August 2006 Mineral of the Month: Cornetite

Cornetite's bright blue color, unusual occurrence, and great rarity make it a favorite among collectors. Our specimens were collected at L'Etoile du Congo Mine (The Star of the Congo Mine), one of the most historic mines in the Democratic Republic of the Congo and the type locality for cornetite. What is the significance of a type locality? Read on and find out!

PHYSICAL PROPERTIES

Chemistry: $Cu_3(PO_4)(OH)_3$ Basic Copper Phosphate (Copper Hydroxyphosphate)
Class: Phosphates, Chromates, Arsenates, and Vanadates Subclass: Anhydrous Phosphates
Group: Cornetite
Crystal System: Orthorhombic
Crystal Habits: Usually short, prismatic crystals, often rounded, and rarely exceeding one millimeter in size; also small rosettes, crusts, and radial aggregates. Double terminations rare.
Color: Bright and pale blue to greenish- blue; often exhibits color zoning.
Luster: Vitreous
Transparency: Transparent to translucent
Streak: Blue
Cleavage: None
Fracture: Brittle
Hardness: 4.5
Specific Gravity: 4.1
Luminescence: None
Refractive Index: 1.76-1.80
Distinctive Features and Tests: Best field marks are blue color and occurrence as a secondary copper mineral in oxidized mineralogical environments, often in close association with linarite [basic lead copper sulfate, $PbCu(SO_4)(OH)_2$] and chalcanthite [hydrous copper sulfate, $CuSO_4 \cdot 5H_2O$], which have similar crystal habits and colors. Unlike the copper carbonate minerals azurite [$Cu_3(CO_3)_2(OH)_2$] and malachite [$Cu_3(CO_3)(OH)_2$], hydrochloric acid does not cause cornetite to effervesce.
Dana Classification Number: 41.3.2.1

NAME

This month's mineral, which is correctly pronounced core-NET-ite, is named in honor of Belgian geologist René Jules Cornet (1865-1929), a pioneer in the study of central African geology. European mineralogists have previously referred to cornetite as "cornetit" and "cornetita."

COMPOSITION

Cornetite's chemical formula $Cu_3(PO_4)(OH)_3$ identifies its elemental components as copper (Cu), phosphorus (P), oxygen (O), and hydrogen (H). Its molecular weight consists of 56.63 percent copper, 33.27 percent oxygen, 9.20 percent phosphorus, and 0.90 percent hydrogen. In the cornetite molecule, three copper cations (Cu^{2+}), each with a +2 charge, produce a total cationic charge of +6. Cornetite's compound anion consists of two radicals (groups of atoms bound together that act as a chemical entity), the phosphate radical $(PO_4)^{3-}$ and the hydroxyl radical $(OH)^{1-}$. In the phosphate radical, the phosphorus ion carries a +5 charge and each oxygen ion carries a -2 charge to produce a net -3 charge. The three hydroxyl ions each consist of a hydrogen ion (H^{+1}) and an oxygen ion (O^{2-}). This creates an individual hydroxyl-ion net charge of -1 and a cumulative charge of -3. The phosphate radical and the three hydroxyl radicals thus have a total anionic charge of -6, which balances the +6 charge of the three copper cations.

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1-800-941-5594 www.mineralofthemonthclub.org

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Cornetite is one of nearly 300 members of the Phosphates, Chromates, Arsenates, and Vanadates class of minerals. The basic building blocks of these minerals are the phosphate ion $(PO_4)^{3-}$, the chromate ion $(CrO_4)^{3-}$, the arsenate ion $(AsO_4)^{3-}$, and the vanadate ion $(VO_4)^{3-}$. All form tetrahedral structures with four oxygen ions surrounding the ion of a metal or semi-metal (chromium and vanadium are metals; phosphorus and arsenic are semi-metals). In phosphates, the phosphorus ion (P^{5+}) is surrounded by, and bonded covalently to, four oxygen ions (O^{2-}). The resulting -3 charge is distributed evenly over the four oxygen ions, enabling the phosphate ion to bond ionically to many metal cations.

