Pink Diaspore from Afghanistan

Gem-quality diaspore is known mainly from Muğla Province in Turkey, and typically appears near-colourless to brownish green in daylight and lavender to pinkish yellow/brown in incandescent light (e.g. Duroc-Danner 1987; Hatipoglu & Chamberlain 2011). Since July 2018, some fine crystal specimens of Turkish diaspore have been produced that displayed attractive purple colouration (Southwood 2020; Wilson & Moore 2020). Pink to purple diaspore is also known from Myanmar (Shen & Lu 2018) and from the Ural Mountains in Russia (Spiridonov *et al.* 2006), but neither locality has produced material of facetable size/quality.

In mid-March 2020, one of the authors (MHS) learned about a new find of gem-quality pink diaspore from Afghanistan. According to his Afghan supplier, the mining area is located in 'Kama Goshta' near Jalalabad, which apparently corresponds to the Kama and/or Goshta Districts in Nangarhar Province of eastern Afghanistan. Author MHS initially obtained a single piece of rough weighing 2 g and a faceted stone that recut to 23.36 ct. He also saw a 146 g parcel of rough material containing pieces ranging from about 1 to 10 g (approximately 2.5 g on average) that was suitable for cutting stones of 1–10 ct (Figure 10). In May 2020 he obtained a 70 g parcel of rough (0.6–12 g pieces), which he had faceted into 35 stones ranging from 0.50 to 10.91 ct (e.g. Figure 11a). The cutting yield was very low due to the presence of cleavage fractures in the rough material. In addition, he acquired a faceted stone that recut to 46.97 ct (Figure 11b). This is the largest gemstone he is aware of from this deposit. Since that time, he has purchased several other gems weighing over 20 ct from the same supplier.

Figure 10: This parcel of rough pink diaspore is from a new find in Afghanistan. The stones range from about 1 to 10 g and the entire parcel weighs 146 g. Photo by M. H. Smith.

All the rough material seen by author MHS has been of similar colour, and the slight variations seen in the faceted stones were likely due to the various cutting orientations and the material's very strong pleochroism. The cut stones ranged from slightly brownish light pink to slightly brownish light purple. Viewed in different light sources there was no colour change, but a subtle colour shift was seen in which larger stones (>10 ct) appeared more pinkish in warm light and purplish pink in cool light. The following gemmological properties were collected by author MHS on two faceted stones weighing

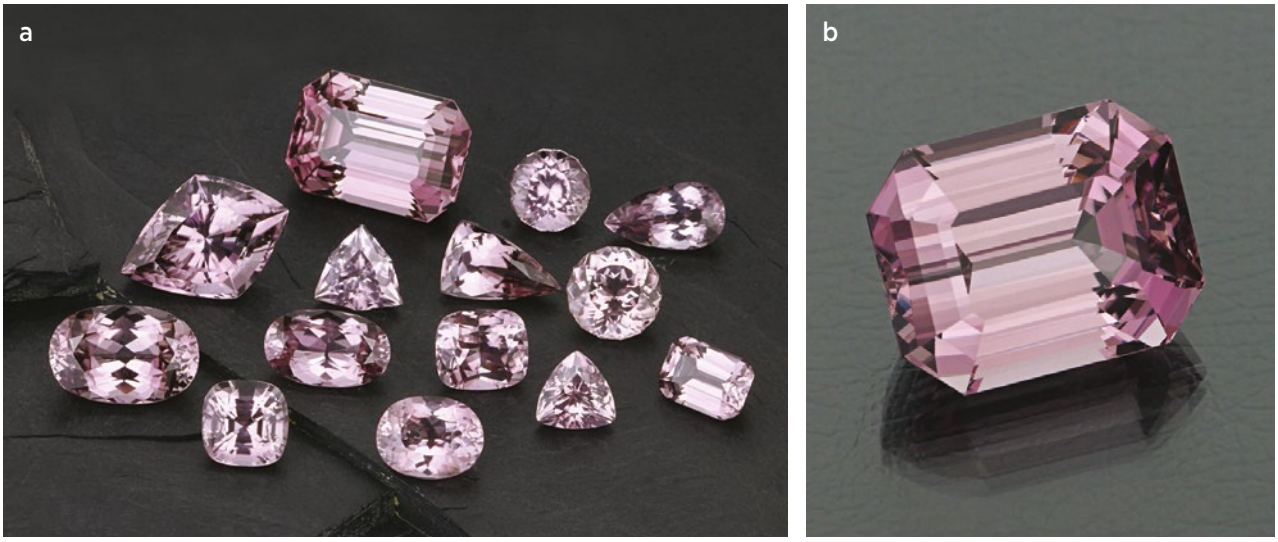

Figure 11: Pink Afghan diaspore has been faceted into attractive gemstones, and those shown here weigh (**a**) 2.05–23.36 ct and (**b**) 46.97 ct. The largest gem is now in the collection of Herb and Monika Obodda (Warwick, Rhode Island, USA). Photos by M. H. Smith.

