Hessonite from Somaliland

Somaliland is an autonomous region of Somalia in East Africa, and has produced gem-quality garnet, opal, emerald, aquamarine and several other gem materials (Kinnaird & Jackson 2000). At the February 2020 Tucson gem shows, one of the authors (AMY) had some recent production of rough and cut orange garnets from Somaliland. According to his contacts in the mining area—including dealer Ahmed Shekh, a miner named Abdikarim and archaeologist Mohamed Abdi Allamagan—the garnet-bearing area is situated in an area measuring approximately 10 × 10 km that is located just south-west of the town of Daarbuduq (or Da'ar buduq), which is in between the capital city of Hargeisa and the coastal city of Berbera. Garnets have been mined from secondary deposits in this area since the 1990s, although some stones were collected from the surface before that time.

Both artisanal and mechanised methods have been used to recover the garnets. Artisanal miners work in groups of 3–5 persons and employ simple hand tools to dig shafts that are 1 m wide and average 4–6 m deep; sometimes three or four tunnels are interconnected. On average, each miner collects about 1 kg of garnet rough per day, although production may be greater during the rainy season. Mechanised mining takes place mainly along riverbanks, where about 50–100 persons work in screening operations. Depending on the capacity of the machinery used, the average daily production from each one ranges from about 15 to 40 kg.

The rough garnets consist of medium to dark orange broken fragments (rarely showing crystal faces) that typically range up to 5 g each, with the largest stones weighing 50 g. About 40% is of good quality and 60% is comprised of lower-grade material.

Author AMY donated some rough and cut garnets to Gem-A (Figure 22), and the five faceted stones were characterised by authors BW and CW. They weighed 5.66–8.16 ct and ranged from medium yellowish orange (6.13 ct) to deep orangey red (6.04 ct). The RI ranged from 1.740 (6.13 ct) to 1.749 (6.04 ct), and SG was measured hydrostatically at 3.61 (6.13 ct) to 3.64 (6.04 ct). These values are all within the expected range for grossular (hessonite), with those exhibiting a deeper, more reddish colouration—along with higher RI and SG values—inferred to contain greater amounts of iron. The identification of all the samples as grossular was confirmed by Raman spectroscopy using a Magilabs GemmoRaman-532SG spectrometer. Between crossed polarisers, some stones showed uneven, patchy, anomalous extinction while others exhibited a more striated and semi-parallel extinction pattern. Inclusions consisted of partially healed fluid-filled fissures, etch tubes (Figure 23) and colourless crystalline inclusions with a prismatic or rhomboid shape that appeared to be calcite and/or apatite. Absent was the roiled optical effect that is commonly seen in hessonite.

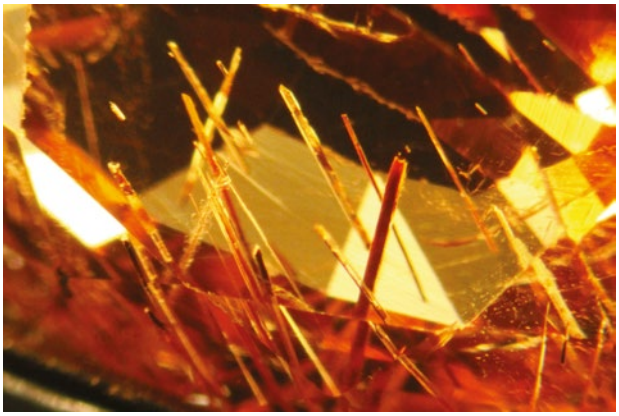

Figure 23: Etch tubes are prominent in this hessonite from Somaliland. Photomicrograph by B. Williams; image width 6 mm.

