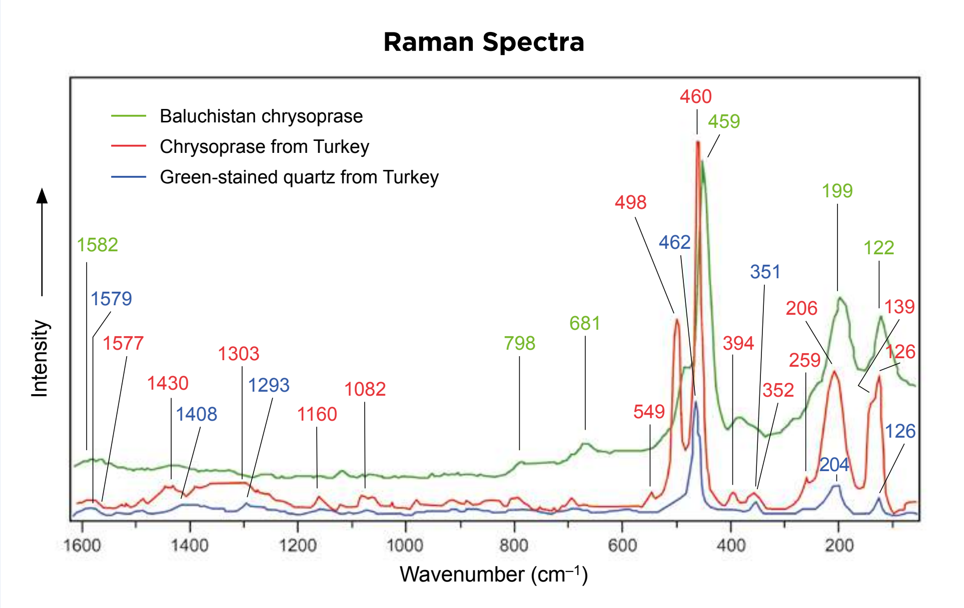

Figure 11: Raman spectra are compared for chrysoprase from Baluchistan and Turkey, as well as green-stained quartz from Turkey. Data for the Turkish samples is from Hatipoğlu *et al.* (2011). Spectra are offset vertically for clarity.

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New Emeralds from Musakashi, Zambia, Appear on the Market

Zambia has been known for many decades as a major source of gem-quality emeralds. Most of the production comes from the Kafubu area (e.g. Figure 12), about 45 km south-west of Kitwe in Zambia's Copperbelt Province. In early 2000, a new emerald source was discovered at Musakashi in the Solwezi District of

Figure 12: This parcel of ten Zambian emeralds (about 5 ct total weight) recently submitted to SSEF for testing was found to consist of nine stones from the Kafubu area and one from the Musakashi deposit. Photo © SSEF.

Figure 13: Spiky multiphase fluid inclusions are seen in an emerald from Musakashi, Zambia. Photomicrograph by M. S. Krzemnicki, © SSEF; magnified 50×.

central Zambia (Zwaan *et al.* 2005), about 160 km west of Kitwe. However, there has been limited production from Musakashi until somewhat recently, partly due to equipment problems and legal issues concerning the mining concessions (Klemm 2010; Pardieu *et al.* 2015).

Interestingly, Musakashi emeralds are very different in their formation and occurrence from the 'classic' schist-hosted Kafubu material. According to Manyepa and Mutambo (2021), Musakashi emeralds are found 'in random pockets' related to weathered metasediments that are cross-cut by hydrothermal veins. They are reminiscent of Colombian emeralds, and to some extent those from Panjshir (Afghanistan) and Davdar (China), notably in the presence of spiky three-phase and multi-phase inclusions (Figure 13), as well as fine hollow channels parallel to the *c*-axis (Figure 14; see also Zwaan *et al.* 2005; Saeseaw *et al.* 2014; Cui *et al.* 2020).

Recently, the Swiss Gemmological Institute SSEF received a parcel of ten emeralds weighing a total of approximately 5 ct (Krzemnicki 2021). Whereas nine of these stones revealed classic features of Zambian emeralds from the Kafubu area (e.g. brownish mica flakes, amphibole fibres and rectangular two-phase inclusions), one stone was quite different and showed characteristics consistent with emeralds from Musakashi. Chemical analysis by LA-ICP-MS (GemTOF, see www.gemtof.ch) confirmed a Musakashi origin by comparison to data from reference samples from this locality that were recently added to SSEF's collection.

