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Notes from the Editors



Daniel Trinchillo, Sr. (1937–2022) and
Camille Trinchillo (1947–2021)

Died, Daniel Trinchillo (Sr.), 84

Daniel Joseph (“Danny”) Trinchillo, Sr. (father of New York mineral dealer Daniel Trinchillo, Jr.) was born in Brooklyn, New York, on December 29, 1937, the son of Frances Stravino and Italian immigrant Joseph Trinchillo. He was the second youngest of seven brothers, and lived in Brooklyn until his mid-twenties. While serving in the Army, he learned his first trade as a butcher—skills which he applied, following his discharge, in New York City’s famous meatpacking district, becoming a production manager for Edmund Mayer Meats.

With an entrepreneurial spirit inspired by his father Joseph (a fruit and vegetable seller), Daniel sought out a business to run for himself. In the early 1980s he met a man named Zoltan Zolbatash (“Mr. Zole”), a Hungarian immigrant who ran a small trucking company named Zole’s Trucking. Daniel struck up a friendship with him and learned all the facets of the trucking business, everything from driving trucks to running the office. After a year of apprenticeship, Daniel purchased the business from Mr. Zole (who stayed on for a while as a consultant), and grew the company to a robust size. His business success provided enough income to support his interests, one of which was mineral collecting.

Daniel Sr. was first introduced to minerals on an excursion with his wife Camille and their son, Daniel. Camille had developed an interest in the purported metaphysical healing properties of crystals, while Daniel Jr. already had a passion for minerals and crystals. On a fall day in 1987, the trio ended up in the showroom of Jim’s Gems, run by lapidary artist and mineral dealer Jim Kaufman and his wife Candice on Route 23 in Wayne, New Jersey. That visit changed their lives forever.

Camille went straight to the metaphysical specimens (see the following obituary) while Daniel and son were drawn to the colorful showcases filled with beautiful mineral specimens in the back of the shop. None of them had known that one could actually *buy* minerals; shocked and inspired by this realization, Daniel Sr. purchased 130 specimens that very day! Back home, father and son logged them

all into a notebook and labeled each one. A week later the family visited their first show, the New Jersey Earth Science Association Mineral Show, which at that time was one of the largest on the East Coast, even hosting a few international dealers. There the hook was set, so to speak; the three Trinchillos fell in love with minerals and the mineral collecting community, and thereafter they attended every possible show and met all of the collectors and dealers in the entire Tri-State area.

A typical weekend was spent driving their Mercury Sable station wagon to either a show or a collector’s home to view, trade for, and buy minerals, weekend after weekend, for years. Daniel could not leave his trucking business unattended for extended periods of time, so larger shows like Denver and Tucson were beyond his reach. But with a warm smile and an easy way, he became well-known in the East Coast community of collectors and dealers, and is fondly remembered by many for his unique negotiating tactic to get the best prices. He would count out an amount of cash that he felt comfortable paying for a given specimen and leave it in the hand of the seller, saying “Hang onto this for an hour, and I will come back. If you like, keep it and I will take that piece; if not, just hand it back, no problem.” Upon his return, the mineral was inevitably already packed and ready to go.

By the mid-1990s, Daniel had built a formidable mineral collection of nearly 2,000 specimens, all of which were on display in the basement of his home in Whitestone, New York. The showcases were brimming with specimens from all over the world, carefully displayed in an often-whimsical manner. Herkimer diamonds were a family favorite, thanks to several collecting trips to the Ace of Diamonds claim. Daniel sometimes used sparkling piles of small herks as the bed on which other specimens were nestled. Or he might place little jewel-like quartz crystals on specimens of other minerals, creating fantasy specimens that obviously defied the laws of mineralogy and geology but (to the untrained visitor) were awe-inspiring to look at. He sometimes did the same thing with single diopside crystals, one of his favorite species; just for fun, he would attach one with a speck of sticky tack to all sorts of other minerals. Imagine a textbook Tsumeb diopside crystal miraculously perched upon a Sweet Home rhodochrosite!

Whimsical as it was in some instances, his collection was quite serious as well, with a focus on Elmwood, Cave-in-Rock, Tsumeb and the Chinese and Russian minerals that were bursting onto the scene in the early to mid-1990s. Russia’s borders were opening, the Cold War was ending, and mineral treasures from the former Soviet Union were starting to appear at shows. American dealer Victor Yount, for example, began bringing back fascinating specimens of optical fluorites from the Dalnegorsk mines in far-eastern Russia. The high quality of these pieces, along with the prices they were commanding, caught Daniel’s attention.

In 1991, Daniel encouraged his son to make a buying trip to Russia. To get things started, he put an ad in the *Lapidary Journal*: “Want to buy Russian Minerals. Will pay CASH!” Before long, this little classified ad was answered by a Ukrainian named Ruslan Adamovsky, who was living in the Rockaway area of New York. Ruslan was an intriguing character with a willingness to travel, and he had a network of friends in Russia and Moscow. Ruslan and Daniel Sr. met at Daniel’s warehouse in College Point, Queens, amongst the pallets and boxes of the trucking company, and discussed the financing of a trip to acquire minerals. Accepting Ruslan’s promise to return with a bounty of mineral specimens, Daniel entrusted him with \$10,000 in cash, and Ruslan made his first buying trip to Moscow.

True to his word, Ruslan returned in about a month with hundreds of specimens of all sorts of minerals and varieties. Daniel learned two important things that day: (1) that Ruslan was a man

of his word and could be trusted, and (2) that he knew absolutely nothing about fine minerals. To supply the missing expertise, Ruslan was introduced to Daniel Jr. who, though only 19 years old, knew minerals; he had attended hundreds of mineral shows, and had visited hundreds of private collections over the previous five years. Like his father, Daniel Jr. had an entrepreneurial spirit, and happily joined Ruslan on a trip to Moscow in January of 1991. The two toured the “circuit” hunting for minerals, and their efforts were well rewarded. Bringing back their treasures, they laid them out for Daniel Sr., who had first choice of the specimens at cost; Daniel Jr. and Ruslan were then allowed to sell everything else and keep the profits. This arrangement continued for almost a decade, and over the years Daniel Sr. was able to build an incredible suite of Russian minerals as the highlight of his collection.

By 1998, son Daniel had made over 70 such trips to Russia and had expanded his reach into other countries including China, Mexico and Colombia. His fledgling dealership grew so much and so rapidly that, by the late 1990s, Daniel Sr. bowed out—no longer able to keep up with his son’s exploits or the rising prices of minerals. But he remained a fixture at local shows for another decade or more, and at last had the opportunity to visit the great Tucson Show on several occasions.

In 2006, with the help of his son and Jim and Mary Fong-Walker of Heritage Auctions, Daniel arranged for the disposal of his collection. The auction was held in September of 2008 and, despite the economic meltdown taking place in the U.S., the sale was a great success. Daniel later closed his trucking business and retired to Florida, where he lived out the rest of his life managing local rental properties he had acquired over the years.

Daniel loved people, and would chat up everyone he met, always making new friends. During his retirement he stayed connected to minerals through a small group of close friends and through the stories his son would tell him about his exploits around the world. He treasured his memories of the days during the peak of his collecting career, and would often reminisce about them with great reverie and joy. He always greatly enjoyed bringing in visitors who had no previous conception of minerals and showing off his collection to them. As they rounded the landing to a view of the brightly lit showcases, their eyes would widen and their jaws drop at the awe-inspiring sight of such mineralogical wonders. Daniel would say (with just a little tongue-in-cheek): “Can you believe these are all real, and that they came out of the ground just like that?”

Daniel Trinchillo Sr. passed away on November 20, 2022, after a long battle with prostate cancer. He leaves behind his loving four children and seven grandchildren. He is assuredly running a trucking company once more, delivering beautiful mineral combinations to his collector friends in the afterlife.

Daniel Trinchillo, Jr.

Died, Camille Trinchillo, 74

Camille Ann Trinchillo was born in New York City on Mott Street in Little Italy on April 9, 1947. Her father, Julius Natale, was a diamond tool setter and her mother Angie a seamstress. After graduating from high school, she worked as a switchboard operator for a few years and shortly thereafter met her future husband, Daniel Trinchillo, Sr. The couple married in 1968, and she juggled being a homemaker and mother with helping her husband develop his new trucking business. Camille stumbled into the world of metaphysics through a single quartz crystal she acquired at a local department store named Fortunoff’s. Standing at a pop-up counter in the store, a clerk placed a single gem quartz crystal into her hand. As she closed her eyes and wrapped her fingers around the crystal, she felt

a tingling sensation, as if the energy of the crystal was resonating within her. Shocked by this, she decided to go with the feeling, and paid for the crystal.

Upon arriving home, she placed the crystal in the hands of her daughter Danae, son Daniel and husband Danny. None of them felt the same sensation that she did, but she nevertheless decided that she wanted to visit a shop called Jim’s Gems in New Jersey, recommended by the sales clerk. And sure enough, proprietors Jim and Candice Kaufman offered a myriad of stones that were purported to heal your every ailment.

Upon entering the shop, Camille walked up to a sales counter and met Candice—who was adorned with a headband and feather in her hair, and was burning sage, her arms floating about in a melodic sway. Camille began asking a million questions and the two spent hours together as Candice acquainted her with the essentials of metaphysical mineralogy. Meanwhile Danny and son ventured to the mineral displays in the back of the store and became entranced by the assortment of minerals on display. Thus began their journey into the mineral world.

The Trinchillos traveled to hundreds of shows across the East Coast in the mid-1980s and into the early 1990s. During that time, Camille was a buyer of all things mineral, with a focus on crystals that were said to have healing properties, and specifically on the ones that “spoke” to her. She built an enormous collection over the years, adding to it at every opportunity. She enjoyed minerals immensely and appreciated both their artistic beauty and scientific importance, as well as the metaphysical allure that she was so passionate about. She likewise fell in love with the mineral community and acted as a motherly figure to all. She literally loved everyone and welcomed them all with a big hug and smile at each encounter. With a classic “Italian mom” warmth, her sweet and loving personality always filled the show floor.

