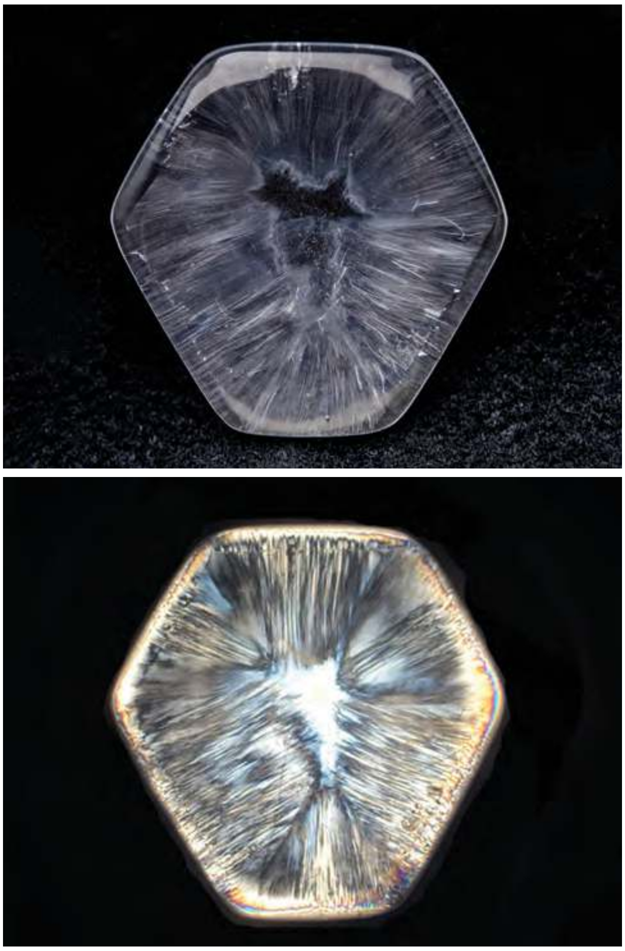

Figure 22: This closer view of the studied quartz shows the nearly inclusion-free core with an irregular spiky outline that is overgrown by a second quartz generation containing a fine fibrous pattern. The fibres are presumably hollow, and they are interpreted as growth channels due to perturbances at the growing prism faces. Photo © M. S. Krzemnicki, SSEF; image width 13 mm.

Figure 23: The skeletal crystal growth pattern in the two trapiche rubies at the bottom right shows distinct differences from the quartz studied for this report. Photo © L. Phan, SSEF.

ruby), the observed phenomenon is not the result of growth dynamics responsible for the trapiche pattern, and is also quite different in appearance (e.g. Figure 23). Previous studies have attributed the trapiche structure to skeletal crystal growth during which the edges of certain crystal planes grew much faster than the faces themselves (e.g. Schmetzer et al., 1996; Sunagawa, 2005).

Nowadays, the term *trapiche* is widely used in the gem trade for any material showing a fixed star-like pattern. Based on the fact that *trapiche* should be used only to describe material showing a skeletal growth pattern, one of the authors (MSK) suggests using another name for fixed star-like patterns of other origins. One possibility is the term *Polaris* (also known as the North Star, which is a fixed star in the northern hemisphere). Therefore 'Polaris Quartz' could be a poetic option for this interesting material that shows a fixed-star pattern.

Michael S. Krzemnicki

Brendan M. Laurs

References

Gübelin E.J. and Koivula J.I., 2008. *Photoatlas of Inclusions in Gemstones*, Vol. 3. Opinio Publishers, Basel, Switzerland.

Schmetzer K., Hänni H.A., Bernhardt H.-J. and Schwarz D., 1996. Trapiche rubies. *Gems & Gemology*, **32**(4), 242–250.

Sunagawa I., 2005. *Crystals—Growth, Morphology and Perfection*. Cambridge University Press, Cambridge, UK, 295 pp.

Yellow Scheelite from Khaplu, Pakistan

In early 2012, gem dealer Dudley Blauwet obtained a large piece of rough 'golden' yellow scheelite that reportedly came from the Khaplu area, Ghanche District, Gilgit-Baltistan (formerly Northern Areas), Pakistan. He first encountered scheelite from this locality in the 1990s, and most of it was orange-brown although rare pieces were red and weighed 7+ ct after faceting. The sample he obtained in 2012 weighed 102 g, but only a small part of it was cuttable. In January 2014 his cutting factory returned 34 stones weighing a total of 19.56 carats, which ranged up to 4.28 ct.

Blauwet loaned the 4.28 ct oval brilliant cut to this author for examination. It showed a light, slightly brownish, yellow colour with a high lustre and strong dispersion, somewhat similar to diamond (Figure 24). Doubling of the pavilion facets was readily seen when looking through the table with low magnification, which indicated a rather strong birefringence (the RI values were above the limit of a standard refractometer). The stone was virtually clean, with only one small cleavage fracture near the culet. Viewed with a prism-type spectroscope, the sample showed faint but sharp lines at about 560 and 570 nm, and a narrow grey band at ~580–590 nm. It fluoresced strong whitish blue to short-wave UV radiation, and very weak orange to long-wave UV. These properties, and its hydrostatic SG of 5.94, are consistent with those expected for scheelite. The absorption spectrum is attributed to the presence of 'didymium', a mixture of the rare-earth elements praseodymium and neodymium, and similar spectra are known in scheelite from other occurrences (e.g. Gunawardene, 1986; Dedeyne and Quintens, 2007). EDXRF chemical analysis