In cornetite, each phosphate ion $(PO_4)^{3-}$ bonds ionically to three copper cations (Cu^{2+}) to form pyramidal-shaped, copper-phosphate ions $[Cu_3(PO_4)]^{3+}$ which, in turn, bond together covalently in a three-dimensional structure to build the cornetite crystal lattice. These copper-phosphate ions form tetragonal pyramids between which hydroxyl ions $[(OH)^{1-}]$ attach ionically to the copper ions to provide electrical balance to the molecule. Because covalent bonds are strong and three-dimensional in nature, cornetite has no discernible cleavage and a moderate hardness of Mohs 4.5. Close atomic packing within the cornetite lattice accounts for a relatively high density (specific gravity 4.1). The basic pyramidal structure also explains cornetite's orthorhombic crystallization, which is characterized by three mutually perpendicular axes of different length that form pinacoidal prisms and dipyramids. Compounds with complex chemistry or bonding, such as cornetite, commonly crystallize in the orthorhombic system.

As an idiochromatic (self-colored) mineral, cornetite derives its characteristic blue to blue-green colors from its essential chemical components, rather than from secondary, nonessential elements. In cornetite, the chromophore (coloring agent) is copper, which is a strong, blue-green pigmenting agent. The cuprous (Cu^{2+}) ions within cornetite enable the lattice to absorb all wavelengths of visible light except for a narrow band of blue and some green, reflectance of which produces cornetite's characteristic color.

Despite the abundance of its individual elemental components, cornetite is quite rare. This is because its formation requires a precise combination of chemical and physical conditions. Cornetite is a secondary mineral that occurs only in shallow, oxidized zones of certain hydrothermal copper deposits. Its formation begins when atmospheric carbon dioxide dissolves in water to produce carbonic acid (H_2CO_3). When carbonic acid contacts certain phosphate minerals, phosphate ions $(PO_4)^{3-}$ replace the carbonate ions $(CO_3)^{2-}$ to form phosphoric acid (H_3PO_4). Under precise conditions of temperature and pressure, and with the availability of free hydroxyl ions, the phosphate ions in phosphoric acid combine with copper ions to form cornetite.

Cornetite's Dana classification number 41.3.2.1 first establishes it as an anhydrous (non-hydrated) phosphate or arsenate containing hydroxyl or halogen ions (41). Cornetite is subclassified (3) by the general formula $(AB)_3(XO_4)Z_q$, in which "A" and "B" are a variety of metals including copper, manganese, zinc, aluminum, bismuth, iron, and lead; "XO_4" is a phosphate or arsenate radical; "Z" is chlorine, fluorine, or a hydroxyl radical; and "q" represents a variable quantity. Finally, cornetite is a member of the cornetite group (2), in which it is the first member (1). The only other cornetite-group member is theoparacelite, a basic copper arsenate $[Cu_3As_2O_7(OH)_2]$, which we are very unlikely ever to feature. Cornetite is very similar to clinoclase [basic copper arsenate, $Cu(AsO_4)(OH)_3$] and forms a partial solid-solution series in which arsenate ions $(AsO_4)^{3-}$ partially substitute for phosphate ions. Mineralogists believe that cornetite, in the presence of excess carbonic acid, may alter to malachite.

COLLECTING LOCALITIES

As a rare mineral, cornetite has few collecting localities, and all are mentioned below. The best cornetite specimens come from the type locality at L'Etoile du Congo (Star of the Congo) Mine near Lubumbashi, Shaba Province, in the Democratic Republic of the Congo, as will be discussed in detail. Other nearby cornetite sources include the Likasi and Kalabi mines at Likasi, the Kasompi Mine at Swampo, and the Musoni Mine at Kolwezi.

The Manto Russo Mine near Copianó in Chile's Atacama Province has yielded good cornetite specimens, as have the Great Australia and Mount Cobalt mines at Mt. Isa, Queensland, Australia. In Germany, cornetite occurs in the Barbara Vein in the Schauinsland lead-zinc mining district in the Black Forest region of Baden-Württemburg. It is also collected at the Río Tinto Mines at Huelva, Andalusia, Spain.

