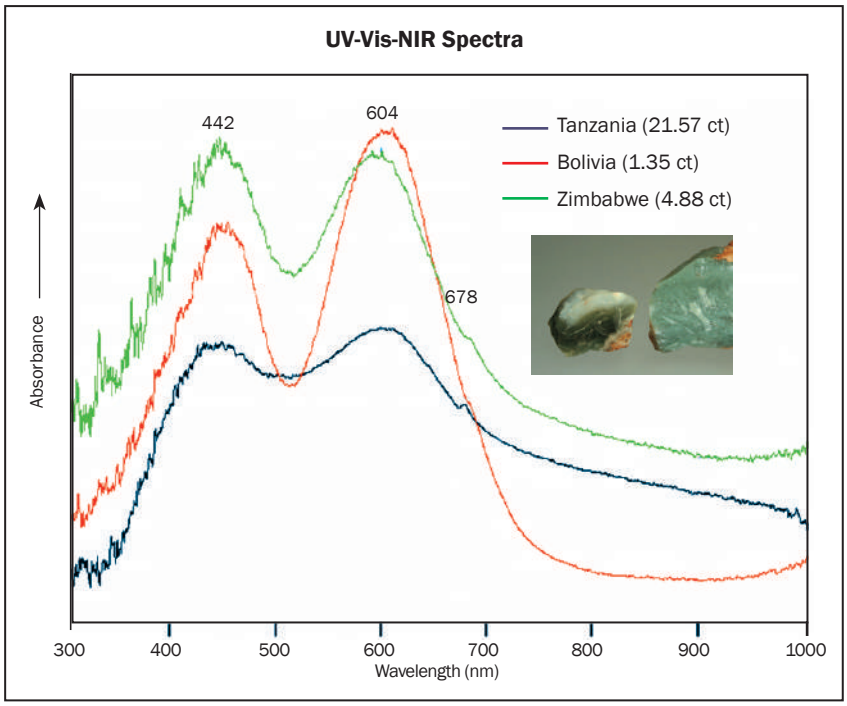

Figure 11: UV-Vis-NIR spectra for chrome chalcedony from Tanzania, Bolivia and Zimbabwe show chromium-related absorption features at 442, 604 and 678 nm. The inset shows the tested samples from Bolivia (left, 26 mm long) and from Zimbabwe (right); photo by J. Hyršl.

spectroscopy of the blue areas revealed chromium as the chromophore (Figure 11; see also Henn et al., 2016), so the correct description of this material is chrome chalcedony.

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Yellow Dravite from Tanzania

During the 2016 Tucson gem shows, Todd Wacks (Tucson Todd's Gems, Tucson, Arizona, USA) showed author BML a yellow 11.13 ct tourmaline that he faceted from a piece of rough recently obtained on a buying trip to Tanzania by Sir-Faraz Ahmad (Farooq) Hashmi (Intimate Gems, Glen Cove, New York, USA). The rough material was reportedly found in October–November 2015 in the Landanai region of north-eastern Tanzania, in an area that is known for producing green 'chrome' tourmaline. The rough consisted of a round 'nodule' that showed a few crystal faces (Figure 12, left). In faceting the gemsone, Wacks cut a small table and a deep pavilion to maximize the colour appearance (Figure 12, right).

Landanai is located in the same region of East Africa that produces 'golden' yellow tourmaline, particularly in the Taita-Taveta District of southern Kenya (see Simonet, 2000, and references therein). The tourmaline from this area is commonly dravite with a minor uvite component. Since the slightly orangey yellow coloration of the present tourmaline was somewhat different from the typical 'golden' tourmaline, we decided to examine the stone in more detail.

Refractive indices measured by author BML were typical for tourmaline: 1.620–1.639 (birefringence 0.019). Microscopic examination revealed a few minor 'fingerprints' and a single colourless mineral inclusion. Additional testing

Figure 12: The tourmaline gem nodule from Tanzania on the left was faceted into the 11.13 ct stone on the right. Photos by Todd Wacks (left) and Orasa Weldon (right).

was performed by author GRR at the California Institute of Technology. The composition of the sample was determined by energy-dispersive X-ray analysis using a Zeiss 1550 VP field-emission scanning electron microscope (SEM) with an Oxford Instruments X-MaxN SDD energy-dispersive spectroscopy (EDS) analysis system. A square-shaped area (155 µm wide) on the table of the stone was analysed. Because the sample was not carbon coated to conduct away electrons from the SEM beam, the analysis was run in variable-pressure mode. The X-ray spectrum (Figure 13) indicated that the stone was dominantly a Na,Mg-aluminosilicate. Minor amounts of Ca, Fe and Ti (but no Mn) also were detected. Detailed analysis of the X-ray spectrum with Oxford Instruments AZtec software showed that a significant amount of boron was present in addition to the other elements mentioned above. The data confirmed that the tourmaline was dravite, with Fe and Ti most likely responsible for its colour.

