Gem Notes

COLOURED STONES

Faceted Aeschynite-(Y) from Afghanistan

Around 2018, a black faceted gem weighing 3.14 ct (Figure 1) was purchased for Jewelry Television's (JTV) reference collection from gem dealer Dudley Blauwet who, in turn, had purchased it from Herb Obodda. Several pieces of the rough material were obtained by Obodda in Kabul, Afghanistan, during one of his earliest buying trips there in the late 1960s or early 1970s. Obodda was told that the black mineral came from the Pech Valley in Afghanistan's Kunar Province, and subsequently the specimens were identified as aeschynite at the American Museum of Natural History in New York, USA.

The name *aeschynite* is derived from the Greek word for 'shame', because this mineral defied early attempts to identify and, later, classify it—to the 'shame' of the chemists who tried. A significant complicating factor is the metamictisation process (Graham & Thornber 1974), which is the natural breakdown of a mineral's crystal structure caused by the alpha decay of radioactive elements (U and Th) in the crystal structure. Aeschynite belongs to a group of rare-earth-bearing minerals that are complex oxides of Ti and Nb. The general formula is A_2DO_6, where A = Y, rare-earth elements (REE), Ca, U and Th, and D = Ti, Nb and Ta (Levinson 1966). Aeschynite ranges from yellow to orange-brown to black, with samples documented from opaque to transparent (Bonazzi & Menchetti 1999; Anthony *et al*. 2003). Chemical analysis is used to identify the specific aeschynite species, with aeschynite-(Ce) and aeschynite-(Y) being the most common (https://www.mindat.org/min-40.html).

Some aeschynite is known to be radioactive due to the presence of U and Th, and the present stone's reaction to a Geiger counter at JTV caused it to be stored away in a lead-lined box. However, since faceted aeschynite has not been documented in the literature, the author recently decided to examine the specimen in more detail. Careful readings with two Geiger counters showed that the stone was only slightly radioactive and was safe to handle.

Figure 1: This 3.14 ct black gemstone, reportedly from Pech Valley, Afghanistan, is a very rare example of faceted aeschynite-(Y). Photo courtesy of JTV.

The 3.14 ct oval-cut gem (8.85 × 7.03 × 5.05 mm) appeared black and opaque. Energy-dispersive X-ray fluorescence (EDXRF) analysis revealed the major constituents Ti, Nb and Y—further classifying it as aeschynite-(Y)—with lesser amounts of Th, U, Fe, Ca, Ta, W and Pb. Specific gravity was determined hydrostatically as 4.84, which is within the typical range for aeschynite–(Y) of 4.82–4.93 (Anthony *et al*. 2003). Other readings were inconclusive: RI was over-the-limit of the refractometer, and the stone's opacity prevented observations with the dichroscope, polariscope and handheld spectroscope. A significant number of irregular fractures were visible on the surface of the gem (see Figure 1), and they appeared to contain a white residue, which may have been polishing compound.

Aeschynite has been found in various countries in Africa, Asia, Europe and North America, typically in association with other REE-bearing minerals, but it is a very rare mineral (Mehmood 2018). In Afghanistan,

no additional finds of aeschynite were encountered by Obodda despite numerous trips to the region in the half century since he first encountered it there.

Charles Evans FGA DGA (Charles.Evans@JTV.com)
JTV, Knoxville, Tennessee, USA

References

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Afghanite of Exceptional Size and Quality from Badakhshan, Afghanistan

Afghanistan has been known since ancient times as a source of exceptional gems such as lapis lazuli, tourmaline, emerald, ruby, spinel and many more (Bowersox & Chamberlin 1995). In addition to these classic gem materials, Afghanistan is also a source of numerous rare collector stones, such as väyrynenite, bastnäsite, purple diaspore, sodalite and its tenebrescent variety hackmanite.

One of these rare collector minerals is afghanite, a hydrated silicate and member of the cancrinite group with the complex formula $(Na,Ca,K)_8(Si,Al)_{12}O_{24}(SO_4,Cl,CO_3)_3 \bullet H_2O$. It was described in 1968 from the famous lapis lazuli deposit at Sar-e-Sang in Badakhshan Province, Afghanistan (Bariand *et al*. 1968). Forming whitish to dark blue trigonal crystals, afghanite is seldom of gem quality, so faceted stones have only been reported in small quantities and sizes (Koivula & Tannous 2003; Kondo *et al*. 2008; Tunzi & Pearson 2008; Overlin 2011; Henn 2015; Lu *et al*. 2018; McBride 2018).

In January 2024, the Swiss Gemmological Institute SSEF received for testing an outstanding collection of approximately 40 faceted afghanites, together with a larger parcel of rough material, from Mohamed Hassan (Hassan Spinel Gem Co. Ltd, Bangkok, Thailand). Reportedly from Sar-e-Sang, these stones were characterised by an attractive range of colour—light blue and slightly greenish blue to vivid blue—and exceptional clarity and size (e.g. Figure 2). The largest of the faceted stones was 4.2 ct, measuring 13.9 × 9.3 × 4.9 mm, which is more than double the size of the largest faceted afghanite described previously in the literature (1.91 ct; McBride 2018).

The samples contained very few inclusions, mainly small incipient cleavage fissures and fluid inclusions. They showed moderate-to-distinct pleochroism of nearly colourless to blue, with the strength depending mostly on the sample's colour saturation. A conoscope revealed their anisotropic uniaxial nature, and RIs ranged 1.520 (n_o) to 1.530 (n_e), generally with a birefringence of +0.006, all consistent with data reported in the literature.

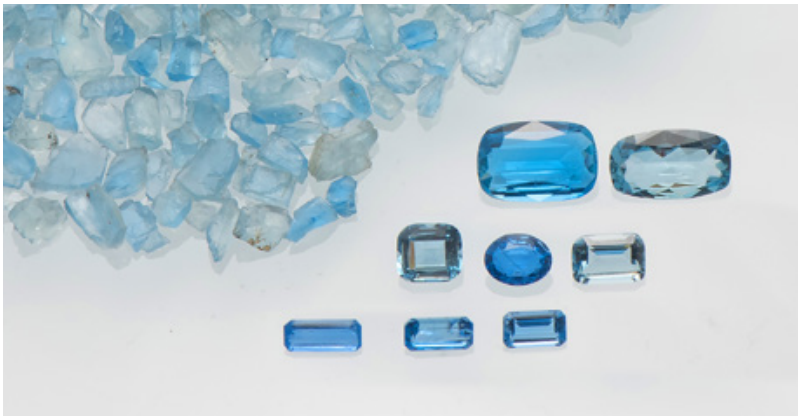

Figure 2: These faceted (0.2–4.2 ct) and rough afghanite samples recently submitted to SSEF are characterised by exceptional clarity, in some cases combined with attractive vivid blue colouration and impressive sizes. Photo by Julien Xaysongkham, SSEF.