In the United States, cornetite is found in Arizona at Saginaw Hill in the Amole District of Pima County. In Nevada, it occurs at the Red Metals Mine in the Peavine District of Washoe County, the Mylar Mine in the Antelope District of Pershing County, and the Douglas Hill, Blue Jay, Yerington, and Nevada-Empire mines of the Yerington District in Lyon County. The Burro Mountains District of Grant County, New Mexico, has also produced specimens.

JEWELRY & DECORATIVE USES

Cornetite's rarity, relative softness (Mohs 4.5), and small crystal size preclude any jewelry or decorative uses. Collectors value cornetite for display and study purposes because of its bright-blue color and rarity.

HISTORY & LORE

Cornetite was identified in 1916 as a distinct mineral species by Belgian mineralogist Henri Buttgenbach (1874-1964) after he studied specimens he had collected at L'Etoile du Congo (The Star of the Congo) open-pit copper mine near Elisabethville, Katanga Province, Belgian Congo (now Lubumbashi, Shaba Province, Democratic Republic of the Congo). The following year, Buttgenbach named the new mineral cornetite, in honor of René Jules Cornet (1865-1929), a Belgian geologist and doctor of natural sciences who performed the first surveys of physical geography and geology of the southern Congo region in the late 1800s. X-ray diffraction analysis revealed cornetite's basic crystal structure in the 1930s, but in 2003 mineralogists employed advanced, infrared spectroscopic methods to more precisely define its structure.

According to modern metaphysicians, cornetite facilitates the recollection of dreams and increases awareness of nonphysical realms.

TECHNOLOGICAL USES

Because of its rarity, cornetite has no commercial uses. However, its study has provided valuable insight into the crystallography, atomic structure, and weathering (oxidation) sequences of various copper-phosphate minerals.

TYPE LOCALITIES AND TYPE SPECIMENS

Whenever applicable, our write-ups specify the type locality of that particular Mineral of the Month. As noted under "Collecting Localities," the type locality for cornetite is L'Etoile du Congo (The Star of the Congo) Mine near the city of Lubumbashi in the Shaba Province of the Democratic Republic of the Congo. A "type locality," designated "TL" in mineralogical literature, is defined as the source of the specific specimens that are studied to provide the data necessary to describe a new mineral species. L'Etoile du Congo was designated the type locality for cornetite after it yielded the specimens that were collected and studied in 1916 to obtain the data that defined cornetite as a new mineral species.

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Botanist and zoologists began documenting type localities in the late 1700s, making the place of discovery a standard part of descriptive literature for new plant and animal species. By the early 1800s, after the identification of a sufficient number of chemical elements had established mineralogy as a modern science, mineralogists drew upon botanical and zoological precedents to make type localities part of the formal descriptions of all new mineral species.

Today, mineralogists have identified more than 4,400 mineral species. Of all these mineral species, only about 160 are not assigned a type locality. In modern mineralogical literature, the absence of a type locality for these minerals is simply noted as “type locality uncertain.” Generally, the minerals without designated type localities are abundant, readily available, and have been mined and utilized for many centuries and even millennia. Most were recognized as distinct mineral species in the late 1700s, prior to the inclusion of type localities in new-mineral descriptions. Examples include gold (Au), diamond (carbon, C), galena (lead sulfide, PbS), halite (sodium chloride, NaCl), quartz (silicon dioxide, SiO_2), and pyrite (iron disulfide, FeS_2).

With its considerable geographic size, richness and variety of mineralization, extensive mining history, numerous mineralogical surveys, and excellent research capabilities, the United States, with 16 percent of all type localities, ranks first among nations. Russia is second with 13 percent, largely for the same reasons. Next is Germany at 6.7 percent; Italy at 5.0 percent; Canada at 4.6 percent; and Sweden at 3.9 percent. Despite the smaller geographic sizes of the European nations, they have rich mineralization, long mining histories, and capable research institutions. Australia follows Sweden with a surprisingly low 3.0 percent. For such a large and very richly mineralized nation, Australia’s relatively low percentage of type localities is explained by the relatively recent development of its mining industry and research capabilities.