The slightly orangey yellow colour of the dravite showed moderate dichroism such that the E⊥c direction had the more intense colour. Compared to many dravites of similar size, which are commonly brown, this sample showed a low intensity of colour and a high degree of transparency. To confirm the cause of colour, Vis-NIR spectroscopy was performed. Absorption spectra (Figure 14) were obtained through the girdle of

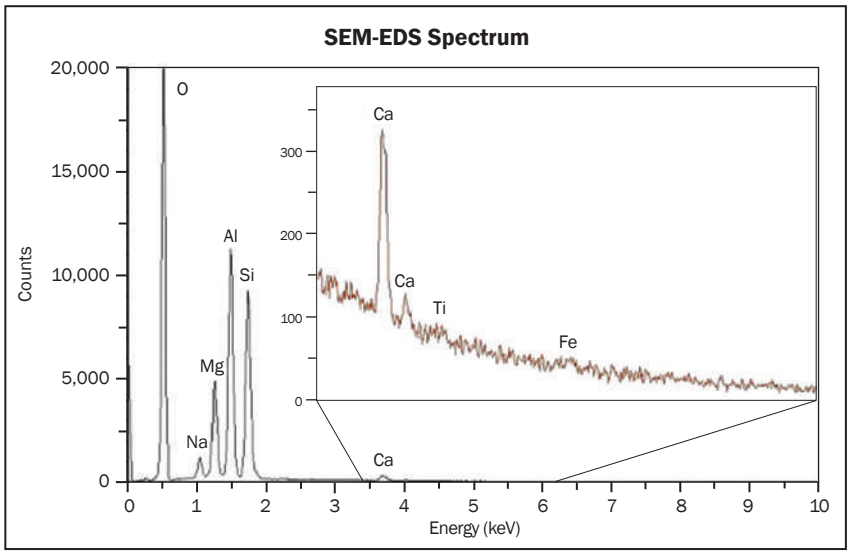

Figure 13: SEM-EDS chemical analysis shows that the tourmaline in Figure 12 is Mg-rich with some Na and minor Ca, corresponding to a dravite composition. Also present are traces of Fe and Ti.

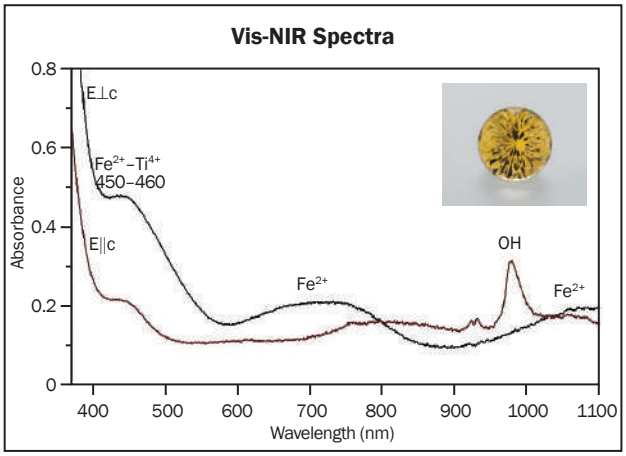

Figure 14: Polarized Vis-NIR absorption spectra of the yellow dravite show a dominant feature in the 450–460 nm region that is caused by Fe^{2+}–Ti^{4+} intervalence charge transfer. The spectrum is plotted for a 10.0 mm sample thickness.

the stone with the beam polarized both parallel and perpendicular to the girdle direction, corresponding to the E⊥c direction and approximately to E||c, respectively. A prominent absorption feature was recorded in the 450–460 nm region, and this is also an important characteristic of brown dravite such as the material from Yinnietharra, Australia. It arises from Fe^{2+}–Ti^{4+} intervalence charge transfer (Mattson and Rossman, 1988), and is the dominant cause of colour in this dravite. Fe^{2+}-related features occurred near 700 and 1100 nm, and narrower peaks in the 900–1000 nm region were overtones of OH absorptions in the infrared.

This attractive yellow dravite is much lighter coloured than typical brown dravite because of its low Fe and Ti contents. Its spectrum is similar to that of the golden dravite from Kenya (cf. Simonet, 2000), except that the broad absorption band in that material was centred at 435 nm rather than in the 450–460 nm region.

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New Garnets from East Africa

During a buying trip to Arusha, Tanzania, from late May to early June 2016, rough stone dealer Farooq Hashmi encountered some new garnet rough that was reported to be from north-eastern Tanzania or south-eastern Kenya. Several kilograms were available as pebbles and fractured pieces ranging up to ~10 g. The garnet was sold by local dealers as rhodolite. The colour of the material showed some variation, and Hashmi purchased only the lighter material (with a more purple colour in daylight), which he has marketed as 'Rhodolaya'.

Hashmi loaned three faceted stones (e.g. Figure 15) and 18 rough samples to authors CW and BW for examination. The cut stones weighed 3.24, 3.36 and 3.89 ct, and measured up to 9.4 × 8.2 ×

Figure 15: These two specimens (3.24 and 3.89 ct) are representative of some of the new garnet production from East Africa. The stones were faceted by Marvin M. Wambua, Safigemscutters Ltd., Nairobi, Kenya; photo by B. Williams.