In 1994, Camille made her first trip to the Tucson Gem and Mineral Show, traveling with her son’s partner Ruslan, whom she barely knew. They set up a showroom to show off their newest selection of Russian minerals (son Daniel could not participate, as he was still in college). They arranged for a room at the Desert Inn, in the last year of its existence, before the deteriorating old motel was leveled to a parking lot. But the legendary show that had long been held there had already moved on to a new venue at the Executive Inn, so they found themselves in the most important city for minerals but in completely the wrong place. They finished out the dismal show but Camille was a trooper, having gamely driven cross-country with a young Russian man to participate in an international mineral show where she knew few people.

In the years that followed, Camille accompanied her son as he set up shop at all of the major shows across the U.S., including Springfield, Denver and, of course, Tucson. She became woven into the community and made friendships that lasted a lifetime. She continually studied metaphysical healing and read hundreds of books on the subject. She could often be found in a sales room, cleaning someone’s aura of negativity, aligning their chakras for them or giving them advice on which stones might help ease their woes. She completely supported her son Daniel, and that support, from both of his parents, was a strong factor that led to his widely acclaimed success as a mineral dealer. She loved and was loved by the mineral community at large, and treated all people equally with an open heart.

Camille Trinchillo died on May 10, 2021 after a long and painful battle with breast cancer. She was survived by her four children and seven grandchildren all of whom cherished her deeply and loved every moment they were able to spend with this rare human who could love unconditionally.

Daniel Trinchillo, Jr.



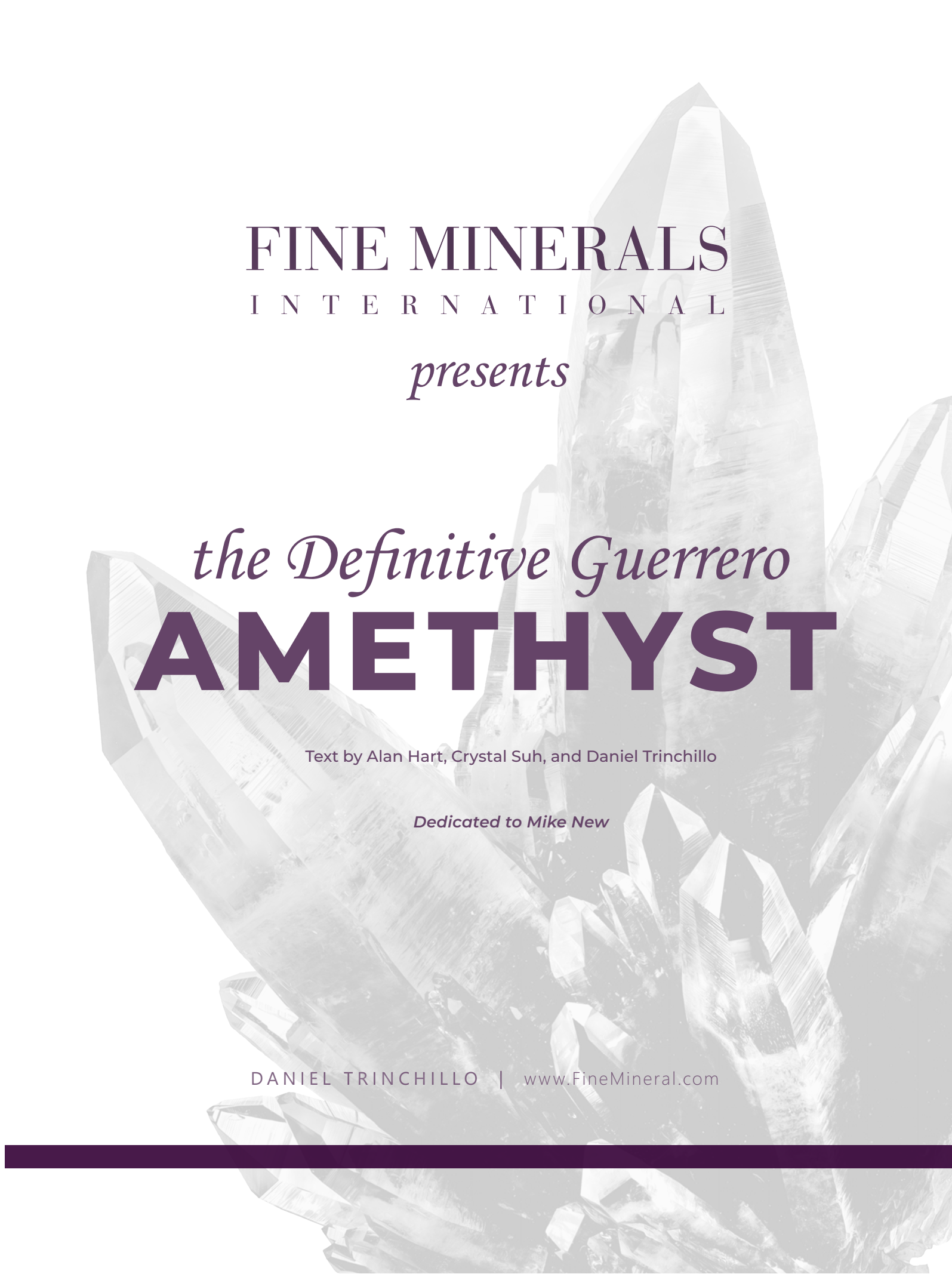
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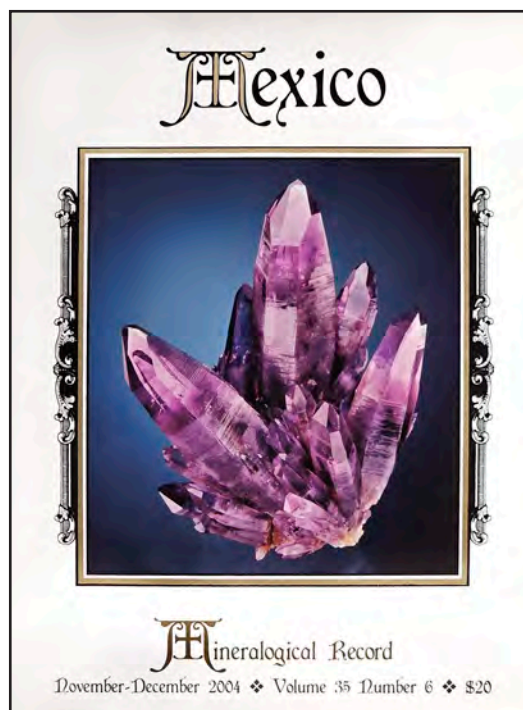
Quartz has been loved since antiquity, and amethyst, the violet to purple variety of quartz, is its most prized variation. Amethyst is one of the oldest gem minerals known. Archaeologists have discovered amethyst good luck charms, seals, and beads in Egypt made before 3,000 BC. Countless myths and legends have been forged around amethyst as it was popularly thought to protect people from contagious disease, but interestingly, it takes its name from 'Amethystos' - Greek for 'not intoxicated.' This is due to the fact the Greeks and Romans thought the wine-colored stones were talismans of the god of wine and revelry, Bacchus, and could ward off or prevent drunkenness. We know this to be true because Pliny the Elder's "Historia Naturalis," written around 77 CE, described amethyst as follows: "The magicians' fallacies would have us believe that these stones prevent inebriation, and it is from this notion that they've drawn their name."

Amethyst was also used extensively in religious adornment. Since the Middle Ages it has been worn in rings by members of the Roman Catholic Church. The intense purple of amethyst has also meant that it was popularly used in regalia, as purple was considered symbolic of grandeur and wealth, owing to the fact it was a difficult and expensive color to create and manufacture. Therefore, amethysts were once fashioned and valued as much as diamonds, rubies, sapphires, and emeralds and used prominently by aristocrats in the UK (with several examples among the British Crown Jewels), as well as Russia, which was once a resource for the most desirable amethyst rough thanks to its tones of deep mauve and/or violet.

In the mid-19th century, huge deposits of crystal-lined vugs (pockets) in Uruguay and Brazil (now often seen as entire crystal-lined geodes) were discovered. However, even with this potential volume of available material, little was suitable for gem rough, and the great color of fine old Siberian amethyst could not be matched.

The state of Guerrero encompasses a diverse landscape of flatlands, canyons, and mountains. Within its borders are parts of both the Sierra Madre del Sur mountain range and the Trans-Mexican Volcanic Belt.

Today, amethyst is found in many locations all over the world, notably in Zambia, Madagascar, Sri Lanka, USA, Mexico, Namibia, the Ural Mountains, and Australia. When speaking of rough material to fashion into gems,



Gracing the cover of the Mineralogical Record in 2004, the 'definitive' Guerrero amethyst specimen, a cluster of violet crystals that remains unsurpassed to this day.

each location is able to, on occasion, produce some quantity that rivals the finest Siberian material, which once set the bar for gem rough. That said, the hierarchy for fine amethyst crystal specimens is quite different.

Fine crystal specimens of the highest quality come from a suite of completely different locations. No specimens from Siberia, Uruguay, or Brazil, even rank in the top locations for collectible specimens. Instead, the bar is set by places like Guerrero, Mexico, the mountain ranges of the Brandberg and Goboboseb Mountains in Namibia, Jackson Crossroads, Georgia in the USA, Vera Cruz-Las Vigas, Mexico, and Denny Mountain, Washington, USA.

THE RIGHT MIX

This brings us to the reason for the disparity between quantity and fine quality available. One may think that quartz, made up of the two most abundant elements in the Earth's continental crust (silicon and oxygen as silicon dioxide SiO_2), would commonly occur as well-formed crystals. However, there are only a few specific places where the right geological processes, ingredients, and conditions come together to form fine crystals, and even rarer are those exceptional crystals of its purple variety, amethyst.



The municipality of Amatitlán is centrally located within the state of Guerrero and is not known for a single, large mine but several small regional deposits.