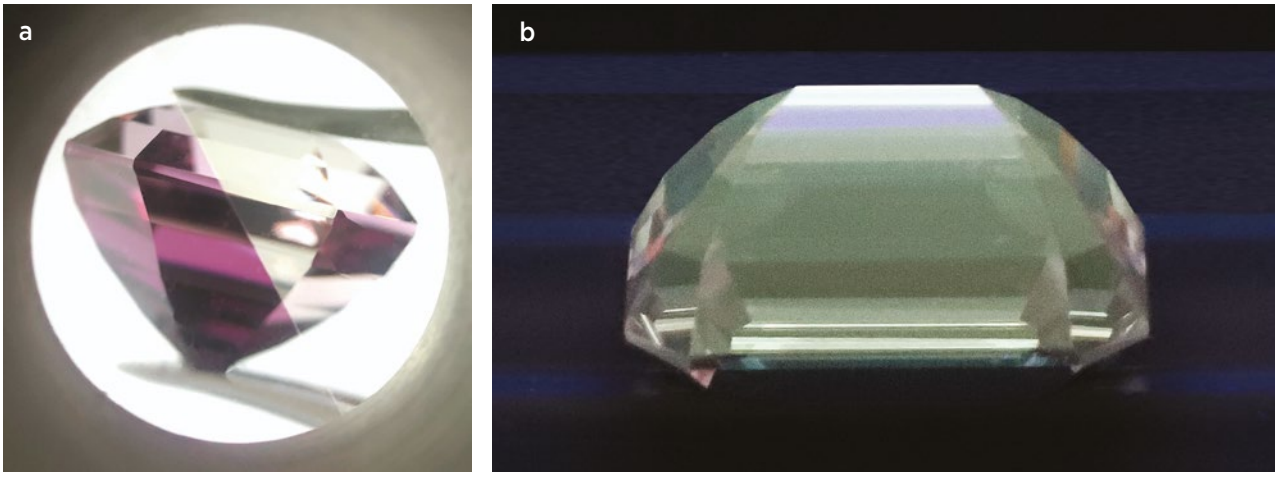

Figure 12: The Afghan diaspore shows (**a**) strong pleochroism and (**b**) weak chalky yellowish green fluorescence to short-wave UV radiation. Photos by M. H. Smith (a, 13.45 ct) and GIT (b, 23.36 ct).

13.45 and 23.36 ct: Pleochroism—very strong, in light yellow and dark purplish pink (Figure 12a); RI—n_α = 1.699–1.700, n_β = 1.720–1.721 and n_γ = 1.748–1.749; birefringence—0.049–0.050; optic character—generally B+; and hydrostatic SG—3.39–3.40.

The 23.36 ct stone was also examined at The Gem and Jewelry Institute of Thailand (GIT) in Bangkok, where the UV fluorescence was documented as inert to long-wave UV and weak chalky yellowish green under short-wave UV radiation (Figure 12b). In addition, the stone appeared reddish when viewed with the Chelsea Colour Filter. Chemical analysis by energy-dispersive X-ray fluorescence (EDXRF) spectroscopy using an EDAX Eagle III instrument showed traces of Ti, Fe, Ga, V and Cr. Polarised ultraviolet-visible (UV-Vis) absorption spectra were collected with a PerkinElmer Lambda 1050 spectrophotometer in two polarisation directions (purplish pink and near-colourless; Figure 13), and showed features at 398 nm (Fe^{3+}), 450 nm (Fe^{3+}) and 480 nm, as well as broad bands centred at about 400 and 550 nm (V^{3+} and Cr^{3+}; cf. Shen & Lu 2018). A transmission window above about 650 nm is responsible for the overall purplish pink colour of the stone. The

