

## Cat's-eye Apatite from Namibia

In March 2013, this author obtained a parcel of yellow gem rough from a small informal market on the road leading to the Spitzkoppe beryl and topaz area in west-central Namibia. At first glance the material appeared to be heliodor, which is well-known from Klein Spitzkoppe (e.g. Cairncross et al., 1998). The parcel consisted of ~500 g of mostly small fragments (<1 g each), as well as one larger piece that showed obvious chatoyancy.



Figure 3: Namibia is the source of this 26.10 ct chatoyant apatite, which resembles fine cat's-eye chrysoberyl. Photo by C. L. Johnston.

To clean the parcel prior to a closer examination, the material was placed in a rock tumbler (together with some aquamarine obtained from the same dealer), and it soon became apparent that the 'heliodor' was actually yellow apatite. There are several apatite localities in Namibia, but the origin of this particular material is unknown. Cutting of the single chatoyant apatite yielded a 26.10 ct round cabochon measuring 15.8 mm in diameter (Figure 3). It is the best Namibian cat's-eye apatite known to this author, with both a sharp eye and an attractive 'golden' yellow colour that are strongly reminiscent of cat's-eye chrysoberyl.

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### Reference

Cairncross B., Campbell I.C. and Huizenga J.M., 1998. Topaz, aquamarine, and other beryls from Klein Spitzkoppe, Namibia. *Gems & Gemology*, **34**(2), 114–125, <http://dx.doi.org/10.5741/gems.34.2.114>.

## Colour-change Axinite-(Mn) from Tanzania

During the June 2014 JCK show in Las Vegas, Nevada, USA, gem dealer Mark Kaufman (Kaufman Enterprises, San Diego, California, USA) informed one of us (BML) about an interesting colour-change stone from Tanzania that he had recently faceted. Kaufman obtained the rough material, represented as magnesioaxinite [renamed axinite-(Mg) after the scheme proposed by Burke (2008)], from a supplier who had purchased it in Tanzania in late April 2014. The rough consisted of a large crystal that was broken into several pieces, two of which were facetable. Kaufman cut a 4.48 ct oval stone that showed a distinct colour change, from greenish blue in daylight to lavender purple in incandescent light (Figure 4). He loaned the gem to authors CW and BW for examination and confirmation of its identity.



Figure 4: This 4.48 ct axinite-(Mn) appears greenish blue in daylight and lavender purple in incandescent light. Composite photo by B. Williams.

Members of the axinite group typically exhibit trichroism, and this sample showed pleochroic colours of violet-blue, pink and yellow (with some green appearing at certain angles, presumably due to the facet arrangement creating a blending of the yellow and blue directions

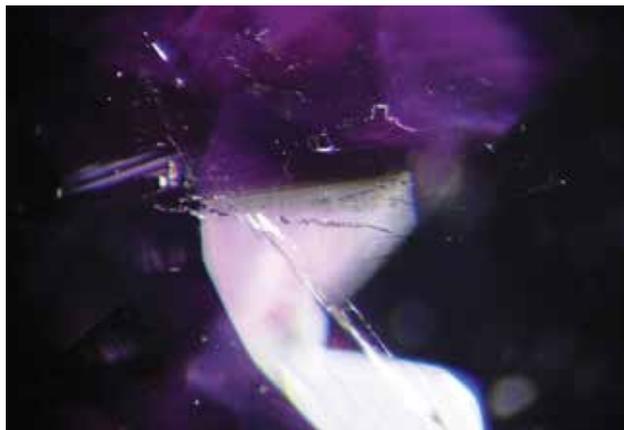


Figure 5: The only internal features seen in the axinite-(Mn) consisted of thin blade-like inclusions. One of them (top-centre) contains fluid and a vapour bubble. Photomicrograph by C. Williams; magnified 40 $\times$ .

when viewed from certain angles). The gem was eye-clean. Microscopic examination revealed a few thin colourless blade-like inclusions; one of them contained fluid and a vapour bubble (Figure 5). The RIs were 1.672–1.687, yielding a birefringence of 0.015. Hydrostatic SG was 3.27. When viewed with the Chelsea colour filter, the stone appeared distinctly purplish pink. It fluoresced moderately strong orangey red to long-wave UV radiation, and weak green to short-wave UV. EDXRF spectroscopy showed major amounts of Si and Ca, a significant Mn component, and only traces of Fe and V. (Although no Mg was recorded, this relatively light element is not easily detected by EDXRF.) Taken together, the physical and chemical properties identify the stone as axinite-(Mn) [or manganaxinite,  $\text{Ca}_2\text{MnAl}_2\text{BSi}_4\text{O}_{15}(\text{OH})$ ] rather than axinite-(Mg), and this was consistent with the Raman spectrum. The presence of significant Mn was also evident with simple magnetic testing, in which the stone was easily pulled across the desk by a rare-earth magnet.

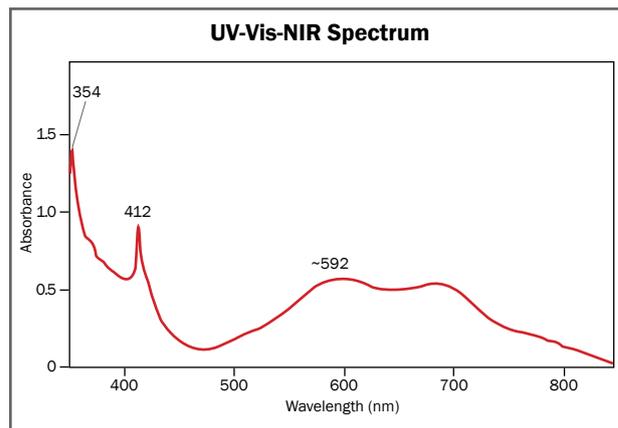


Figure 6: UV-Vis-NIR spectroscopy of the axinite-(Mn) shows features that may be ascribed to  $\text{Mn}^{2+}$  and  $\text{V}^{3+}$ .

An ultraviolet-visible–near infrared (UV-Vis-NIR) absorption spectrum of the axinite-(Mn) collected with an Ocean Optics USB4000 spectrometer showed sharp peaks at 354 and 412 nm, and a broad absorption centred at ~592 nm (Figure 6). Similar features were documented in a fragment of pale blue axinite-(Mn) by Arlabosse et al. (2008): a broad band centred at ~597 nm due to  $\text{V}^{3+}$  and several features that could be due to  $\text{Mn}^{2+}$ , including sharp peaks at 355, 368, 413 and 421 nm and two broad bands at 515 and 733 nm.

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## References

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## Green Fluorite from Stak Nala, Pakistan

Pegmatites at Stak Nala in northern Pakistan are famous for producing exceptional specimens of tourmaline, as well as a variety of other minerals (e.g. Laurs et al., 1998). Particularly coveted by mineral collectors are matrix specimens consisting

of tricolour tourmaline with white albite and green fluorite. According to gem dealer Dudley Blauwet, there has been sporadic production of small amounts of gem fluorite from Stak Nala since 1982. In June 2013, he obtained a parcel