The cause of color in the varieties of quartz was once long debated and thought to be due to the presence of trace amounts of iron and manganese, and this uncertainty remained until the colors were duplicated in quartz crystals grown in a laboratory. It was discovered that if quartz is grown with a little aluminum, an estimated 1 out of 10,000 Si^{4+} atoms will have an Al^{3+} atom in its place. To maintain the charge balance of the overall crystal, a proton (H^+) is present in an interstitial site within the atomic structure,

but add some radiation and an electron can be ejected from an oxygen next to the aluminum, trapping this proton to form a hydrogen atom. The hydrogen atom does not absorb light, but the resulting $[\text{AlO}_4]^{4-}$ does, and forms a color center producing smoky quartz. If we do the same with iron, Fe^{3+} instead of Al^{3+} , we get a pale-yellow color center, but irradiate that and “voilà!” that $[\text{FeO}_4]^{4-}$ alongside some positive charge transfer mechanism effectively absorbs portions of light wavelengths. What remains we perceive and see as the vibrant purple color of amethyst.

We can therefore understand the rarity of this occurrence whereby in nature we need the right environment to form crystals with a few (10-100) iron atoms substituting for a million silicon atoms as crystals form, and we need an adjacent natural radiation source (either in fluids or surrounding rocks from minerals containing trace amounts of elements such as, Thorium 232, Potassium 40, or Uranium 238) to create the right mechanism to produce light absorption for that pleasing royal purple color. On top of this, the crystals themselves must be close enough to the surface to be able to be discovered, and mankind needs to have the knowledge to discover, and carefully mine and preserve them. None of these conditions are at all common!

THE GUERRERO MINE

The specimen that inspired this dissertation comes from the Guerrero mine in Mexico, hailed by many collectors as the definitive location for amethyst specimens. The piece is among the greatest specimens it has ever produced. The deposits of Guerrero were discovered around 1930 in a remote area dense with jungle vegetation by Señor Donato Retana, a peasant farmer who raised corn in the mountains near the municipality of Amatitlán. One day while turning soil, he discovered white and amethystine quartz, which he took to Querétaro with the intention of selling for cutting material, as the town was known for its lapidary industry. Miguel Ontiveros, who was a young man during this time, recounts that Señor Donato visited his family and offered the pieces for sale. His father staked a claim near Amatitlán called “La Cuna,” which was a simple vein or lode, heavily covered by vegetation. After some hard work, this claim started to produce excellent crystals.

Despite the exceptional quality of the material, there was a lack of any established potential specimen value at the time, so most would-be specimens were broken apart and destroyed to become gem rough for faceting. As before, miners sought out high-quality cutting-grade material, as the color was considered to be as good as the much-celebrated Siberian amethyst; the finest pieces displayed an attractive purplish red undertone reminiscent of the Russian material. Further prospecting across the range revealed other similar potential areas. The prospecting involved opening a series of trenches along amethyst veins just on or below the surface. Often, the veins would simply disappear and pinch out, but some opened into pocket zones. The near-surface

pockets were filled with sand or reddish mud, sometimes with a manganese oxide covering the crystals, but if they continued in depth, the more weathered surface zones gave way to crystal pockets of finer quality with little to no manganese oxide coatings. The large veins also pinched and swelled and were dug to 8-10 meters both in depth and width. There was even some tunnelling done on the larger veins, but in general, all the work was superficial and lacked systematic or advanced mining techniques.

Crystal sizes varied, but a feature of the deposit was that they usually thickened towards their bases, and those with no manganese oxide coating (which tended to etch the crystals) had the most brilliant faces. Incredibly, because the color in many crystals often appeared better at their base, miners simply broke off and removed the crystals entirely and held them up to the light to ascertain how good they were for cutting into gems, the deep purplish red being the most desired. In this respect many beautiful and fine specimens were broken and destroyed.

With news spreading of what was being discovered, care had to be taken to conceal or hide evidence of mining activities. Not only was a huge amount of hard work undertaken to discover and collect the crystals, but also much effort was devoted to concealing all signs of activity by scattering rubble and vegetation into the veins to hide them. Over the years miners and prospectors continued searching and competing for the elusive veins and pods. Some deposits became famous among the miners for their incredible output, and the most important claims became the stuff of lore, given names like “Palo Verde,” “Margarita,” “Donato,” “Rayas,” and, of course, “La Cuña.” (The prolific trenching and other small diggings may have had names too, those now long since lost.) Although the region may have had a short history of working, the endeavors and hard work of the miners ultimately produced some of the world’s most exceptional amethyst specimens.

Over the years, the rarity of good crystal specimens was recognized, and specimens began to appear in the then-fledgling mineral markets. Indeed, a spectacular example made its way to the Smithsonian Institution, where curator Paul Desautels considered it to be the world’s finest example of amethyst known at the time. With such an endorsement, collectors sought out the few surviving crystals. The intense demand then led many to attempt visiting the area in hopes of rediscovering surviving pocket areas in the difficult and remote setting. Concurrent efforts were made by geologists to ascertain the genesis of the deposit, an aid to find new potential prospecting areas. The range was a part of what became known as the “Guerrero Gold Belt,” where volcanic rocks have intruded Lower Cretaceous dolomitic limestones and calcareous shales. The intrusions produced metamorphic skarn zones around the contact areas where the sedimentary rocks were invaded by large amounts of silicon, aluminum, iron, and magnesium. It was here that circulating hot fluids formed the quartz crystals in veins and lode systems and aligned perfectly

with the addition of a small amount of iron as Fe^{3+} that replaced some silicon atoms in the quartz structure and then underwent natural radiation over time, activating the color centers that give us the dazzling color of amethyst.

Despite the demand for specimens, the region is remote and the landscape challenging. Over time only few were able to venture into the area to collect specimens. However, during the 1990s, a group of celebrated collectors and dealers led by Mike New and Wayne Thompson came together and funded an expedition to seek out new material. A half-mile exposure of veins called ‘Mina La Sorpresa’ was mined in 1997-1998. Interestingly, these veins were refuse-filled, presumably from an earlier effort to hide mining activities, so it is likely the Sorpresa property once had another previous name. Most of Sorpresa’s major pockets were empty, but the team was able to recover some exceptional specimens and ensure that they were collected as diligently and carefully as possible. The magnificent piece represented here, the subject of this report, is widely considered the finest found from this adventure.

A MEXICAN MASTERPIECE

This spectacular specimen is considered by many to be the greatest ever found in Guerrero. It exhibits all the most desired traits from the region, all in one specimen—a culmination of perfection of form and rich amethystine color. The piece is composed of a group of sharp crystals with pristine faces. Characteristically for their locality, the individual crystals taper towards their terminations from a thickened base. They have exceptional transparency that reveals internal color zones, a product of growth phantoms, which range from a breathtaking electric violet, to the sumptuous and much revered red-purple tone, a hallmark of amethyst quality. With no restorations, repairs or enhancements, the natural balance and aesthetic of the group, in terms of form and development, is unsurpassed. This specimen is a true rarity, and the authors regard it not only as one of the finest amethysts in the world but among one of the finest minerals as well. It has passed through the collections of a veritable *Who’s Who* of some of the most notably esteemed collectors and dealers, including: Wayne Thompson, Steve Smale, Sandor Fuss, and now Daniel Trinchillo.

It has graced the cover of the Mineralogical Record (Mexico - Special Issue IV, Nov-Dec. 2004), and is sure to continue inspiring the mineralogical world for generations to come, a testament to the timeless and ancient beauty of its species.

Sources:

ONTIVEROS, M., WILSON, W.E., and MEGAW, P.K.M. (2004) Famous Mineral Localities: The Guerrero Amethyst Deposits. *Mineralogical Record*, 35 (6), 29-37



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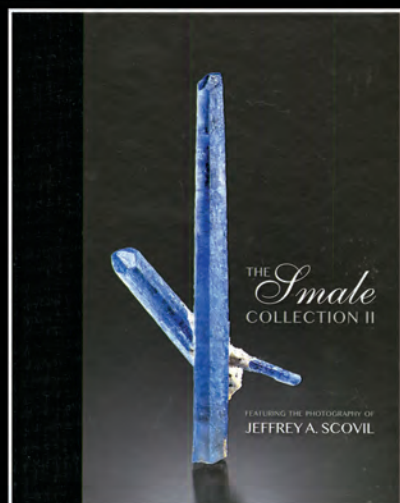
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AZURITE ON SMITHSONITE, 11.1 CM, FROM THE TSUMEB MINE, NAMIBIA. HERB OBODDA AND RICK SMITH OBTAINED IT IN GERMANY AROUND 1970, FROM AN OLD PRE-WWII MINER. THEY SOLD IT TO DAVE WILBER, WHO SOLD IT TO RICH KOSNAR, WHO SOLD IT TO KEITH PROCTOR, I OBTAINED IT IN AUGUST 1980. JEFF SCOVIL PHOTO.



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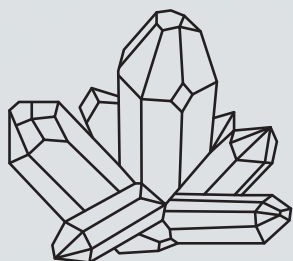
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Berbes, more formally known as the Berbes District, is one of three great fluorite districts in Spain's Asturias Province (the other two being La Collada and Villabona). All of them are well known to mineral collectors. The mines at Berbes (especially the Ana, Cuetu L'Aspa and La Cabaña mines) have yielded only a few mineral species—fluorite, barite, calcite and quartz—but in great abundance and aesthetic quality ranking them among the finest known.

INTRODUCTION AND LOCATION

Coal mining in Spain's Asturias Province is a pillar of the local economy, practiced widely in the mountain belt which straddles the border with León Province on the south. However, in Asturias there is also extensive mining for metallic and non-metallic minerals, from mines that have been important economically for much of the 20th century and now into the 21st (Adaro and Junquera, 1916). Many of these mines exploit "fluorspar" (fluorite).

