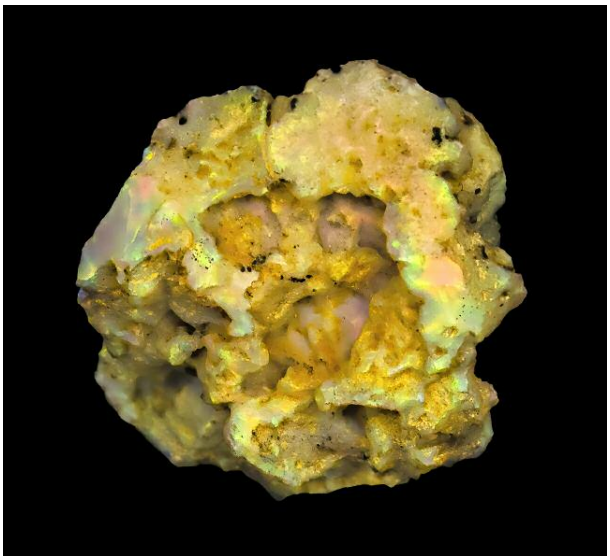

Figure 15. The untouched opal specimen displays the yellow coating caused by years of storage in silicone oil. Photo by Ted Grussing.

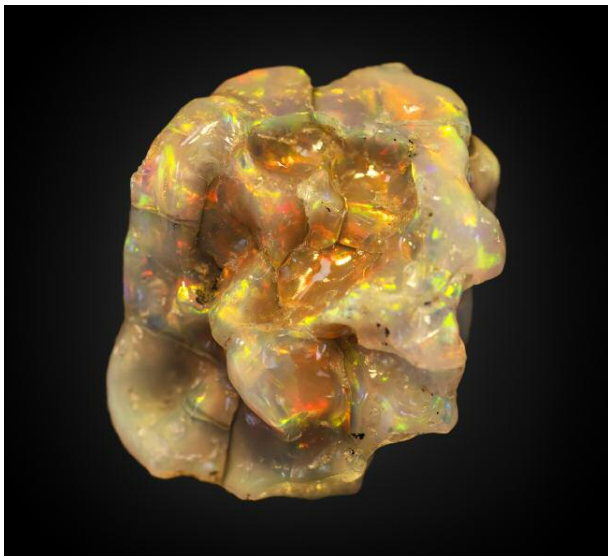

Figure 17. The finished piece, dry and ready for display. Photo by Ted Grussing.

still there, but the look was different. They looked like they could be worked—if not on the wheels, then with a flex shaft. The first opal that caught the author's eye (again, see figure 15) was cleaned and worked (figure 16). The completed piece, shown in figure 17, is named "Bonnie Jean." There are many more to finish, and they are dry and unlikely to craze or crack any further.

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Trapiche emerald from Swat Valley, Pakistan. Trapiche emeralds are usually found in Colombia. Recently the authors received six emeralds reportedly from Swat Valley, Pakistan, polished as double-sided wafers, retaining their original hexagonal crystal habit and exhibiting a trapiche-like pattern (figure 18). These samples weighed from 0.38 to 0.83 ct, with a refractive index of 1.588–1.599 and a birefringence of 0.009–0.011.

Generally, these trapiche emeralds were composed of four parts from rim to core: a green rim, a light green area, six arms, and a colorless core, as illustrated in figure 19A. The rims had a highly saturated green color, and most were relatively clean except for several fractures and tiny fluid inclusions. The rims ranged from approximately 1 to 2 mm wide. Although the boundary between the green rim and

