

## Hessonite from Somalia

Somalia is not often reported as a source of gem materials, although small amounts of beryl (emerald and aquamarine), quartz and pyrope are known from there (Eliezri and Kremkow, 1994). Recently, another gem was found there—hessonite. According to gem dealer Dudley Blauwet, his supplier encountered the rough garnet in July or August 2011 in Nairobi, Kenya, where there is a large population of Somalis. He obtained about 10 pieces of rough ranging from orange to ‘honey’-tan to red-brown, and Blauwet had them faceted into stones weighing 0.18–1.05

Figure 15: This 1.05 ct hessonite, reportedly from Somalia, shows an attractive orange colour and good transparency. Photo by Bilal Mahmood.



ct. His supplier is not aware of any additional production of this garnet.

Blauwet loaned a 1.05 ct orange faceted hessonite (Figure 15) to the American Gemological Laboratories for examination. The RI of 1.741 and faint band at 430 nm in the absorption spectrum were consistent with grossular (Stockton and Manson, 1985). This identification was confirmed by FTIR and EDXRF spectroscopy. Microscopic examination showed small flake-like inclusions as well as transparent needle-like and tabular crystals. The roiled appearance that is typical of some hessonite was not obvious in this sample.

It is always interesting to see gem varieties that reportedly come from new sources, and this hessonite from Somalia is no exception.

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## Polycrystalline Kyanite from Tanzania

Recently the Swiss Gemmological Institute SSEF received two samples of a blue translucent material from Tanzania for examination (Figure 16). They consisted of a sawn waterworn pebble and a 1.72 ct faceted stone that was cut from the same piece. The pebble was obtained by gem dealer Farooq Hashmi in December 2013 while on a buying trip in Arusha. The person who sold him the stone was unaware of its identity, but noted that it was very hard.

Testing of both samples revealed an anisotropic polycrystalline optic character (i.e. always bright in the polariscope). As a consequence of this, it was difficult to obtain a precise RI value on the refractometer; the faceted sample showed an indistinct reading of approximately 1.72. SG was

Figure 16: These translucent blue samples proved to be polycrystalline kyanite. The sawn pebble (7.48 ct) is what remains after cutting of the pear-shape gem (1.72 ct). Photo © M. S. Krzemnicki, SSEF.

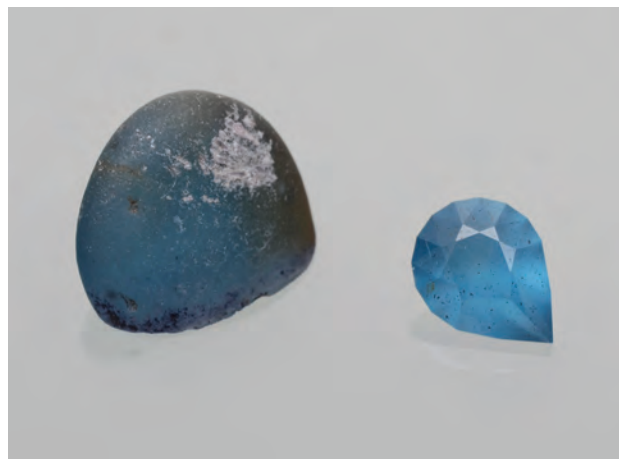




Figure 17: Viewed with the microscope, the faceted polycrystalline kyanite showed a treacle-like appearance and numerous black residues of polishing powder in small cavities on the polished surface. Photomicrograph © M. S. Krzemnicki, SSEF; magnified 60×.

determined to be 3.67 for both samples using a hydrostatic balance. They were inert to long- and short-wave UV radiation. Since the identity of the material was still not evident after this initial testing, it was analysed by Raman spectroscopy, which revealed a distinct kyanite spectrum. This identification was also in agreement with the RI and SG values. Chemical analysis confirmed that it was kyanite, showing Al and Si as main constituents, with small amounts of Fe and Ti, as well as traces of Cr, V, and a few alkaline earths. The blue colour of kyanite is most commonly linked to intervalence charge transfer of  $Ti^{4+}$ - $Fe^{2+}$  (elements present in this sample) through the replacement of two  $Al^{3+}$  ions on adjacent

crystal sites (Platonov et al., 1998; Henn and Schollenbruch, 2012; Krzemnicki, 2013); this mechanism is also well known in blue sapphire.

Microscopic observation revealed an interesting treacle-like appearance (Figure 17), similar to polycrystalline hessonite, created by an abundance of tiny fluid inclusions along kyanite grain boundaries. As a consequence of its microgranular nature and the directional hardness of kyanite, polishing of this material obviously was quite difficult, resulting in numerous black accumulations of polishing powder in small cavities on the surface of the faceted stone (again, see Figure 17).

To the author's knowledge, this is the first time that polycrystalline kyanite of gem quality has been reported. Hashmi has not encountered any other examples of this material on previous or subsequent buying trips.

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## Green Daylight-Fluorescent Hyalite Opal from Mexico

At the 2014 Tucson gems shows, some interesting rough specimens of transparent hyalite opal from Mexico entered the market (Moore, 2014). The material shows noticeable green fluorescence in daylight (e.g. Figures 18 and 19-left), but when viewed in incandescent light there is almost no body colour (Figure 19-right). Although production of this opal is quite limited, one of the authors (PM) obtained several pieces of rough

material, and five faceted stones ranging from 0.83 to 3.84 ct were cut by Michael Gray of Coast-to-Coast Rare Stones, Fort Bragg, California. In October 2014, author PM visited the opal deposit in the mountains of western Zacatecas State (Figure 20) and obtained more material from the miners. The opal occurs as botryoidal coatings or crusts within iron oxide-filled fractures cutting a quartz-rich devitrified rhyolite welded tuff.