Asturias is a major European producer of fluorite, yielding more than 140,000 tons annually. The three main fluorite mining districts in the province are Caravia-Berbes, La Collada and Villabona; together these districts have produced more than 15 million tons of fluorspar ore thus far (Gutiérrez Claverol *et al.*, 2009). The fluorspar mines near the small northern coastal village of Berbes—a town with just 82 registered inhabitants, located at the easternmost end of the Caravia-Berbes mining district—are of most importance

to collectors, and are the focus of this article. Most of the fluorite mineralization occurs as stratabound lenses in Permian calcareous breccia-conglomerate that either rest unconformably on the underlying Carboniferous basement or a few meters above it (García Iglesias, 1972; Forster, 1974; Kuchelka, 1974; Díaz González, 1978; Tejerina Lobo and Zorrilla Bringas, 1980; Peña Barbero, 1981). Minor amounts of fluorite have also been mined from veins in faults that cut across both the unconformity and the mineralized stratabound horizon.

This article is the result of extensive documentary research, and also incorporates testimonials from people who mined there and are now very old or have recently passed away. The article is intended to provide a special perspective on the history of the Caravia-Berbes mining district, its mining methods, and the geology and mineralogy of the Ana, Cuetu L'Aspa and La Cabaña mines near the village of Berbes. This district is known worldwide for the exceptional



Figure 1. Location map. The Caravia-Berbes District is situated on the northern seacoast of the Asturias region of Spain.

Figure 2. The Caravia-Berbes District is one of three great fluorite districts in Spain, the other two being La Collada and Villabona, all of which have produced fine specimens of fluorite and other minerals.



quality and beauty of its fluorite specimens, generally considered to be among the world's finest (Curto Mila and Fabre Fornaguera, 1992; García García and Calvo, 1998; Calvo and Calvo, 2006; García Álvarez and Sanabria, 2007).

HISTORY

The following history is summarized from the publication by García Álvarez and Sanabria (2007) and from the more extensive accounts in the book *Fluorite, a Century of Mining in Asturias* by Gutiérrez *et al.* (2009). The interested reader is strongly encouraged to read the book, as it contains much additional detail about the histories of these and all other mines in the three Asturian fluorspar districts.

In 1802, Lope José Bernardo de Miranda y Quirós, a local priest from Ribadesella who made frequent trips to the Berbes area, wrote in his notes about Berbes that “there are rock crystals of different colors” and “some of them look like a kind of diamond, so transparent and pure”—clearly describing fluorite and the doubly terminated quartz crystals occurring at the locality.

A more formal written reference to the existence of fluorite in

the Berbes-Caravia region was made by Guillermo Schultz (1836), who observed that “every once in a while, pockets and cracks are found lined by large and beautiful fluorspar crystals, and that mineral substance is also found in the Carboniferous limestones of Berbes, near Ribadesella.” At about the same time, Máximo Fuertes Acevedo (as quoted in Luque Caval and Gutiérrez Claverol, 2008) noted that fluorite was seen “in small cubic crystals in geodic cavities formed within the carboniferous limestone in Berbes de Villaviciosa.”

The first mining concession recorded in Berbes, dating to 1910 (Adaro and Junquera, 1916), was awarded to Raimundo Fueyo, a resident of Santander, who intended originally to mine iron ore. In the years between 1920 and 1930, Federico Lipperheide (1898–1992), a German businessman headquartered in Bilbao, armed with his pickaxe and his sample bags, personally conducted geological reconnaissance work on fluorite deposits which were already known from their surface exposures. Aware of the growing worldwide demand for minerals for the chemical industry, Lipperheide focused mainly on potentially minable mineral deposits in Spain. In 1924, together with D. Guillermo Ibáñez, the principal officer of the Banco de Vizcaya bank, Lipperheide co-founded the SOMIMET company



Figure 3. Ana mine facilities and headframe circa 1960, operated by the mining company known as MINERSA (*Minerales y Productos Derivados, S.A.*), which still holds the mining concession today. Photo courtesy of MINERSA.

(*Sociedad Bilbaína de Minerales y Metales, S.A.*), whose main interest was in mining and exporting non-ferrous minerals (Puig, 2005). Lipperheide and Ibáñez already knew that “fluorspar” was present in the early mining concession owned by Raimundo Fueyo, as well as in the neighboring Agustina concession, also owned by Fueyo. Encouraged by the strategic interest in fluorspar that had developed during World War I (1914–1918), they acquired both concessions, although some others in the vicinity, such as the Sueve mines, owned by J.A. Zuberrigoitia, remained apart. In this way the consolidation of the Berbes-Caravia fluorite mining district began. At the same time, the area awakened the interest of Belgian engineer Frédéric Edward Otlet Dewolf, who, with Celestino Llaneza, explored for fluorite in Berbes, but failed in his attempt to start his own company (Gutiérrez Claverol *et al.*, 2009).

During the following years, more fluorspar occurrences were found in an area known as El Frondil, and from there, small batches of concentrate were transported in oxcarts to the town of Barredo. In the early 1930s, the first concentrates were collected by Celestino Llaneza del Valle from fluorite fragments eroded from the cliffs at the beach immediately adjacent to El Frondil. Concurrently, a rudimentary facility (the first attempt at a washing plant) was built near the road that connects with the village of Vega. At this plant, first, 25 or 30 men washed the fluorite ore in wooden boxes in Acebo Creek to eliminate the clay and organic matter; then 10 or 15 women hand-sorted the fluorite fragments to produce a high-grade concentrate. Some 75 tons per day were obtained by operating this completely artisanal manual setup (García Álvarez and Sanabria, 2007). The washing plant was later acquired by the Lipperheide group and became the main ore-processing facility for the Minera Vulcano, S.A. property of SOMIMET.

Lisandro Bode, a local contractor from Berbes and an expert on fluorite mining in Asturias, was interviewed and shared his memories of the early days of mining in the Berbes area:

One morning in 1930, a plane landed right on the sands of the Vega beach. It was there to pick up the fluorspar ore collected by Federico Lipperheide during the previous six months. Several wooden boxes were sent out for metallurgical testing in the laboratories of a Belgian company.

This fluorite concentrate was loaded onto freight ships at the Ribadesella seaport. Women, who were paid less than men at the time, often did this work, using baskets. There are testimonials such as that of Virgilio Campollo Gonzalez, a miner from Vulcano, whose mother, Florentina Gonzalez Blanco, helped to load the ships at Ribadesella. From there, the concentrate was taken to Bilbao and shipped from there to Germany, the first country to purchase fluorspar ore from the Berbes-Caravia area. Between 1924 and 1930, the Lipperheide family company, through its German contacts, exported fluorspar concentrates from the Ribadesella seaport to Bremen in batches of 400 to 500 tons (Puig, 2005).

Exports were interrupted for about four years (1936–1939) as a result of the Spanish Civil War, which completely halted mining in the area between 1934 and 1938. The fluorspar mining operations in Asturias resumed in 1939; in fact, these years were a bonanza period, with profits from sales of fluorspar reaching such high levels that loans received during the Civil War period were repaid in full. There was a group of companies created in 1938 for this sole purpose, directed by Johannes Bernhardt, a resident from Tangier (Morocco), together with the HISMA company (*Hispano Marroquí de Transportes*). This group of companies became a diversified

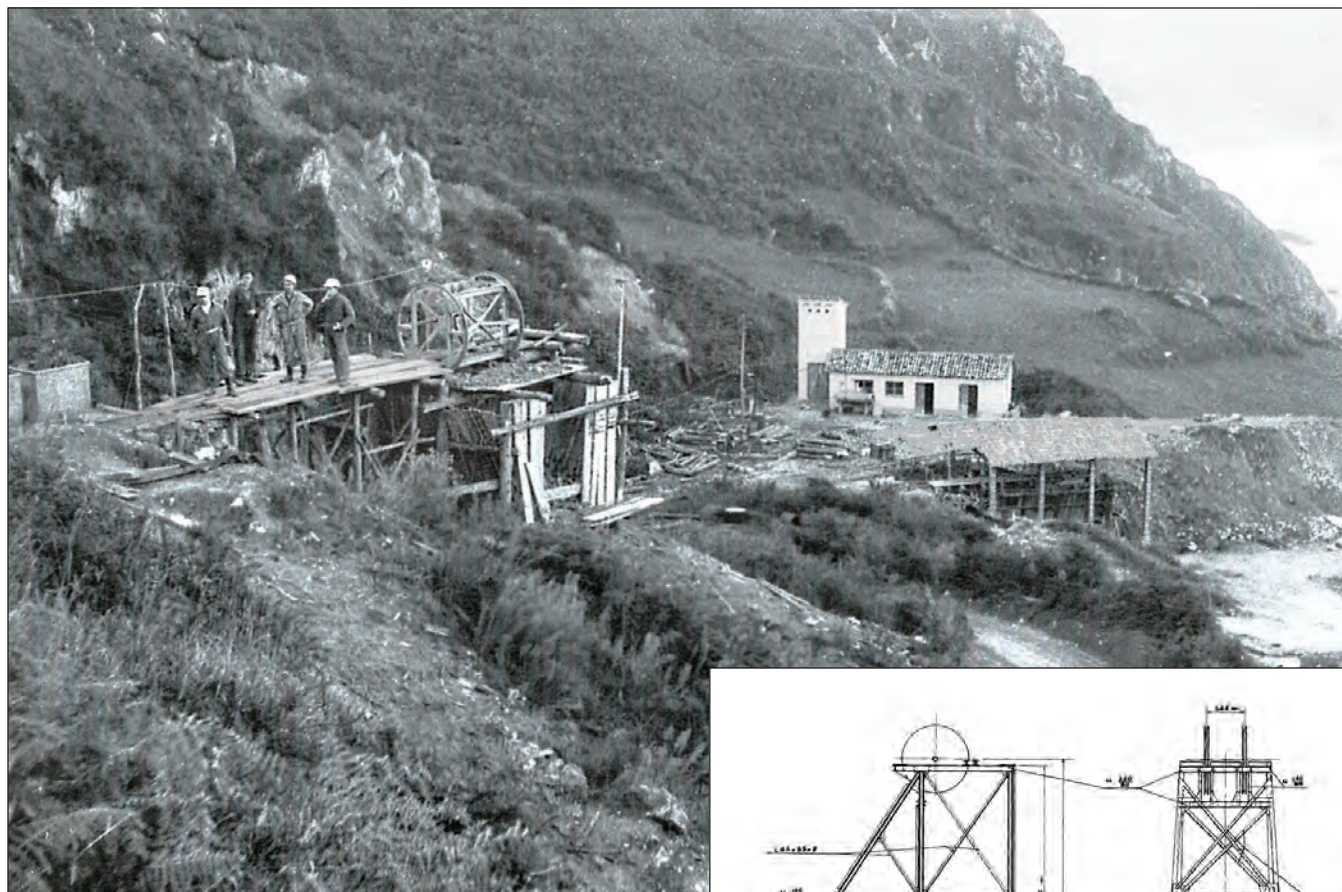


Figure 4. Mine portal infrastructure at the Ana mine, Level 46, in 1960 Photo courtesy José Durán.