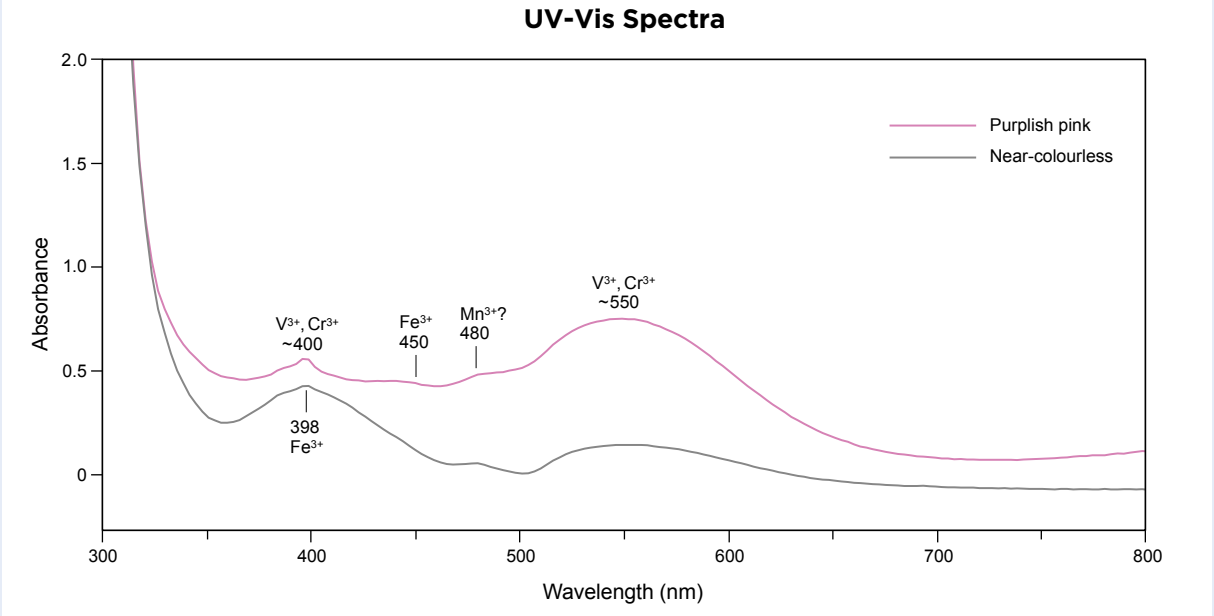

Figure 13: UV-Vis spectroscopy of the 23.36 ct diaspore reveals absorption features at about 398, 450 and 480 nm, as well as broad bands centred at about 400 and 550 nm. A transmission window above about 650 nm is responsible for the purplish pink colour of this diaspore. The path length of the beam was approximately 11 mm.

480 nm feature was not well defined in the spectra, but is probably related to Mn^{3+} (cf. GRR 73 at http://minerals.caltech.edu/FILES/Visible/diaspore/Index.html), which is a strong chromophore and could therefore influence the spectrum when present in very small amounts that are below the detection limit of EDXRF spectroscopy. The spectral features were more pronounced in the purplish pink direction, corresponding to the strong pleochroism, and indicate that the colouration of this pink diaspore is due to a combination of Fe^{3+}, V^{3+}, Cr^{3+} and probably Mn^{3+}.

The supplier of the Afghan diaspore indicated that there continues to be minor production of small- to medium-sized gems but that rough material suitable for cutting clean larger stones (20+ ct) is rare.

Mark H. Smith (mark@thailanka.com)
Thai Lanka Trading Ltd Part.
Bangkok, Thailand

Thanapong Lhuaamporn
GIT Gem Testing Laboratory
Bangkok, Thailand

Brendan M. Laurs FGA

References

Duroc-Danner, J.M. 1987. Diaspore, a rare faceted gem. *Journal of Gemmology*, **20**(6), 371–375, https://doi.org/10.15506/jog.1987.20.6.371.

Hatipoglu, M. & Chamberlain, S.C. 2011. A gem diaspore occurrence near Pinarcik, Mugla, Turkey, *Rocks & Minerals*, **86**(3), 242–249, https://doi.org/10.1080/00357529.2011.568304.

Shen, C. & Lu, R. 2018. The color origin of gem diaspore: Correlation to corundum. *Gems & Gemology*, **54**(4), 394–403, https://doi.org/10.5741/gems.54.2.394.

Southwood, M. 2020. Connoisseur's Choice: Diaspore, Muğla Province, Turkey. *Rocks & Minerals*, **95**(2), 145–153, https://doi.org/10.1080/00357529.2020.1689336.

Spiridonov, E.M., Alferova, M.S. & Fattykhov, T.G. 2006. Gem minerals from the Saranovskoye chromite deposit, western Urals. *Journal of Gemmology*, **30**(1–2), 91–102, https://doi.org/10.15506/jog.2006.30.1.91.

Wilson, W.E. & Moore, T.P. 2020. The diaspore mines near Pinarcik in the Ilbir Mountains, Mŭgla [*sic*] Province, Turkey. *Mineralogical Record*, **51**(4), 541–554.

Pink Fluorite from Inner Mongolia

The Huanggang mining complex is located approximately 30 km west of Linxi town, near the city of Chifeng in Inner Mongolia, China. This large Fe-Sn polymetallic ore deposit was discovered in 1959 and is exploited by several major mines (Lavinsky & Chen 2012; Mei *et al*. 2014).

During the February 2020 Tucson gem shows, Dr Robert Lavinsky (The Arkenstone, Richardson, Texas, USA) had pink fluorite from Huanggang mine no. 5 as mineral specimens and faceted stones (e.g. Figures 14 and 15). This is the first time that pink fluorite had been produced from this locality since an initial find in the latter part of 2010 that yielded translucent octahedral crystals up to 13 cm. At that time, many of the fluorites were broken off their matrix before the miners knew their value as mineral specimens. In addition, some of the fluorite was damaged by thermal shock due to temperature changes when they were taken out of the cold mines or even while being handled with bare hands (Lavinsky & Chen 2012).

Figure 14: This fluorite crystal cluster was recently produced from Huanggang mine no. 5 in Inner Mongolia. The specimen measures 10 cm across. Courtesy of The Arkenstone; photo by Beth Van Allen.