Cornetite is one of 88 minerals with type localities in the Democratic Republic of the Congo, which has the most of any African nation. Namibia (home of the famed Tsumeb mineral locality) ranks second among African nations with 73 type localities, while South Africa, a nation with a large mining industry, ranks third with 65.

The place with the most type localities in the world is the Lovozero Mountains on Russia’s Kola Peninsula, and area with many diverse alkaline rocks and unique mineralogical environments. Most of the record number of minerals first identified here—more than 90—have only recently been described, largely through the work of Pete J. Dunn of the Smithsonian Institution, and Alexander Khomyakov of the Institute of the Mineralogy of Rare Elements (Moscow)

While discussing type localities, it is also important to consider the term “type specimen,” which refers to the specific reference sample(s) collected and studied to define a new mineral species. In the case of cornetite, its type specimens are kept in a mineralogical repository at the University of Liège, in Brussels, Belgium. The practice of preserving type specimens in mineralogical repositories began shortly after 1900. By 1999, when mineralogists had recognized 3,934 mineral species, 2,777, or roughly 70 percent, were represented by preserved type specimens. Originally, when type specimens were found in colonized regions, they were preserved at institutions within the colonizing nation—the reason that cornetite’s type specimens are kept in Brussels, Belgium. Today, type specimens are almost always preserved within the nation of origin at a suitable museum or a university nearest to the type locality.

Type specimens fall into four categories: holotypes, cotypes, neotypes, and topotypes. Holotypes are specimens that provide all data required for an original mineral description; pieces of holotypes sent to other laboratories for study are formally called “parts of the holotype.” A cotype refers to another specimen from the same type locality that is studied to obtain additional data for the original mineral description. A neotype is a specimen designated to represent a species when it must be redefined and the original holotype or cotype has been lost. A topotype is another specimen obtained from the type locality that corresponds to the original holotype description.

Type specimens are important in the scientific process of mineral-species discreditation. Once described, most mineral species remain valid. But because species are continuously restudied, often with advanced analytical methods, new data occasionally indicates that the original description of certain minerals is invalid. It then becomes vital that researchers are able to restudy the original type specimens.

While type localities and type specimens are primarily of scientific value, they also have a practical aspect. Mineral specimens collected from their type localities command premium prices on collectors' markets because of their added historical and scientific value.

ABOUT OUR SPECIMENS

L'Etoile du Congo Mine, the type locality for cornetite and the source of our specimens, is located five miles from Lubumbashi in the Shaba Province of the Democratic Republic of the Congo, formerly known as Zaire. (The Shaba Province is also known as the Katanga Province, as seen on the map in Figure 1. Lubumbashi was formerly known as Elisabethville; you may see specimen labels at shows or in collections using these various names.)

Although currently inactive, this open-pit copper mine produced steadily for 50 years and helped make the Congo a major copper source during the first half of the 20th century. Since it opened in 1911, the ups and downs of L'Etoile du Congo have closely paralleled the political and economic fortunes of the Congo itself. Although producing little commercial copper for the past 40 years, L'Etoile du Congo has until very recently remained an important source of cornetite and other mineral specimens, and especially of gem- and decorative-quality malachite. Our February 2002 featured malachite specimens came from mines in the area.