holding company called SOFINDUS (*Sociedad Financiera Industrial Limitada*), a subsidiary of ROWAK (*Rohrstoffe und Waren Einkaufsgesellschaft GmbH*, incorporated in 1937) and the German Ministry of Economy, created specifically to supply strategic minerals to Germany (Puig, 2005). The excellent relationship of the Lipperheide group with the IG Farben group, the most important chemical conglomerate in the world at that time, allowed the Lippenheide group to position itself advantageously, even if current markets were subject to the Francisco Franco dictatorship regime.

In 1942, Federico, José and Francisco Lipperheide, together with Rafael and Enrique Guzmán, and several members of the Barrenechea, Churrua, Aresti and Ybarra families, bought the Osor mine, in Girona, in partnership with Dámaso Ibáñez, its owner (Puig, 2006; García Álvarez and Sanabria, 2007; Gutiérrez Claverol *et al.*, 2009). The new partnership was consolidated and the new MINERSA Company (*Minerales y Productos Derivados, S.A.*) was formed; MINERSA still holds the fluorspar mining concessions in the Caravia-Berbes District, and is the largest producer of fluorspar in Spain—and one of the largest in the world.

Immediately after the end of World War II, MINERSA commenced systematic work on the Ana vein. At first the fluorspar ore was mined from a small opencast quarry, but beginning in about 1950, mining moved underground, and this Ana mine became MINERSA's flagship property.

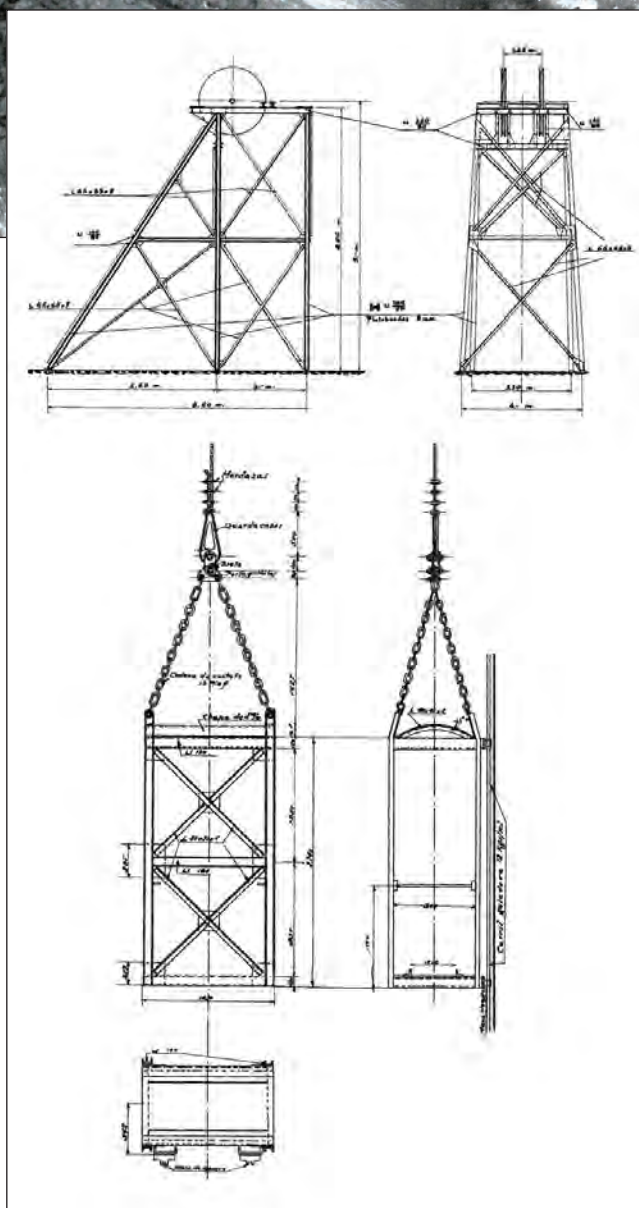


Figure 5. Designs for the steel Ana mine headframe (1956) and hoist cage (1962) MINERSA Archives.



Figure 6. A view of the Nucleo Rocoso and Cuetu I open pits, circa 1978. Peña Barbero photo.



Figure 7. Technical staff at the Ana mine ca. 1960. From left to right: Juan Uribe, José Durán, Teodor Ituarte and Guillermo Bode. Photo courtesy José Durán Zoloña.

In 1947, *Coto Minero Berbes*, a company headquartered in Bilbao and owned by José Luís Aldecoa, declared bankruptcy, following which it was acquired by Nicasio Fernández Alberdi, who changed its name to *Coto Minero Pilar*. This company mined fluor spar in the area known as El Frondil until about 1950 (Lynton, 1953), driving two parallel tunnels which followed the direction of the Ana vein. The company was later sold to *Minera Vulcano*, which continued mining El Frondil until 1961. During those years, a cable tram was installed to bring the fluor spar ore from the mid-section of the

mine, known as the *Aldecoa-Vulcano* zone, up to an area called La Ermita (“the Hermitage”) near the town of Berbes. From there, the ore was loaded into trucks and taken by road to the original washing plant in the Barredo area. The first vehicle used for the purpose was an “HC” (High Capacity) truck of Russian origin, bought at an auction of Civil War surplus materials, which operated with chain transmission and had rear wheels made of solid rubber (García Álvarez and Sanabria, 2007).

The Vulcano mine was informally and locally known as *La*

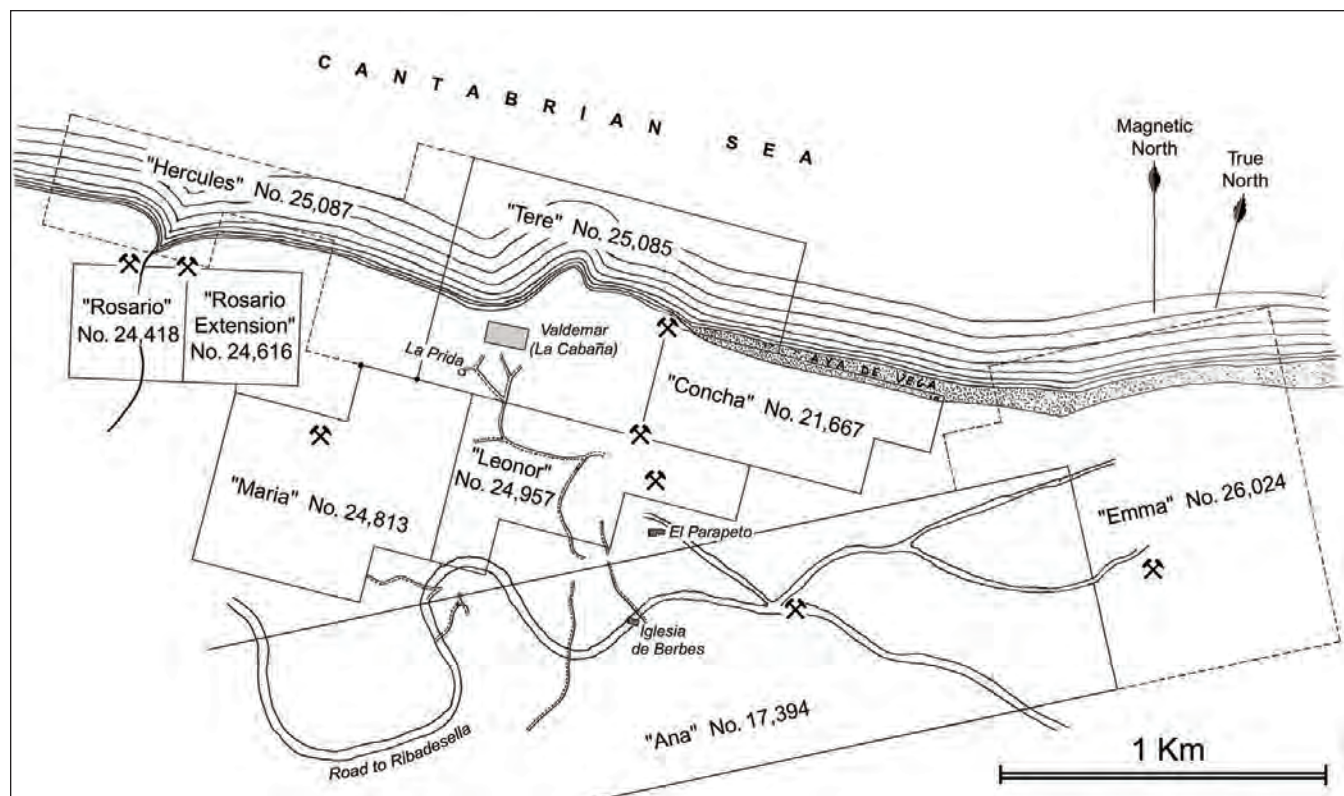


Figure 8. Mining Concessions around Berbes as of December 1968. MINERSA Archives.



