Phenakite: an Elusive Pegmatite Mineral

by Bob Carnein

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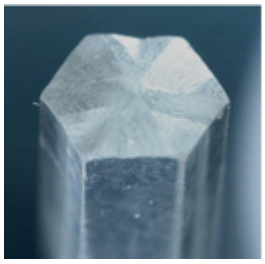


Figure 1. Small (5 mm across) phenakite crystal from Palelni mine, Myanmar, showing hexagonal shape. (Carnein collection and photo.)

Figure 2 (Carnein collection and photos.)

Figures 2 and 3. Small (2.3 cm x 5 mm) prismatic phenakite crystal from Myanmar, showing "drill-bit" twinning. (Carnein collection and photos.)

Phenakite (aka phenacite; pronounced feen'-uh-kite) is a rare beryllium silicate mineral (formula Be_2SiO_4) that occurs as excellent crystals at several Colorado localities. For the beginning collector, it's one of the most difficult minerals to identify, commonly being confused with the much more common quartz and topaz. This article is designed to help you to recognize this elusive and often overlooked mineral.

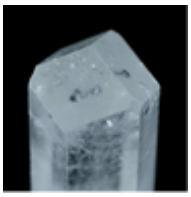
Properties. The name phenakite comes from the Greek phenakos, meaning "a deceiver", because of its resemblance to quartz (Klein and Hurlbut, 1999). Phenakite occurs in the rhombohedral division of the hexagonal crystal system. If you look carefully, crystals are usually clearly hexagonal (Figs. 1, 2), which helps one to distinguish phenakite from topaz, whose orthorhombic crystals are often rectangular or diamond shaped in cross section. Be aware, though, that some topaz crystals look superficially hexagonal. Both minerals commonly exhibit vertical striations, unlike quartz, which has horizontal striations on its prism (vertical) faces. Unlike topaz, phenakite is often twinned, in which case its crystal terminations may resemble an old fashioned star drill (so-called "drill-bit" twins; Fig. 3). Terminal faces are usually gently inclined, compared with the more "pointy" terminations on quartz crystals (Figs. 4, 5).

Phenakite crystals from some localities have a flattened, lensoid shape (Figs. 6, 7). Phenakite's hardness is 7.5 to 8—very close to that of topaz (number 8 on the Mohs scale) or quartz (number 7). All three easily scratch glass or steel. Its specific gravity varies between 2.93 and 3.0 (Anthony, et al., 1995), which helps to distinguish it from topaz (3.49 to 3.57) and quartz (2.65). To the experienced collector, topaz (except in small crystals) feels a bit heavier than expected, while phenakite does not. Phenakite crystals usually are too small for this to be of much use. Unless you can actually measure the SG, quartz is too close to phenakite to use this property to tell them apart.

Phenakite's color varies from colorless to yellow, pink, or brown. None of these colors help to distinguish it from topaz. However, topaz is often pale blue or greenish blue, which is very rare in phenakite. Quartz occurs in so many different colors that color, alone, usually isn't helpful in distinguishing it from phenakite. However, phenakite is rarely strongly colored (unlike, for example, smoky quartz or amethyst).

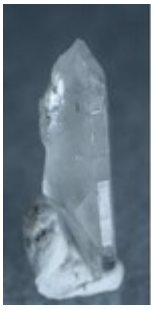
Both phenakite and topaz have cleavage, but that of topaz is much more obvious (perfect) and is perpendicular to the long axis (c axis) of its crystals ({001}). In phenakite, cleavage may occur in several directions, none of which are perpendicular to c. The cleavage is rarely apparent (Hurlbut and Kammerling, 1991). More commonly, like quartz, it exhibits

Figure 4 (Carnein collection and photos.)



Figures 4, 5. Large (2.9 cm x 1.3 cm) phenakite crystal from Myanmar, showing simple rhombohedral termination. (Carnein collection and photos.)

Figure 6 (Carnein collection and photos.)



Figures 6, 7. 1.8-cm flattened, lenticular phenakite crystal from Bear Creek Canyon, near Specimen Rock, El Paso Co., Colorado (top and side views). (Carnein collection and photos.)

conchoidal fracture.

All three minerals are commonly transparent to translucent. This and their high hardness and moderately high indices of refraction make phenakite and topaz useful gemstones. Quartz is also cut and polished, but its low RI makes it a bit dull. Phenakite has more “sparkle” than topaz, but this usually isn’t apparent in an uncut crystal. Although phenakite isn’t nearly as familiar to the general public as topaz, gemstone connoisseurs appreciate its greater rarity and will pay a premium (up to about $300 per carat at present), especially for large stones, which are rare. If offered an expensive gem phenakite, it behooves the collector to test its specific gravity, which is the simplest way to distinguish it from the much commoner quartz or topaz.

Occurrence. Phenakite’s mode of occurrence overlaps that of both topaz and quartz. All three minerals commonly occur together in granite pegmatites (very coarse grained granites), though quartz and, to a lesser extent, topaz also occurs in many other kinds of deposits. All three also occur in greisens (rocks formed near the contacts of bodies of granite, where high temperature fluids from the granite invade and profoundly alter the composition of the host rocks). In greisens, they aren’t likely to occur as good crystals—the three minerals may be very difficult to distinguish when massive.