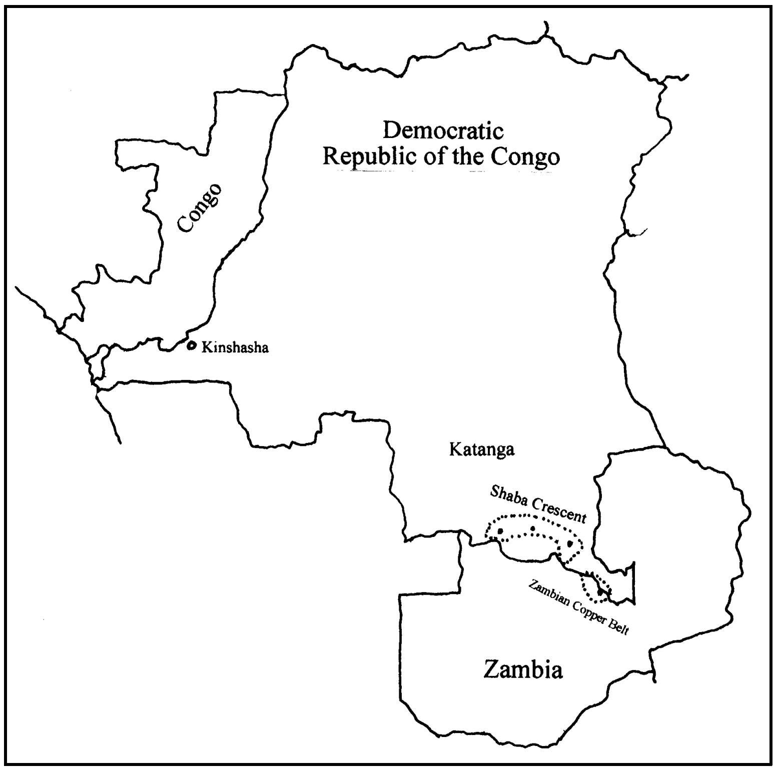

Figure 1. Copper-producing regions of the Democratic Republic of the Congo and Zambia.

L'Etoile du Congo is located at the northern end of the Central African Copper Belt (or Copperbelt), a 250-mile-long, 30-mile-wide mineralized region, most of which lies in Zambia (formerly Rhodesia). Both the Shaba Crescent and the Zambian Copper Belt regions seen on the map in Figure 1 belong to this belt. Geologists have traced the origin of the Copper Belt, which is one of the world's richest metallogenic provinces, to a tectonic collision between two crustal plates called the Kalahari Craton and the Congo Craton. This collision, which occurred some 500 million years ago, uplifted the Lufilian Arc mountain chain and helped form the ancient Gondwana supercontinent. Rapid weathering of the Lufilian Arc deposited enormous amounts of metal-rich sediments between the two cratons. Faulting that accompanied sustained tectonic stresses then introduced hydrothermal fluids that remobilized the metals, mainly copper and cobalt, which later recrystallized in fractures and along stratigraphic boundaries of sandstone and shale. Within the Central African Copperbelt, copper was initially present primarily as the copper-iron-sulfide minerals bornite ($CuFeS_4$) and chalcopyrite ($CuFeS_2$). The primary cobalt mineral was cobaltite, or cobalt sulfarsenate (CoAsS).

Millions of years of erosion eventually exposed many of these metal-rich sandstone strata. Within the exposed strata, the copper and cobalt minerals oxidized into malachite, or basic copper carbonate, $Cu_2(CO_3)(OH)_2$; chrysocolla, or hydrous copper aluminum hydroxysilicate, $(Cu,Al)_2H_2Si_2O_5(OH)_4 \cdot nH_2O$; libethenite, or basic copper phosphate, $Cu(PO_4)(OH)$; tenorite, or copper oxide, CuO; and heterogenite, or basic cobalt oxide, CoO(OH). Because of the extraordinary richness of the mineralization and the intensive degree of oxidation, large surface areas within the Copperbelt were literally covered with malachite and other bright, blue-green copper minerals. In places, these minerals had even been reduced to masses of native copper.

For centuries, pre-colonial native Africans had worked much of the Central African Copperbelt, including the area that would later become L'Etoile du Congo Mine, obtaining copper both by collecting the native metal and by smelting malachite in stone furnaces. They used copper, usually fashioned into *croisettes*, four-armed crosses that ranged in weight from only a few grams to many pounds, both as money and as a trading commodity. Interestingly, *croisettes*—copper crosses—appear on the flag of the Province of Katanga and the crest of the city of Lubumbashi today, as symbols of both ancient and modern copper mining.