The Musakashi emeralds investigated so far by SSEF chemically resemble Colombian stones in many aspects (see also Zwaan *et al.* 2005; Saeseaw *et al.* 2014). Their main chromophore is Cr (about 0.42–0.78 wt.% Cr_2O_3), together with V and Fe in similar concentrations (0.15–0.41 wt.% V_2O_3 and 0.22–0.42 wt.% Fe_2O_3). In addition, they contain only low-to-moderate concentrations of alkali elements, and—similar to Colombian emeralds—their Fourier-transform infrared and Raman spectral features show predominantly type I water (Wood & Nassau 1968). This all is very much in contrast to the more Fe-rich emeralds from classic schist-type deposits in the Kafubu area of Zambia. The Kafubu emeralds show an Fe/Cr ratio in the range of 6.5–20, compared to just 0.33–0.84 in the studied samples from Musakashi.

When comparing Musakashi emeralds to stones from Afghanistan, specifically those described in a recent article in this journal on Panjshir emeralds (Krzemnicki *et al.* 2021), we now have to assume that at least some of those samples might have originated instead from Musakashi. This is based on additional and new LA-ICP-MS data acquired on Musakashi emeralds. Further advanced testing in collaboration with other research institutions and gemmological laboratories is underway to define criteria to characterise samples from these different deposits, and is planned for publication in a future issue of *The Journal*.

It is often challenging for laboratories to investigate gem material from new sources. We commonly depend on obtaining reliable information from trade members and miners (e.g. Manyepa & Mutambo 2021), as accessibility to the deposits is not always allowed, especially in these difficult times of COVID-19. Nevertheless, studying samples from new and lesser-known deposits gives us greater insights into the different formation mechanisms of emerald deposits. This ultimately supports origin determination work, but it also means that occasionally we have to update our findings and conclusions when new scientific evidence is pertinent.

Figure 14: Fine parallel hollow tubes along the *c*-axis are present in this Musakashi emerald. Photomicrograph by M. S. Krzemnicki, © SSEF; magnified 50×.

Having now seen additional fine-quality Musakashi emeralds in the 2–5+ ct range, we assume that production from there has increased, and that more of these interesting emeralds will appear on the market in the near future.

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Two Holy Water Stoups Made from 'Lepidolite'

In 1792, H. Klaproth described a new mineral, lepidolite, from a quarry on Hradisko hill in the north-eastern part of Rožná village, Vysočina Region, Czech Republic. (The name *lepidolite* has subsequently been discredited and this lithium mica is now recognised as being in the polylithionite–trilithionite series.) Further information on the discovery and mining of lepidolite at Rožná can be found in Bohatý (1993) and Pařizek (1999). Probably the first person to recognise that it could be a new mineral was a count, Jan Nepomuk Mitrovský (1757–1799). According to a 1793 report by him, the lepidolite was processed into various objects, including paperweights and snuff boxes (Velebil 2002). The present report documents the use of this material in religious objects: two holy water stoups in the church of St Havel in Rožná, which dates to the second half of the 13th century.

The first stoup (Figure 15a) is located next to the main church entrance and dates from 1863. It is carved in the Baroque style and is semi-circular at its top, with a maximum outer diameter of 33.5 cm, an inner diameter of 25 cm and a depth of 6.5 cm. An inscription below the upper rim has the following characters: F, backwards letter J, K, O, 1863, K, U and probably two missing letters. The lower part consists of eight broad vertical ribs, which connect at the bottom of the stoup. It is deep purple and partially polished, with a dull waxy lustre.

The second stoup (Figure 15b) is located elsewhere on the first floor of the same church. However, it is smaller and not decorated. It has a maximum outer diameter of 24 cm, an inner diameter of 17 cm and a depth of 6 cm. Its upper rim overhangs the semi-circular bowl, which passes directly into the body of the stoup. It has a deep purple colour and a dull waxy lustre. Mrázek and Rejl (2010) stated that this stoup has the same date as the other one (1863).

In order to confirm the material composition of both stoups, we performed Raman analysis using a portable GL Gem Raman PL532 TEC spectrometer. The Raman spectra of both stoups were quite similar, and were consistent with a reference spectrum for 'lepidolite' collected at the University of Chemistry and Technology in Prague, Czech Republic.

The visual appearance of the 'lepidolite' of both stoups is consistent with material from the nearby Hradisko