Topaz, Thomas Range, Utah

Mineral News

Vol. 9 No. 2
February 1993

The Mineral Collector's Newsletter $1.50

Some Interesting Crystal Phantoms from Illinois, Indiana, and Kentucky

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Phantoms present a unique opportunity to see how crystals grow. Visually they can be stunning. They present the more complicated growth history that is all but obscured in opaque minerals. Simply defined, a phantom is the result of transparent later crystal growth covering, but not completely obscuring earlier growth.

The zones of earlier periods of mineral growth can be delineated by changes in color, clarity, inclusions, or other minerals. The chemistry of the solution that forms the crystals can change over time altering the crystal in the aforementioned ways.

This article is not a comprehensive source of crystal phantoms in the three states covered by the writer. Only species and habits collected or observed by the writer will be discussed. Collecting access will not be discussed and accessibility would not be inferred by this article.

Calcite with phantoms can be found at many localities. The quarry of the Corydon Crushed Stone Company, Harrison County, Indiana, produces a number of crystal habits. Phantoms may be visible in some crystals by earlier "contamina-

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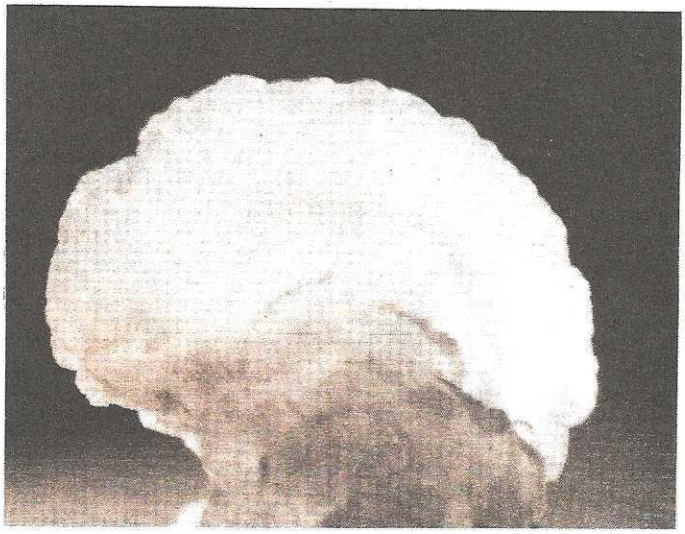

Fig. 1 Limonite in calcite, zoned phantom, from Corydon Crushed Stone Company quarry.

Meteorites

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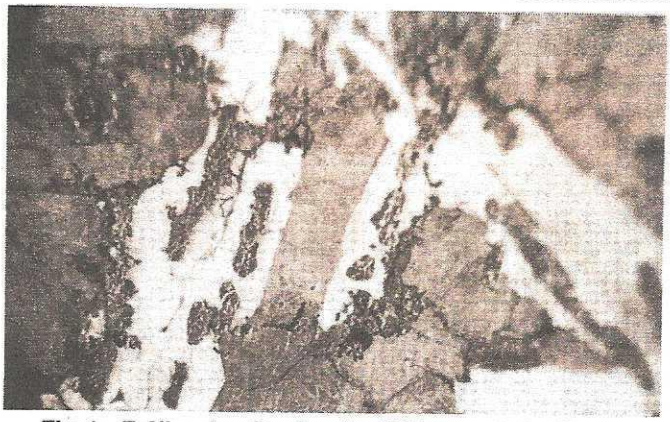

Fig. 1 FeNi meteorite showing Widmannstatter figures (coarse), Field of view 1 inch, Canyon Diablo, Arizona.

Those rocks from outer space might appear to some people a little bit mysterious, but they are formed by minerals just like on earth. It is only for about the last 150 years that meteorite have been known to be extraterrestrial material.

The minerals which build up the meteorites are about 4.5 billion years old, therefore, older than than most rocks and minerals on Earth. They were formed, in some cases, even before the final stages of our solar system. Besides that, almost all the early minerals and rocks on Earth have been dissolved and reformed several times by the orogenic forces, metamorphism, and erosion.

Meteorites are classified into three main groups: iron, stone-iron, and stone. Iron meteorites are composed by an alloy of iron and nickel which is altered to kamacite, taenite, and

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tion" by iron. The interiors may have subtle or conspicuous yellow-orange zones (Fig. 1). The same quarry can produce modified scalenohedrons of a buff-yellow color that may have sharp white scalenohedrons visible inside.