British-born American correspondent and explorer Sir Henry Morton Stanley (1841-1904) was the first outsider to explore the interior of the Congo. Stanley had initially gained fame by locating the lost Scottish missionary and explorer Dr. David Livingston (1813-1873) near Lake Tanganyika in 1871. He then floated the Zaire River (formerly the Congo River) from east to west in 1876. In 1878, King Leopold II of Belgium hired Stanley to enact treaties with the Congolese and to establish Belgian trading stations along the Zaire River. Leopold then established the Congo Free State in 1885 as his personal possession, instituting a cruel, forced-labor system to develop the region's rich natural resources, mainly ivory and rubber.

Belgian earth scientists, including geologist René Jules Cornet, used the Congo Free State as a base from which to conduct the first central African mineralogical and geological surveys. After surveying the richly mineralized Central African Copperbelt, Cornet helped establish small-scale copper mining in southern Katanga in 1900. In 1906, the slowly growing Katangan copper-mining and smelting industry came under control of the Union Minière du Haut Katanga (Mining Union of High Katanga), a Belgian company with Cornet as its first administrator.

By then, the oppressive rule of Leopold II, which had caused the deaths of several million Congolese natives through forced labor, starvation, and outright extermination, had attracted international attention. In 1908, Britain and the United States pressured Leopold to convert his African possession into a national colony called the Belgian Congo. Somewhat reformed labor practices then furthered development of the Katangan copper mines. In 1910, Belgians founded the city of Elisabethville as the commercial hub of the copper-mining region. The following year, after construction of a 700-mile-long railroad linked Elisabethville with the Atlantic port of Benguela, Angola, L'Etoile du Congo began production and Elisabethville and southern Katanga became the most prosperous area of the Belgian Congo.

Also in 1911, Belgian mineralogist Henri Buttgenbach replaced Cornet as the head of the Union Minière du Haut Katanga. Backed by the University of Liège, Buttgenbach had already led two Belgian mineralogical surveys to the Congo in 1902 and 1906. Under his direction, Katangan copper mining expanded rapidly. By World War I, L'Etoile du Congo, Ruashi, and other nearby open-pit mines, served by seven smelters and employing 12,000 Congolese workers, were producing 22,000 tons of copper per year. By the 1950s, L'Etoile du Congo and the other Katangan mines had made the Belgian Congo the world's fourth largest copper producer.

But the fortunes of L'Etoile du Congo and the Congo itself were about to change dramatically. After years of civil unrest in its African colony, Belgium granted independence to the new Democratic Republic of the Congo on June 30, 1960. Civil war immediately erupted that shut down the nation's economy, including all copper mining. In 1965, in a desperate effort to restart its copper-mining industry, the government nationalized the Union Minière du Haut Katanga, replacing it with an inefficient, corrupt state office called La General et des Mines (GECAMINES).

In 1971, the name of the Democratic Republic of the Congo was changed to Zaire, Katanga to Shaba, and Elisabethville to Lubumbashi. A heavy-handed attempt to purge the nation of all foreign investment created economic disaster and triggered another succession of bloody civil wars, the last of which turned into an uneasy peace in 2001.

Copper mining at L'Etoile du Congo and other Katangan mines shut down with the first civil war in 1960. GECAMINES reopened the mines in 1968, but political corruption and poor management limited production. For the next 30 years, copper production at L'Etoile du Congo and other nearby mines would amount to less than 10 percent of capacity. GECAMINES finally declared bankruptcy in 1996.

By then, L'Etoile du Congo had been taken over by thousands of impoverished artisan miners called *croiseurs* (literally "copper crossers," a reference to the pre-colonial native miners who worked the area centuries earlier). Using nothing but picks, shovels, and their bare hands, the *croiseurs*, among them men, women, and children, dug and collected anything of value. This included mine-run malachite (containing 57 percent copper by weight), which they hand cobbed (cleaned of matrix material) and sold to waiting buyers. Another valuable ore was heterogenite [basic cobalt oxide, CoO(OH)]. The buyers then illegally trucked the ore across the nearby border to sell it to operating smelters in Zambia.