Figure 9. Distribution of mining concessions around the town of Berbes 20 years after the closure and reclamation of the mining works (indicated in purple for reference), barely visible nowadays. Google Earth photo, 2016.

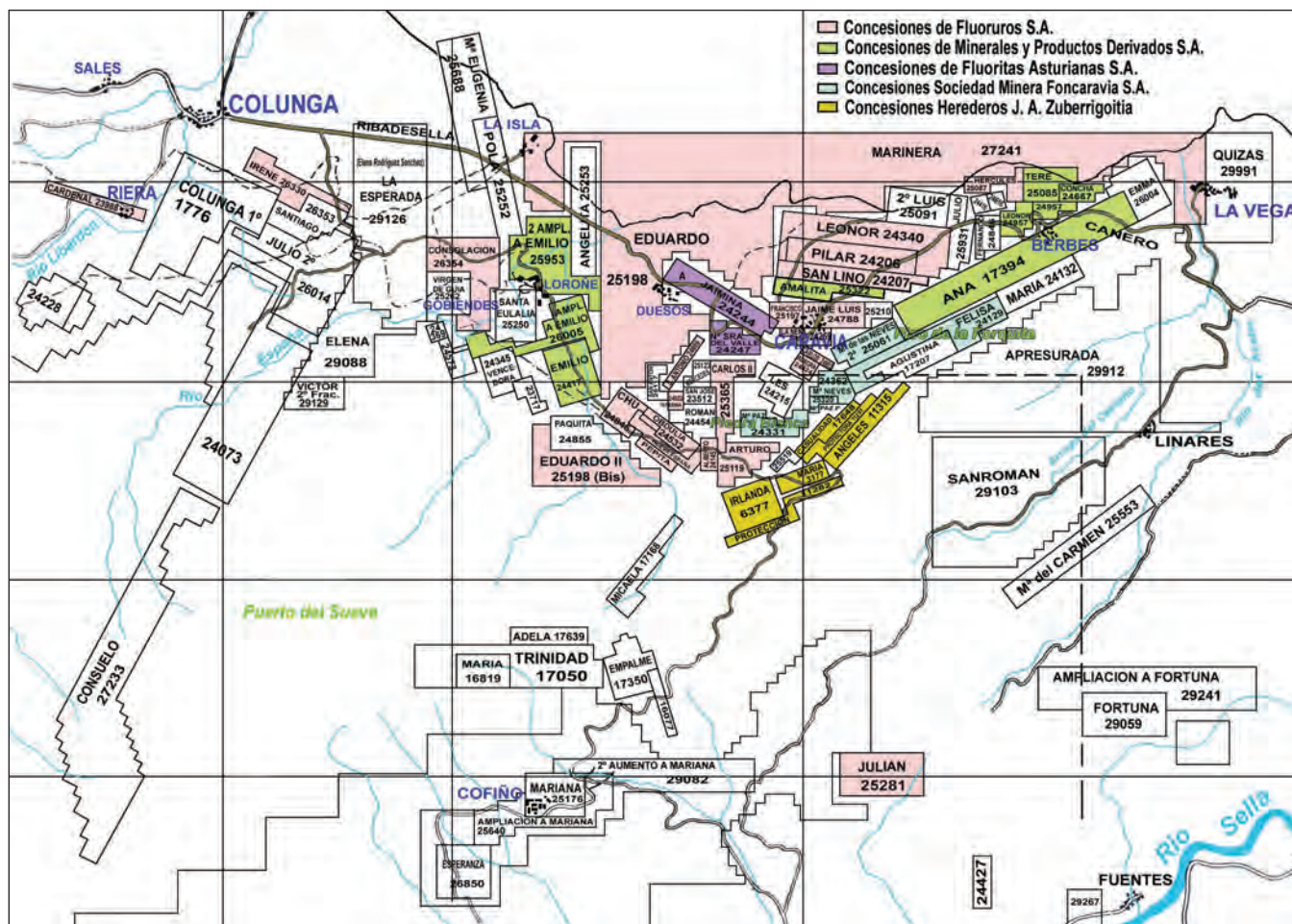


Figure 10. Distribution of some of the Mining Concessions at the Caravia-Berbes fluorspar district around 1950.

Probe, which in local Asturian dialect means “the poor,” because its infrastructure and mining equipment were indeed poor. Drilling and blasting were done in a very rudimentary way. In each shift there were two drillers who worked only with a hammer and drill steel (“double jacking”), one man hitting the drill bar while the other turned it a little between strokes; with time and patience this method could drill blast holes to 1.5 meters deep. One of the miners who worked in this mine at the time, Manuel Martínez Menéndez, remembered:

The tunnels were driven following the fluorite vein, and normally nothing but a pickaxe was necessary to loosen the fluorspar ore. But only when the vein was lost, due to the presence of a fault, was dynamite used to advance, always drilling by hand with bars and hammers.

Even under these conditions, 10,000 tons of fluorspar were mined from the northern part of the Ana mine between 1943 and 1945.

Mining progressed rapidly under the leadership of mining specialist Teodoro Ituarte Curpión, who directed the sinking of a shaft from Level 25 of the Ana vein all the way down to Level 76 without the use of mechanized equipment. The shaft walls were supported by timbering. In 1954, company management proposed deepening the shaft to Level 106 and lining its walls with concrete, while also constructing a new headframe with an upgraded cage. The task was completed in 1955–1956 by Mr. José “Pin” Durán Zaloña (Durán Zaloña, 1961), a mining engineer hired by the company to direct the operation. Under Durán’s supervision the Ana vein was mined down

to a depth of 100 meters on five sublevels, and a metal headframe was later added (García García and Durán Zaloña, 1998).

The Ana vein had an average width of 8 meters. Its footwall contact was against the Caliza de Montaña limestone and its hanging wall contacted rocks of the Triassic sequence; the softness of the latter caused some stability problems (Durán Zaloña, 1967). The lowest level, Level 106, was barely worked for two main reasons. First, it was under the water table and incurred expensive pumping costs. Second, the content of the Ana vein was gradually changing from fluorite to calcite at the root of the mineralized system. The richest part of the Ana vein was towards its westernmost end, reaching under the Berbes church: there are records of finds of very large single fluorite crystals in this area (García García and Calvo, 1998).

“Top slicing” was the mining method used during the first years of operation, starting in 1957. It would not be the preferred method nowadays, but at the time it was profitable, as it entailed low labor costs. Top slicing involved working the orebody from the top down in successive horizontal slices that may follow one another sequentially or simultaneously. The fluorspar ore itself was brecciated and unconsolidated, so the work was easy. But top slicing produced ore containing too much waste rock from the friable hanging wall, and eventually Durán switched to a novel room-and-pillar technique for mining the Ana vein. In every stretch of tunnel there was an 80-cm × 1.6-meter raise divided into two chambers, one giving access to miners and ancillary mining equipment, and for an ore chute down which the loosened ore was pushed—a method similar to that used in neighboring coal mines. Heavy timbering was needed

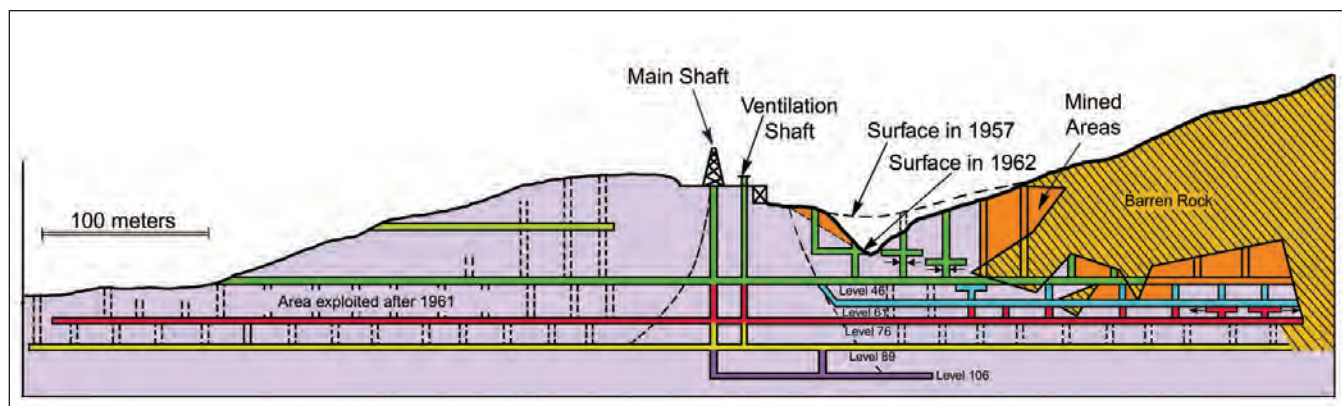


Figure 11. Longitudinal section along the Ana vein in 1957-1962. Level 89 (yellow) is at sea level (Sanabria and García, 2007; modified from J. Durán).



Figure 12. View of the Cueto L'Aspa mining operation during its heyday around 1979. J. Peña Barbero photo.

to deal with the pressures that accumulated after weeks of mining in certain zones, but the technique worked fine until the final days of underground mining in the Ana mine (García García and Durán Zaloña, 1998).

In 1953, MINERSA commenced construction of a totally new fluorspar processing plant near the village of Torre. The plant included a trommel and flotation cells, upgrading the previous artisanal setup near Acebo Creek. Construction of the processing plant was halted several times because of land and permit disputes, and the work was not finally completed until 1957 (Gutiérrez Claverol *et al.*, 2009). The plant was originally designed for a processing capacity of 120 tons per day, achieving 98% purity of the end product and exceptionally achieving up to 99.3%. Soon after being commissioned, the plant needed to be upgraded to handle 150 tons per day. For that purpose, a new ball mill was installed in 1959, and additional fluorspar ore was supplied from the Vulcano mine to match the new plant capacity.