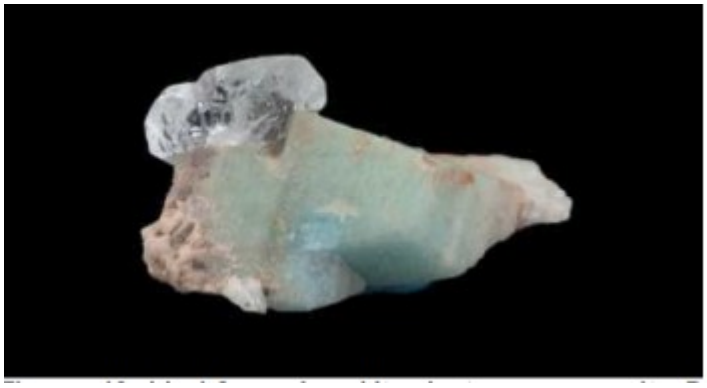
Although small amounts of phenakite occur at many locales, the world’s best crystals currently come from the Jos plateau, Nigeria and the Mogok gem tract in Myanmar (formerly Burma). Superb, large (up to several cm), transparent, colorless to pale yellow, etched phenakites from Nigeria (Figs. 8, 9) have, for the last decade, set the standard for the world. These crystals don’t look much like those from anywhere else but may be mistaken for etched topaz or pale colored garnet. Crystals from Myanmar typically are simple, short to elongate prisms that, more often than not, exhibit “drill-bit” twinning and complex terminations (Figs. 1-3). Other great world-wide occurrence include Russia (Yekaterinburg and Miass), Norway (Kragerö), Brazil (various mines in Minas Gerais), and Madagascar.

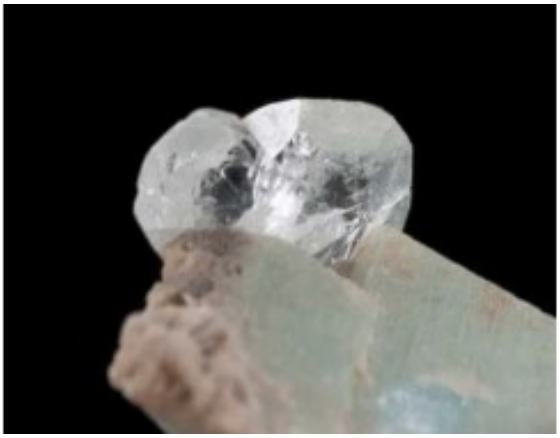
In the United States, the finest phenakites come from North Chatham, NH; Amelia, VA; Chaffee County, CO (Mt. Antero and Mt. White); and Teller and Park counties, CO (the Crystal Peak area). Mt. Antero continues to be especially productive, but the comparative rarity of phenakite from the Crystal Peak area may be partly due to the fact that many collectors don’t know how to recognize it. The writer recently purchased a “topaz” from Bear Creek Canyon, El Paso County that turned out to be a nice lensoid phenakite crystal (Figs. 6, 7). Although the buyer recognized the crystal when it was offered, the dealer was somewhat surprised when informed that it wasn’t topaz. Colorado localities (from Eckel, 1997) include the following:

Chaffee County: Mt. Antero and Mt. White, with beryl, bertrandite, quartz, potassium feldspar, albite, topaz, and fluorite. Mainly prismatic crystals, some twinned, to a bit more than 1 inch in length. Most are milky white and many are dominated by rhombohedron faces (Figs. 10-12).

El Paso County: Crystal Park (first US find, about 1880), as large (up to 3 inches across) broken rhombohedral crystals found in the 1880s, with topaz, zircon, amazonite, and smoky quartz. Also occurs at Bear Creek Canyon, Cameron Cone and Hunters Run, near Specimen Rock.

Park County: Spruce Grove Campground locality, as inclusions in topaz; Crystal Peak area, with amazonite, smoky quartz, topaz, and zircon (Figs. 13, 14); Harris Park, with albite, amazonite, and topaz; Tarryall Mts., as inclusions in topaz; and Badger Flats area, in beryl-bertrandite greisens on smoky quartz.





Teller County: Crystal Peak area, as small, flat, highly modified pale yellow to gray to colorless crystals perched on amazonite, with smoky quartz, albite, topaz, and iron oxides.

References Cited. Lake George Gem and Mineral Club September, 2015

Anthony, J.W., et al., 1995, Handbook of Mineralogy, Volume 2: Silica, Silicates, Part 2: Tucson, Arizona, Mineral Data Publishing.

Eckel, E.B., updated and revised by R.R. Cobban, et al., 1997, Minerals of Colorado: Golden, Colorado, Fulcrum Publishing.

Hurlbut, C.S., Jr., and R.C. Kammerling, 1991, Gemology, 2nd Edition, New York, John Wiley & Sons, Inc.

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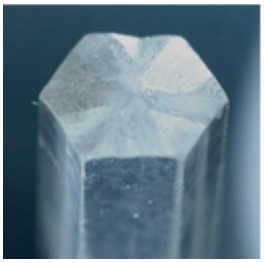

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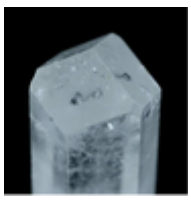

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