

Observations of Pegmatitic Amethyst from São Paulo State, Brazil

In many parts of the world, construction can be halted by the discovery of ancient ruins or burial sites. In July 2006, during road construction in a rural area of southern São Paulo State in Brazil, an interruption occurred for a different reason—the discovery of a rich deposit of amethyst hosted by granitic pegmatites (see www.cprm.gov.br/publique/media/evento_1776.pdf). The site was rapidly overtaken by *garimpeiros* (Brazilian artisanal miners), causing the government to close the area, which lies approximately 90 km from the city of São Paulo. Due to the local poor economic conditions, the deposit may be reopened to the miners in the future as a potential source of income. However, environmental legislation would require that any future digging be done in a responsible manner.

Recently submitted for analysis by George Williams, a senior buyer for Jewelry Television (Knoxville, Tennessee, USA), was a selection of 39 amethyst gemstones reportedly obtained from this locale. Several of them were quite large, weighing more than 100 ct (e.g. Figures 5 and 6). Standard gemmological testing yielded results that were expected for single-crystal quartz (RI of 1.543–1.552 and hydrostatic SG of 2.65). The samples were a medium strong purple, and straight and angular colour zoning was prominent when they were viewed in

Figure 5: These large amethysts (113.79 and 114.15 ct) are from southern São Paulo State in Brazil. Photo by B. Williams.



Figure 6: Straight and angular colour zoning is evident in this 113.79 ct São Paulo amethyst. Photo by B. Williams.

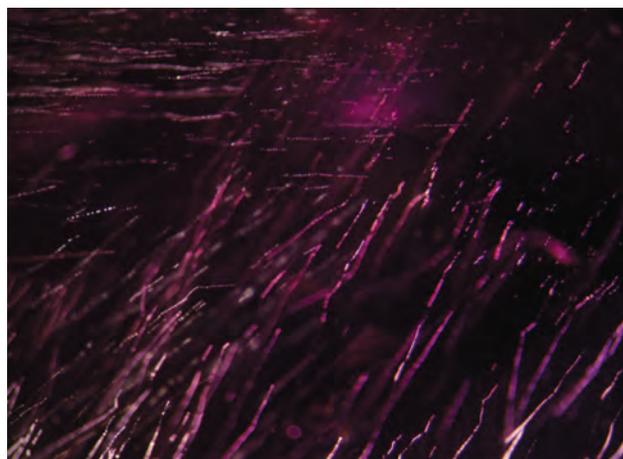


Figure 7: Undulating dotted lines of fluid inclusions such as these were present in most of the São Paulo amethysts examined. Photomicrograph by B. Williams; magnified 35 \times .

certain orientations (Figure 6), which is not unusual for amethyst. No twinning was seen in the samples, which is consistent with the reported pegmatitic origin (Guzzo, 1992). Viewed with darkfield illumination, some of the stones contained numerous, evenly spaced, undulating dotted lines of fluid droplets that were oriented in various directions (Figure 7). Of the 39 stones examined, all but seven contained these inclusions. While fluid inclusions are common in all varieties of quartz, this type and arrangement has not been previously observed by the authors, and a literature search did not reveal any such inclusions in amethyst.

The presence of abundant molecular H₂O was detected with Fourier-transform infrared

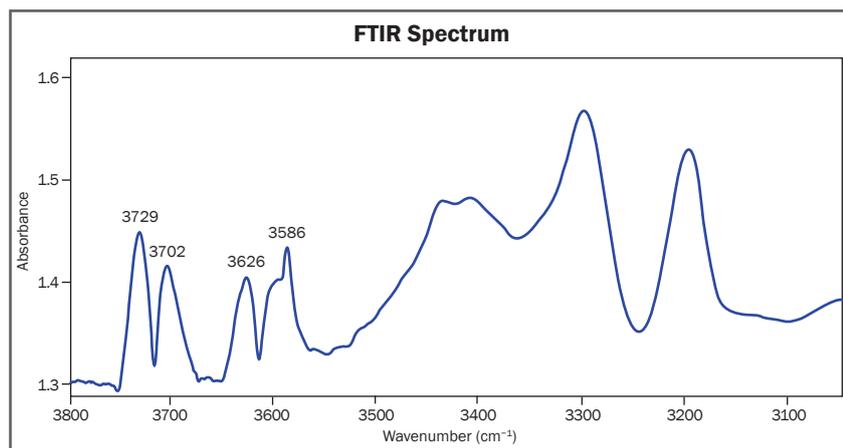


Figure 8: FTIR spectroscopy showed an unusually high water content in the amethyst. The four bands in the 3750–3550 cm^{-1} region correspond to molecular H_2O within the fluid inclusions of this pegmatitic amethyst.

spectroscopy (FTIR; see Figure 8, cf. Fukuda, 2012). This water was trapped in the fluid inclusions described above.

Determining provenance for any material as plentiful and diverse as amethyst is problematic at best, but the unusual fluid inclusions could help differentiate material from this São Paulo locality. In addition to these inclusions, the pegmatitic origin of this amethyst makes it an interesting gem for collectors.

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References

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- Guzzo P.L., 1992. Characterization of the Structures, Impurities and Defects Centers Related to Al and OH in Natural Quartz. PhD dissertation, Mechanical Engineering Department, University of Campinas, Brazil.

Apatite from Kenya

In September 2013, gem dealer Dudley Blauwet (Dudley Blauwet Gems, Louisville, Colorado, USA) received a 35.1 g parcel of rough green apatite from his supplier in Nairobi. The material was obtained from local dealers who confirmed that it came from the Machakos area in south-central Kenya, but did not want to give more specific location information to protect their source. The parcel consisted of 39 pieces, and after cutting Blauwet obtained 54 stones totalling 30.93 carats that ranged from 0.10 to 3.78 ct each.

Blauwet loaned two of the apatites (1.28 and 3.78 ct; Figure 9) to this author for examination. Their colours were a medium-dark to dark, moderately strong, slightly yellowish green. Refractive indices varied between 1.638 and 1.644, with a birefringence of 0.003–0.005, and the hydrostatic SG of both stones was 3.17. These values are consistent with apatite. Both stones showed remarkably strong dichroism, in bluish

green and greenish yellow. No fluorescence was observed under UV radiation, and neither stone showed any well-defined features when viewed with a prism spectroscope. They were moderately included, with growth tube-like inclusions oriented parallel to the c-axis that looked

Figure 9: These apatites (3.78 and 1.28 ct) are reportedly from Kenya. Photomicrograph by Dirk van der Marel.