In the following years, the mining concessions belonging to Coto

Minero Pilar became properties of SOMIMET. In 1962, as part of the consolidation plan, the neighboring Vulcano mine was purchased and incorporated into MINERSA. Underground mining continued at the Vulcano mine under the new ownership. The remnants of the mine infrastructure are still visible next to what is left of the transformer tower in the Frondil mine area and above the most modern crosscut tunnel, driven in the 1990s by the Corteguera contractors.

For the workers hired by the Vulcano mining company, commuting to the work site wasn't easy, since there were no public means of transport, and some of them lived up to 10 kilometers away from the mine site, arriving on foot (many of them wearing "madreñas," typical Asturian shoes carved out of a single piece of wood). To solve the problem of the workers not arriving on time, management provided bicycles to everyone who needed them, substantially improving the scheduling of the relay shifts. The initiative was well received: one of the miners recalled that "the bike allowed [me] to sleep for one more hour." The advent of the company-issued bicycles was so popular, and so useful for the management of the



Figure 13. A view of the Frondil mine area, Berbes; a small lagoon has formed in the excavation. Joaquín Puga photo (2021).

Ana mine, that bicycles were also given to other workers, attracting a more experienced workforce and even luring some workers away from competing companies (García Álvarez and Sanabria, 2007).

Underground mining at the Ana and Vulcano mines, with its network of tunnels on five levels, extended in a northerly (N35°W) direction. There were difficulties below level 106, which (as mentioned) extended beneath the Cantabrian Sea water table and required continuous pumping (García García and Durán Zaloña, 1998). Because of this, and because the quality of the ore was decreasing, the underground operations, which had begun in 1950, finally ceased in May 1968.

Curiously, very few mineral specimens were collected during the underground mining period at the Ana mine, as there was no culture or market for them. Most potential specimens ended up being crushed at the concentration plant at Torre. Perhaps the crystals found in the mine at that time were not of high enough quality to inspire the miners to save them: some records of specimens preserved from that period indicate that the crystals, although large, were lacking in luster, and their faces commonly were corroded.

After 1968, mining at Berbes involved only small open pits such as Los Cobayos (at La Cabaña), El Cueto L'Aspa, El Frondil, Cueto I, Cueto II, Cueto Norte (or Bloque IV), and La Busteriza. These areas, however, produced a great number of excellent fluorite specimens, associated mainly with quartz and barite, which very soon gained international recognition because of their high quality and fine aesthetics.

The Cueto L'Aspa mine occupies part of the Concha mining concession, initially granted to Enrique Fernández Alberdi, then sold in 1947 to José Luís Aldecoa Valle. In the late 1950s, a mining engineer from the neighboring Ana mine, José Durán Zaloña, suggested mining the *Cuetu* zone (in the local Asturian dialect, *Cuetu* means “hill” or elevated ground) to increase the production of ore to be sent to the Torre washing plant. But the ore from Cueto

L'Aspa exceeded the maximum barite content of 6% tolerated by the washing plant. The first batches that arrived contained in excess of 12% barite, and were rejected. Therefore, it was necessary to develop a system for concentrating the ore at the pit site (MINERSA archives, 1958). Once this was accomplished, the ore was profitable.

Open pit mining continued at the Ana, Concha and Emma mining concessions from 1969 to the mid-1980s. In the 1970s, MINERSA worked La Cabaña as an open pit, recovering about 300,000 tons of fluorspar ore. In 1973, the best production year, 82,500 tons were mined from a rich vein using five-meter benches. The Cueto II and Coro zones were mined intermittently, but more intensely during the 1970s. The open pit there reached a maximum depth of 30 meters, with five-meter benches. The Cueto Norte and Block IV were also mined intermittently between 1981 and 1986, but mining in these areas was discontinued because of the low fluorspar content of the ore—in the range of 20% CaF_2 for Cueto II and Coro and 30–35% CaF_2 for Cueto Norte and Block IV. La Busteriza (Emma mining concession No. 26004), the closest open pit to the village of Vega, was owned in 1946 by Fluoritas Asturianas (FASA) but was operated by MINERSA for a brief period in the 1980s. La Cabaña ended operations in 1975 and Cueto L'Aspa in 1989 (García García and Durán Zaloña, 1998).

In 1970 there were 11 companies mining fluorspar in Asturias. Five of them produced “acid-grade” fluorite concentrates (defined as exceeding 97% CaF_2 , and therefore suitable for the manufacture of hydrogen fluoride and hydrofluoric acid): MINERSA; Fluoruros, S.A.; Minas de Villabona, S.A.; Fluoritas Asturianas, S.A. (FASA, today owned by MINERSA); and Minas de Arlós, SL. The rest of the smaller mining operations around Berbes mined only lower-grade fluorite to sell to commercial concentration companies or as metallurgical-grade concentrates for domestic consumption.

With a growing market for fluorspar, the district attracted numerous independent contractors who carried out surveys and randomly



Figure 14. Jasperoid outcrops at the Cuetu L'Aspa mining operation around 1979. J. Peña Barbero photo.

excavated pits. Often these contractors were not guided by geological expertise but rather by pure instinct. Their activities were numerous in the vicinity of the town of Berbes, in the “Taraniellu,” “Sollareu” and “Cuetu la Cabra” zones, to name a few. Opportunistic miners, some of whom were only the owners of farms whose lands were legally registered as concessions to the mining companies, mined fluor spar illegally for quick and easy income, resulting in frequent conflicts. There were numerous legal disputes between companies and individuals throughout the area. Because of fluctuations in supply and demand for fluor spar in the global markets, most of the companies were eventually forced to shut down; by 1988 only MINERSA had managed to stay in business.

From 1957 to 1969, the Torre plant processed fluor spar ore not only from MINERSA's concessions (95% of these from the Ana mine, Cuetu L'Aspa, La Cabaña, Amalita, and Cucona) but also from other, competing companies in Caravia, e.g. Minera Togar, Huerta Argüelles, Fluoruros (FASA), Oseja de Sajambre, Fios, Escobio, Villabona, Arlós Torazo and Borluso. From 1980 onwards, fluor spar ore processed at the Torre washing plant came exclusively from MINERSA's mining operations (Cucona, Moscona, Rosario and Cuetu L'Aspa), and later from the Jaimina and Emilio mines, this last mine commencing operations in the late 1980s. Continuous upgrades during recent decades have increased processing capacity to 1,350 tons per day, achieving an acid-spar product grade (Guti-

érrez Claverol *et al.*, 2009). Today, the Torre fluor spar processing plant has become one of the largest and most modern facilities of its kind in the world.

ZONES OF THE DEPOSIT

In the 1980s, after the closure of the underground works at the Ana mine, MINERSA consolidated the mines and open pits within the group of mining concessions around the small town of Berbes into a single mining group known as the *Cuetu L'Aspa* mining camp (MINERSA Archives). The mining area can be divided into four distinct zones based on slightly varying geological and mineralogical characteristics:

(1) **The amalgamated “La Cabaña” and “Valdelmar” zones**, the latter located in the westernmost part of the mining area, were in the Tere mining concession (n° 25085), originally recorded by Minera Vulcano. This is the most noteworthy site for mineral collectors.

(2) **The “El Frondil” area** is adjacent to the Vulcano mine portal, and its tunnels drifted into the Tere mining concession along the trace of the Ana vein.

(3) **The “Cuetu L'Aspa” zone**, northeast of La Cabaña, El Frondil and the Ana vein, was subdivided into the “Cuetu I” and “Cuetu II” pits, which are the largest, most productive and most intensely mined open pits in the central zone of the deposit, encompassing part of the Concha (n° 24667) and Leonor (n° 24957)

Figure 15. Large fallen boulders that broke open in 1993 to reveal one of the most celebrated fluorite pockets (the “El Llisu” Pocket). Jan Loun photo (2007) (mineralexpert.org).



Figure 16. Old mine entrance near Berbes. Patrimoniul Industrial photo.



mining concessions.

(4) The “**La Busteriza**” zone in the Emma concession (n° 26024) formerly owned by Fluoritas Asturianas, S.A. (FASA), was the easternmost open pit of the mining camp, near the town of Vega.

These zones were named, formally or informally, by the residents of the towns of Berbes and Vega. Their names are roughly reflected in specimen labels in mineral collections worldwide, and therefore are employed in this article.

La Cabaña-Valdelmar

La Cabaña has historically been the favorite collecting site for visitors in search of minerals. One part of this zone is informally known as “Los Cobayos,” but is also called “La Paredona” (“the big wall”). The “wall” referred to is a large cliff face very rich in solution cavities lined with purple fluorite and ivory-white barite crystals on silicified limestone matrix. More rarely the cavities yield doubly terminated quartz crystals. The fluorite crystals either line the walls of the cavities in the silicified limestone or occur, more attractively, as individuals on rosettes of ivory-white, bladed barite crystals. The color contrast between the purple fluorite and the white barite makes specimens from La Cabaña extremely attractive. Typically, the crystal pockets at La Cabaña, when opened, are found to be completely filled with a very sticky, fine-grained clay.

Another feature that makes these fluorite specimens from La Cabaña so special is that almost all of the fluorite crystals are color-zoned and have distinct phantom lines. The blue to deep purple color zones and phantoms mark chemical and environmental changes that took place in the crystallizing solution. The cube is the dominant crystal habit, with small development of dodecahedron faces indicating lower formation temperatures and slower growth; on the other hand, cubic crystals with mosaic or stepped faces, usually of darker purple colors, indicate higher temperatures of formation (García Iglesias and Touray, 1977; García Iglesias, 1978).

Many pockets lined and filled with exceptional fluorite specimens have been found along the entire Los Cobayos quarry wall. In one zone of very hard, strongly silicified limestone, fluorite is common as large, sharp, stepped cubic crystals, generally lacking good luster. Of the two mineralized zones existing in this part of the deposit (see Geology section, p. 32), the one located at the lower level produced the best collector-quality specimens.

