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

Anthony, J.W., Bideaux, R.A., Bladh, K.W. & Nichols, M.C. (eds) 2003. Aeschynite-(Y). *Handbook of Mineralogy*. Mineralogical Society of America, Chantilly, Virginia, USA, https://www.handbookofmineralogy.org/pdfs/aeschynite-Y.pdf, accessed 26 February 2024.

Bonazzi, P. & Menchetti, S. 1999. Crystal chemistry of aeschynite-(Y) from the Western Alps: Residual electron density on difference-Fourier map. *European Journal of Mineralogy*, **11**(6), 1043–1050, https://doi.org/10.1127/ejm/11/6/1043.

Graham, J. & Thornber, M.R. 1974. The crystal chemistry of complex niobium and tantalum oxides IV. The metamict state. *American Mineralogist*, **59**(9–10), 1047–1050.

Levinson, A.A. 1966. A system of nomenclature for rare-earth minerals. *American Mineralogist*, **51**(1–2), 152–158.

Mehmood, M. 2018. Rare earth elements – A review. *Journal of Ecology & Natural Resources*, **2**(2), 1–6, https://doi.org/10.23880/jenr-16000128.

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.

As described for previous specimens (Koivula & Tannous 2003; Kondo *et al*. 2008; Henn 2015), all our samples showed a characteristic strong orange fluorescence to long-wave UV radiation, and a weaker and more reddish orange reaction to short-wave UV. No photochromism was observed in any of the samples. EDXRF chemical analysis revealed Na, Al, Si, Ca, S and Cl as the main elements, with minor amounts of Cl and traces of Mn, Fe, Rb, Sr and Ba. In combination with Raman spectroscopy, these data further confirmed the identity of these samples as afghanite. In addition, Fourier-transform infrared and ultraviolet-visible (UV-Vis) absorption spectra (Figure 3) showed features consistent with those of afghanite.

As seen with other recent finds from this region of Afghanistan (e.g. the yellow-to-orange sodalite documented by the present authors on pp. 20–22 of this issue), it appears that active mining of the Sar-e-Sang area has been producing some new and notable gem materials in recent times.

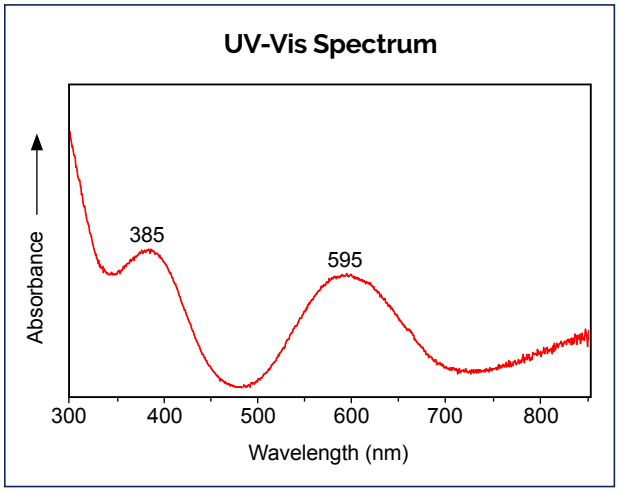

Figure 3: This unpolarised absorption spectrum of a faceted blue afghanite shows two broad absorption features at 385 and 595 nm, and a transmission window at about 480 nm, which is responsible for its attractive blue colour. The path length of the beam through the stone was approximately 5 mm.

Dr Michael S. Krzemnicki FGA
(michael.krzemnicki@ssef.ch)
and Chanya Rochd
Swiss Gemmological Institute SSEF
Basel, Switzerland

References

Bariand, P., Cesbron, F. & Giraud, R. 1968. Une nouvelle espèce minérale: l'afghanite de Sar-e-Sang, Badakhshan, Afghanistan. Comparaison avec les minéraux de groupe de la cancrinite. *Bulletin de la Société française de Minéralogie et de Cristallographie*, **91**(1), 34–42, https://doi.org/10.3406/bulmi.1968.6184.

Bowersox, G.W. & Chamberlin, B.E. 1995. *Gemstones of Afghanistan*. Geoscience Press, Tucson, Arizona, USA, 220 pp.

Henn, U. 2015. Observations on some rare gem materials. *34th International Gemmological Conference IGC*, Vilnius, Lithuania, 26–30 August, 105–106.

Koivula, J.I. & Tannous, M. 2003. Gem News: Gem-quality afghanite. *Gems & Gemology*, **39**(4), 326–327.

Kondo, D.M., Laurs, B.M. & Fritz, E. 2008. Gem News International: Gem-quality afghanite and haüyne from Afghanistan. *Gems & Gemology*, **44**(1), 79–80.

Lu, W., Cao, J., Zhang, L., Zhang, Q. & He, S. 2018. Gemmological and spectral characteristic of afghanite. *Journal of Gems & Gemmology*, **20**(5), 39–43, https://doi.org/10.15964/j.cnki.027jgg.2018.05.004.

McBride, H. 2018. Lab Notes: Large faceted afghanite. *Gems & Gemology*, **54**(2), 206.

Overlin, S.D. 2011. Gem News International: Gem-quality afghanite from Afghanistan. *Gems & Gemology*, **47**(3), 235.

Tunzi, J. & Pearson, G. 2008. Hackmanite, tugtupite and afghanite – Tenebrescence and fluorescence of some sodalite related minerals. *Australian Gemmologist*, **23**(8), 349–355.

Hematite and Magnetite Inclusions in Aquamarine

Recently, Guild Gem Laboratories received several attractive blue gemstones with high colour saturation for identification (Figure 4). Standard gemmological testing revealed characteristics consistent with aquamarine, and this identification was confirmed using FTIR, UV-Vis and Raman spectroscopy.

Microscopy revealed several eye-catching inclusion scenes. The most noticeable internal features were numerous opaque red rectangular platelets (Figure 5a) and dark brown skeletal plates (Figures 5b). Some of the latter showed a hexagonal

Figure 4: These aquamarines (1.88–3.09 ct) with high colour saturation host an unusual suite of inclusions. Photo by Huixin Zhao.