One large specimen of calcite on pink dolomite collected by the writer has zones visible only with UV light. These zones are visible as dark bands placed at 120° angles on the rounded scalenohedral crystals. Other crystals with similar habits examined have not been found to have this fluorescent zoning.

Scalenohedral calcite at the Kentucky Stone Company (Irvington) in Breckenridge County, Kentucky occasionally show phantoms with slight color or transparency changes or rows of carbonaceous or sulfide inclusions.

Calcite in geodes at Halls Gap and Muldraugh, Kentucky and Harrodsburg, Indiana may show inclusions of carbonaceous material that form multiple zones within the crystals.

One of the most spectacular cases of fluorescent phantoms found by the writer was on dark tan, rounded, scalenohedral calcite from the old Cleveland Mine, Spar Mountain, Cave in Rock, Illinois. (The site has been buried by quarrying overburden.) Plates of numerous crystals to 1 cm coating fluorite were found to contain brilliant sharp scalenohedrons under UV light. This phantom cannot be seen under ordinary light.

Fluorite from the Illinois-Kentucky fluorspar district is widely collected for the colorful phantoms and multiple zones. The small purple cubes can be found with at least three zones per millimeter. Zones are less distinct in blue and yellow fluorite. Much of the fluorite has zones on the (111) axes (Miller indices). When chipping octahedrons, these "Mercedes-like" patterns can be quite dramatic. Sawed chunks of intergrown crystals of fluorite from Conn's Mine, Pope County, Illinois, contain at least 10 zones in 2 cm, with color shifts of lavender, blue, gray, and white scattered throughout (Fig. 2). Yellow fluorite has zones of needle-like chalcopyrite crystals, which grew simultaneously with the fluorite. Such zones almost universally occur in specimens from the district in the yellow to purple transition boundary. When chalcopyrite grew during episodes when the fluorite was not, the more typical tetrahedral-like sphenoids would grow on the cube surface. Subsequent fluorite growth would cover these crystals forming phantom zones. Zones of fluorescent gas bubbles occur throughout the fluorspar district in both phantom zones and along cleavage planes.

The central Kentucky fluorspar district lacks the rainbow of color found in the Illinois-Kentucky fluorspar district. Nonetheless, chalcopyrite phantoms are not uncommon. They also occur in the calcite, some of which is lavender in color.

The best phantom fluorites in Kentucky outside of the fluorspar district, occur at the Kentucky Stone Company (Irvington). There, fluorite with a strong purple color covers bright yellow fluorite. Crystals are visually attractive, some up to 2.5 cm across (Fig. 3). The purple forms an irregular surface over the yellow. The shade of purple varies. The yellow fluorite fluoresces (and phosphoresces) brilliantly while the other colors do not.

Yellow fluorite from Irvington usually has glassy crystal faces. A black light will reveal fluorescent zoning within this color. The effect is pronounced at the edges of the cube and is not visible when the purple fluorite is covering it.

Sphalerite at the Medusa Quarry in Bardstown, Kentucky has a subtle, but significant zone pattern. The color is typically brilliant black, though some is an amber-green. The black sphalerite will be found to be predominantly amber-green when back-lit. The iron-rich black layer is but a few microns thick. Some specimens only have a partial black overgrowth.

Fig. 2 Zoned fluorite (sawn slab), Conn's Mine.

Barite from the geodes along Highway 37 near Harrodsburg, Indiana may occasionally contain zones. Rarely, they are multiple color (i.e. blue and white); slightly more common are sulfide zones in the yellow tabular crystals.

Celestite from the Hoosier Limestone Company quarry in Salem, Indiana may have blue and yellow color and/or numerous zones of sulfide inclusions. The celestite at Muldraugh, Kentucky may occasionally have a yellow bar running through the center of an otherwise gemmy light blue color.

Quartz crystals in geodes throughout the region often have a peculiar cocoon-shaped white interior. The crystals are typically less than 3 mm long. Its cause probably relates to inclusions of gas or water.

Fig. 3 Purple fluorite over yellow fluorite, dark purple edges, Kentucky Stone Company, Irvington, Kentucky.