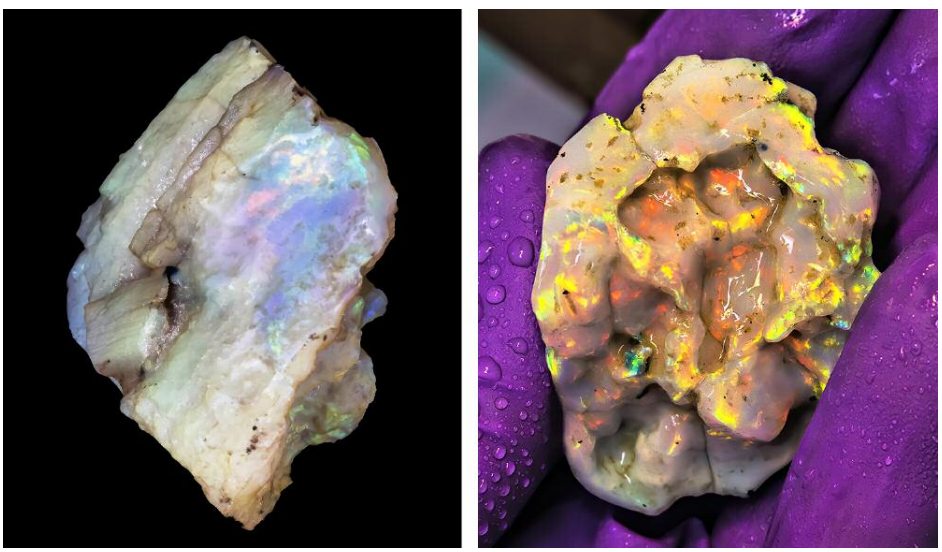

Figure 16. Left: The side of the specimen after cleaning and rubbing on a diamond wheel. Right: The nearly finished opal midway through the cleaning process. Photos by Ted Grussing.

Figure 18. Six emerald wafers reportedly from Swat Valley, Pakistan, showing a trapiche-like pattern. They range from 0.83 to 0.38 ct from left to right, with a thickness of about 1.51 to 2.08 mm. Photo by Kaiyin Deng.

the light area was not very sharp, a hexagonal boundary was visible. Six black arms spread in a hexagonal symmetric pattern, with each arm perpendicular to the hexagonal side. The colorless core usually had a hexagonal shape.

Microscopic observation revealed that every arm contained many minute black platy inclusions. These small particles appeared dark under transmitted light (figure 19B), while they showed bright metallic luster under reflected light (figure 19C). Micro-Raman analyses (figure 20) identified these inclusions as magnetite. Peaks at 662 and 545 cm^{-1} were consistent with two main peaks of magnetite, according to the RRUFF online database (rruff.info), while peaks at 683 and 400 cm^{-1} may be assigned to the emerald host. Chemical analysis by energy-dispersive X-ray fluorescence (EDXRF) on the sample shown in figure 19 revealed an iron content of 20,860 ppm (n = 3) in the light green area and 17,000 ppm (n = 3) in the rim. The difference in iron content may be due to the inclusions, since magnetite (Fe_3O_4) is mainly composed of iron and oxygen.

To our knowledge, there have not been many reports of trapiche emerald from localities other than Colombia.

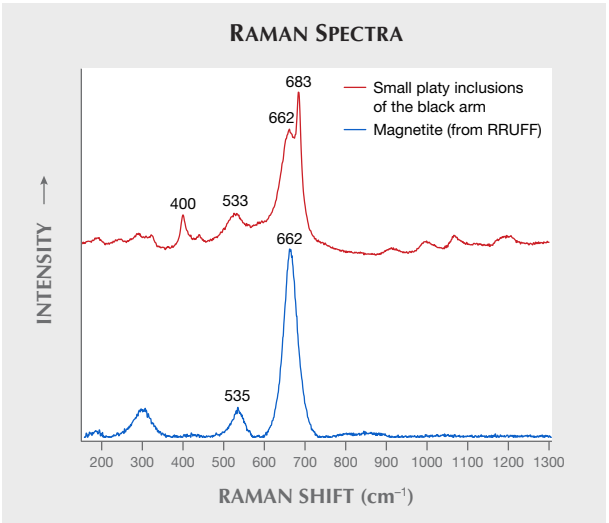

Figure 20. Raman analysis identified these inclusions as magnetite. Peaks at 662 and 545 cm^{-1} agree with the two main peaks of magnetite, according to the RRUFF database, while peaks at 683 and 400 cm^{-1} may be assigned to the emerald host.

The trapiche pattern caused by platy magnetite inclusions could help advance our understanding of trapiche.

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Uvarovite in prehnite from Pangasinan Province, Philippines. Uvarovite, $Ca_3Cr_2(SiO_4)_3$, is the rarest of the commonly encountered garnet species, and the only one that is consistently green. Although seldom faceted due to its tendency to be opaque, drusy coatings of tiny bright green uvarovite crystals on chromite matrix from Russia are used for jewelry. Recently, a new type of rock with lapidary po-

Figure 19. The trapiche emeralds from Pakistan were mainly composed of four parts: a green rim, a light green area, six arms, and a nearly colorless core as illustrated in figure A. These arms appear dark under transmitted light (B) and show bright metallic luster under reflected light (C); field of view 8.48 mm. Illustration and photos by Yujie Gao.