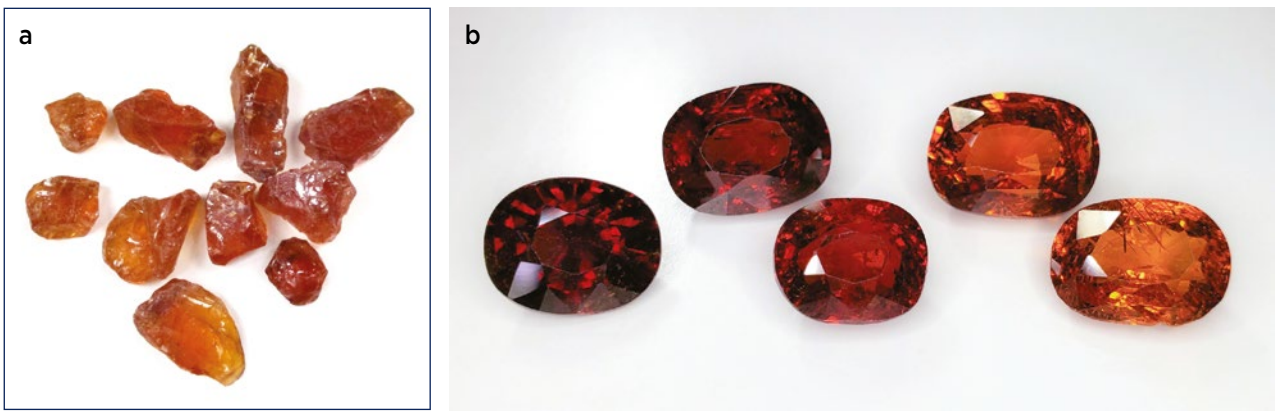

Figure 22: (**a**) These rough pieces of hessonite from Somaliland range from yellowish orange to reddish orange and weigh 0.70–2.47 g. (**b**) The five faceted hessonites examined for this report weigh 5.66–8.16 ct. Photos by (a) B. Williams and (b) C. Williams.

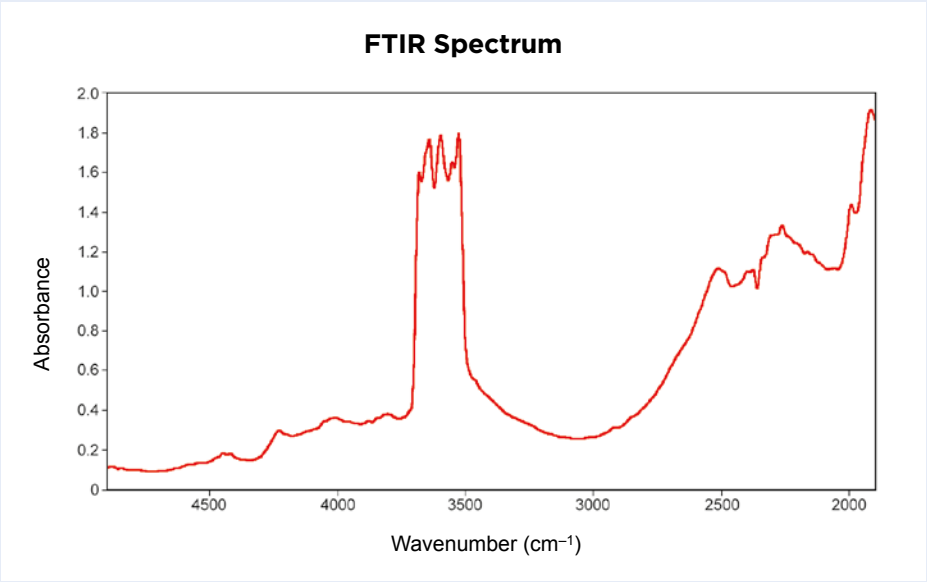

Figure 24: A strong absorption band in the mid-infrared region centred at around 3600 cm^{-1} is indicative of a high water content and is typical of hessonite.

Fourier-transform infrared (FTIR) spectroscopy using a Magilabs GemmoFtir showed a distinctive water absorption band centred at around 3600 cm^{-1} (Figure 24), which in these authors' experience is a consistent feature of hessonite.

Kinnaird and Jackson (2000) documented three different types of orange to red garnets from Somaliland: grossular, pyrope and almandine. The grossular was orange-red (i.e. hessonite) with a composition of $Grs_{86.9}And_{9.86}Alm_{2.57}$ (with traces of pyrope and spessartine components), and it contained a cluster of parallel, tubular, partially liquid-filled inclusions. Clark (2014) also documented a hessonite from Somalia, which was orange and had an RI of 1.741; it was described as containing small flake-like inclusions and transparent needle-like and tabular crystals, descriptions consistent with the inclusions noted in the present hessonites. In addition, as in the present samples, the stone examined by Clark (2014) lacked a roiled appearance.

The presence of hessonite in the Daarbuduq area is consistent with the geology of the region. According to the geological map presented by Kinnaird and Jackson (2000), the area is underlain by Proterozoic marbles and other metamorphic rocks of the Mora complex that are intruded by granitic rocks of mainly Cambrian age (500–550 million years old). The interaction between marble and granitic rock is favourable for the formation of skarn, which is a common host rock for grossular.

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Laurentthomasite, a New Gem Mineral

In March 2020, the GIT Gem Testing Laboratory (GIT-GTL) received two greenish blue faceted stones that weighed 0.98 and 1.67 ct for identification (Figure 25a). The stones' owner indicated that they reportedly consisted of a newly described mineral, laurentthomasite, named after the French mineral dealer Laurent Thomas of Polychrom France (www.mindat.org/min-53556.html). The mineral was discovered in Madagascar's Toliara Province, and in April 2019 it was approved by the International Mineralogical Association as a new member of the milarite (osumilite) group—specifically the Mg analogue of milarite ($KCa_2AlBe_2Si_{12}O_{30} \bullet 0.5H_2O$)—with an ideal chemical formula of $KMg_2AlBe_2Si_{12}O_{30}$ and hexagonal symmetry (Ferraris *et al.* 2019).