

## A Remarkably Large Amblygonite-Montebrasite Carving

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Figure 1: This 1,871 g amblygonite-montebrasite carving (18.50 × 15.10 × 7.30 cm) is unusual for its size and transparency.

Recently the Gem Testing Laboratory in Jaipur had an opportunity to examine an unusually large yellow, semitransparent to translucent carving (figure 1). This 1,871 g (9,355 ct) piece measuring approximately 18.50 × 15.10 × 7.30 cm was fashioned after Lord Mahavira, one of the ancient Indian sages who established the tenets of Jain Dharma. Initial observations suggested beryl due to the color, medium heft, and cloudy liquid inclusions visible to the unaided eye. Gemological testing ruled out that possibility, however. Spot RI was approximately 1.61, with a small but distinct birefringence blink, while hydrostatic specific gravity measured 3.00. The carving was inert to UV radiation.

Examination with a hand loupe revealed reflective liquid films (figure 2, left), fingerprints composed of phase droplets, elongated phase/short tubes oriented in one direction, aligned in planes intersecting at approximately 65/115° angles (figure 2, center). Also present were parallel reflective films that appeared to be incipient cleavage (figure 2, right). The overall inclusion pattern was typical of gems found in pegmatitic bodies such as beryl, tourmaline, and topaz.



Figure 2: Examination of the carving with a hand loupe revealed reflective liquid films (left), elongated phase/short tubes oriented in one direction and aligned in planes intersecting each other at approximately 65/115° (center), and parallel reflective films that appeared to be incipient cleavage (right). Image width 25 mm.

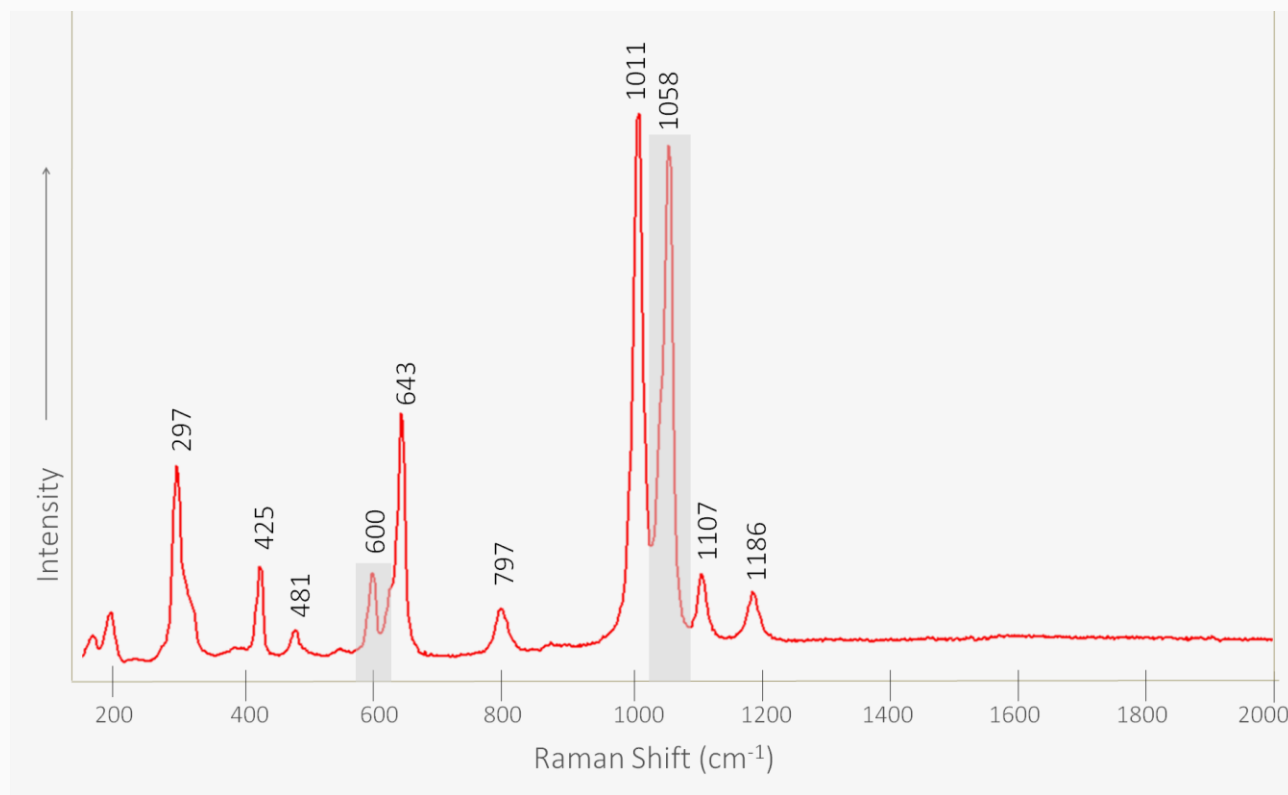


Figure 3: The carving's Raman spectrum showed major peaks at around 297, 425, 481, 600, 643, 797, 1011, 1058, 1107, and 1186  $\text{cm}^{-1}$ . The peaks at approximately 600 and 1058  $\text{cm}^{-1}$  suggest an intermediate member of the amblygonite-montebasite series.

The carving was identified as amblygonite-montebasite by Raman spectroscopy in the 200–2000  $\text{cm}^{-1}$  region, which revealed distinct peaks at ~297, 425, 481, 600, 643, 797, 1011, 1058, 1107, and

1186  $\text{cm}^{-1}$  (figure 3). Amblygonite and montebrasite are both lithium phosphates with a common chemical formula of  $(\text{Li, Na})\text{AlPO}_4(\text{F, OH})$ , forming an isomorphous series between F-rich amblygonite and OH-rich montebrasite. The two minerals can be colorless, yellow, or green. High-quality crystals are prized by collectors but rarely seen in the gem trade (R. Webster, *Gems: Their Sources, Descriptions and Identification*, 5th ed., rev. by P.G. Read, Butterworth-Heinemann, Oxford, UK). The amblygonite and montebrasite end members can be differentiated on the basis of peaks at  $\sim 600$  and  $1060 \text{ cm}^{-1}$  and a peak at  $\sim 3370 \text{ cm}^{-1}$ . With an increasing percentage of fluorine, the  $600 \text{ cm}^{-1}$  peak shifts from  $599$  to  $604 \text{ cm}^{-1}$  while the  $1060 \text{ cm}^{-1}$  peak shifts from  $1056$  to  $1066 \text{ cm}^{-1}$  (B. Rondeau et al, "A Raman investigation of the amblygonite-montebrasite series," *The Canadian Mineralogist*, Vol. 44, No. 5, pp. 1109–1117). According to the RRUFF database, however, the peak for montebrasite is at  $1047 \text{ cm}^{-1}$  while amblygonite's is at  $1060 \text{ cm}^{-1}$ . This is possibly due to different instrument settings. Although the  $\sim 3370 \text{ cm}^{-1}$  peak was not studied here, the  $600$  and  $1058 \text{ cm}^{-1}$  peaks in this carving suggested that it belongs to an intermediate state in the amblygonite-montebrasite series.

Amblygonite-montebrasite is known from many localities, especially the United States and Brazil, but the client did not know the source of the carving. A few faceted samples have been examined at this laboratory, but the carving documented here was exceptional for its large size and transparency, despite its brittleness and tendency to crack.

All photographs by Gagan Choudhary

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