Croiseurs also collected and sold specimens of such minerals as chrysocolla, cornetite, and especially malachite to mineral dealers and middlemen. Most malachite specimens, gems, and decorative carvings that have appeared on world markets during the past 20 years originated in the Democratic Republic of the Congo. Some of this malachite is worked in the Congo and Zambia, but much is also exported to cutters in Hong Kong.

Currently, the future of both L'Etoile du Congo and the Congo itself may be looking up. An uneasy peace has followed the end of the last civil war in 2002. Increasing political stability has enabled GECAMINES to farm out certain copper properties for future mining. In 2004, the South African mining corporation Metorex, Ltd., acquired mining rights to L'Etoile du Congo and the nearby Ruashi mines and plans to process old stockpiles of high-grade, oxidized copper and cobalt ores. Metorex has since closed both properties to the *croiseurs*; accordingly, the supply of cornetite specimens and various forms of malachite has dwindled. Of course, the situation may change at any moment, and many large mining companies are hesitant to invest the large sums necessary to bring Congo mines up and running, due to the poor track record established by previous regimes. Who would want to invest many millions of dollars only to have the government close or take over the mine?

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As mentioned, L'Etoile du Congo is the type locality for this month's mineral, and has truly proven itself as a star producer of quality mineral specimens. Other collectible minerals found there include chrysocolla [$(Cu,Al)_2H_2Si_2(OH)_4 \cdot nH_2O$], dolomite [$CaMg(CO_3)_2$], heterogenite [$Co^{3+}O(OH)$], libethenite [$Cu^{2+}{}_2(PO_4)(OH)$], malachite [$Cu^{2+}{}_2(CO_3)(OH)_2$] sphaerocobaltite [$CoCO_3$], and tenorite [$Cu^{2+}O$. Some of our specimens also contain small crystals of libethenite, seen as little clusters of very small crystals of a pretty emerald-green color. Libethenite was named in 1823 for its type locality, mines near Libethen, Neusohl, Stredoslovensky Kraj, Czech Republic. This type locality in now known as Lubietová, Slovenské Rudohorie Mountaints, Banskobystrický Kraj, Slovak Republic. As political lines are redrawn and cities, regions and countries are renamed, it becomes increasingly difficult to find up-to-date, definitive locality information, as you can imagine! This explains why you sometimes see specimens from the same mine with different place names–who wants to go and remake their mineral labels every time a political name change is made?

Our specimens are on a sandstone matrix, typical of the area. With the naked eye, we can see the little crystals on the matrix, but with magnification we can see the true beauty of the color and crystal form. Cornetite crystals larger than those on our specimens are almost unheard of, and of course quite valuable. Such small crystals are typical of minerals of the phosphates, chromates, arsenates, and vanadates class, which tend to form as minute crystals or inconspicuous masses. We have been fortunate to have featured a number of colorful members of this group over the last ten years, including crocoite, purpurite, vivianite, variscite, conichalcite, olivenite, adamite, augelite, pyromorphite, vanadinite and three members of the apatite group.

While in Los Angeles caring for her Mom, Cheryl came across a piece in the Los Angeles Times newspaper describing an auction of fossils, minerals, and gems at the Beverly Hills gallery I.M. Chait. The brief article mentioned that the auction had grossed more than $1 million, an increase of nearly 70% from its first natural history auction in 2002. According to the auction company, people are paying high prices for minerals, fossils, and gems, not only as an investment, but for the aesthetics of the objects. What caught her eye was a color photograph of a vivid blue cornetite on matrix specimen from the Congo, which was offered at the auction! The piece was eighteen inches across, and had 100% crystal coverage on the matrix, along with what looks like light green malachite. The estimated sales price? $20,000 to $30,000!

Of course, most of us are building our collections for the aesthetics of the minerals rather than as an investment. Yet if we keep our collection properly catalogued and free from damage, it will continue to be of value. Some of the individual pieces may not hold their worth as new finds are made, while others will increase in value as mines close, and specimens become scarce. So we'll end with another appeal to each of you to make a master list of all your minerals specimens, along with the locality information, purchase price, source of the specimen, etc. And be sure to give your cornetite specimen an honored place on the list!

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