Numerous large quartz crystals, most of them rich in hydrocarbon inclusions, were found at a place known as “La Huelga,” located in the westernmost part of the Valdelmar zone—more precisely, at



Figure 17. Digging for fluorite specimens at the Valdelmar-La Cabaña zone. J. R. García photo (1989).

the end of the “Tere” mining concession, adjacent to the “Hercules” mining concession (No. 25087), at the time owned by Fluoruros, S.A. The inclusions are intensely fluorescent green. In the 1990s, the area where the quartz crystals were found was backfilled with the rubble removed from the last mining in Cuetu L’Aspa (Cuetu Norte or Block IV), ending any possibility of recovering new specimens there.

La Cabaña was a paradise for mineral hunters until not that long ago. It was common to find many amateurs from Spain, France, Germany, Switzerland, Austria, the United Kingdom, and many other mainly European countries recovering good specimens of both quartz and fluorite with just hand tools. Other, more experienced collectors utilized more powerful mechanical tools. Over time, the lack of waste rock removal resulted in the most productive lower areas becoming buried, preventing access to yet-unworked sites. In 1984 and 1985, MINERSA removed some of the rubble (about 300 tons) that had accumulated at the base of the quarry, and during this brief time some truly spectacular pockets were found, yielding specimens of exceptional quality.

After a few more years, an ever-increasing number of mineral collectors, some of them returning multiple times with power tools and equipment, generated more rubble in their search for additional crystal pockets. Eventually the accumulated waste rock once again rendered it almost impossible to reach pocket-rich areas. The landowners and the mining company which owned the mining concessions, tiring of all the fuss, decided to put an end to so much uncontrolled digging. And that was the end of a beautiful story: the glorious era of Berbes fluorite. Collectors and visitors still come regularly, particularly in the summer, but their chances of obtaining

fine specimens are very limited nowadays.

At the topographically highest levels of the Tere mining concession, in the area known as “Las Picas,” it was once easy to find loose quartz crystals lying on the surface or at shallow depths in the topsoil created by deep weathering of the limestone ridges. The quartz crystals, always doubly terminated, occur as loose floaters and interconnected clusters; they are not very large but are commonly transparent and lustrous. Given the ease of access and the loose topsoil, Las Picas was heavily frequented by collectors, including families with children. Consequently, the area is now almost a moonscape—full of pit holes to 3 or 4 meters deep, some with tunnels to 5 meters long extending laterally from the pit bottoms to follow quartz-bearing horizons, with evident risk of collapse. This area has been reworked so intensively over time that finding a decent specimen nowadays requires much hard work.

El Frondil

The El Frondil area is located at the northeasternmost end of the Tere mining concession, at the very end of the Vega oceanfront beach. Three tunnel portals of the Vulcano mine are still visible, along with a man-made lake. It is in this specific area where a group of workers hired by Federico Lipperheide back in the 1920s collected the first fluorspar samples from the Berbes-Caravia area, kicking off fluorite mining in the region. Coastal erosion of the fluorite-rich rocks of the cliffs facing the ocean disaggregated the fluorite and concentrated it on the sand beaches. Fluorite nodules with beautiful deep purple colors were once quite abundant, and the local inhabitants gathered them as decorative pieces for their houses; to this day, some come to the Vega beach to collect the



Figure 18. The La Cabaña collecting area looking east towards Vega Beach. Fluorite crystals line the walls of the caves and pockets here in the area known as “Los Cobayos” (or “La Paredona”) by local collectors. Raúl Sanabria photo (2006).

small purple stones rounded by the tide.

The mineral assemblage in this area is almost identical to that of La Cabaña: quartz-fluorite-barite and rarely calcite and pyrite, but with very subtle differences. The fluorite specimens found here are deep purple, but with a dull luster; their large composite crystals, formed by mosaic stepped growth, reach considerable sizes. Most of the barite has a dull, corroded appearance. The main difference between El Frondil and the adjacent La Cabaña zone is that no large, doubly terminated quartz crystals are known to have been found at El Frondil, although the classic carbonaceous inclusions inside the fluorites do still appear. The only site in El Frondil where some collector-quality fluorite specimens may have been found is probably in one of the two tunnels accessing the Vulcano mine, or perhaps in the tunnel dug in the 1980s to intersect level 76 of the Ana vein. From this site, fractures lined by pale blue fluorite crystals with good transparency and luster have been reported.

Cuetu L’Aspa

The Cuetu L’Aspa area occupies most of the Concha mining concession (n° 24667), where open pit mining began in 1962. The first area mined was close to the Ana mine shaft, on surface outcrops along the Ana vein extending towards the southwest. During the 1970s and 1980s, the mining operation was progressively extended

towards the central area to access other mineralized areas: Cuetu I, Cuetu II (Coro and Núcleo Rocosó) and Cuetu Norte.

During the overburden-removal period, crystal pockets to several cubic meters in size were encountered, and countless specimens were recovered. Lustrous, intensely colored fluorite crystals to more than 15 cm on edge were collected, almost always associated with quartz and commonly with barite. The medium-size and larger fluorite crystals always show mosaic or stepped faces, whereas many smaller, isolated, lustrous crystals are sharp cubes with corners modified by the dodecahedron; these have abundant inclusions of black carbonaceous matter which may also cover the crystal faces. The fluorite from this area ranges from colorless to deep purple. Silicification at Cuetu L’Aspa affected the host limestone differently than at La Cabaña, the individual quartz crystals in the druses lining the pockets being much bigger—around 1 cm in diameter—and milkier, producing a pleasant contrast with the purple fluorite. Another unique feature of this zone is that the fluorite and barite are often completely coated by a very thin layer of quartz microcrystals, giving some specimens an attractive sparkling, sugar-dusted appearance.

Open pit mining at Cuetu L’Aspa ceased in 1985, and reclamation work followed for another four years until the original pit area had been almost entirely backfilled with waste rock from Cuetu II. In



Figure 19. Freshly opened pocket lined with large fluorite crystals at La Cabaña. Raúl Sanabria photo (2006).

Figure 20. Large in-situ cluster of doubly terminated quartz crystals covered by iron-rich clay at La Cabaña. J.R. García photo.

the early 2000s, further backfilling with waste from subway construction in the town of Gijón put a final end to any chances of collecting minerals in this zone.

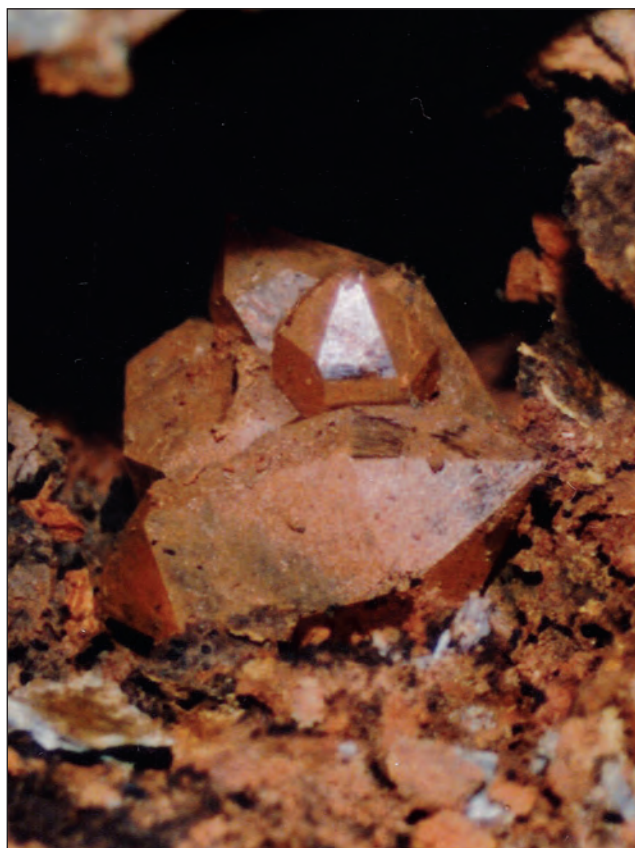
COLLECTING HISTORY

The La Cabaña area is known worldwide for its exceptional specimens of fluorite associated with ivory-white barite and for its doubly terminated quartz crystals (Curto Mila and Jordi Fabre, 1992; García García and Calvo, 1998; Calvo and Calvo, 2006; García Álvarez and Sanabria, 2007).

In times past, the inhabitants of the town of Berbes, while working their farms in the upper part of the coastal cliffs in the area known as “Las Picas” (later known as “La Cabaña”), found doubly terminated quartz crystals, some of them of good size. There are older people who still remember playing with the quartz crystals, throwing them against each other to watch them break.

Early mineral collecting began around the 1960s, when a young Lisandro Bode began mining for fluorspar ore in the area known as “El Cuetu la Cabra.” By 1965, a group of Berbes residents and some miners from the Ana mine were already collecting and selling specimens, mainly to visiting French collectors, and also to a few Spanish collectors such as Joaquim Folch Girona, Juan Montall and Julio Collado Solís, to name a few. There are records of very large, single fluorite crystals found near the richest part of the Ana vein where it crops out towards its westernmost end, before dipping just under the Berbes church building.

Some of the names of local mineral hunters from Berbes or nearby towns are worth mentioning. Among them, José María Costales Nieto (“El Grelho”), along with Manuel Díaz Pendás (“Manolón”) and Silvino Somoano, stand out as the first to search for collectible specimens in the La Cabaña area. They were followed by Abel Pérez García, Indalecio Prieto (“Lelo”) and his wife Concepción Tárano (“Concha”), Carlos Artidiello Celorio (“el del Hostal Caravia”), Ernesto Pérez, Francisco Margolles, Pedro Rodríguez (“El Nene”), José Manuel Cuesta Aller (“Cuesta”), Hermenegildo Martínez



Rosete (“Gildo”), José Ramón García Álvarez (“J. R.”), and many more. In fact, almost every person from Berbes collected *piedres* (“rocks”) to sell to visiting collectors. Thanks to all of these local collectors, it has been possible to preserve exceptional specimens that would otherwise still be buried under tons of rocks in the cliffs of Berbes. Abel Pérez, for example, would wrap the magnificent

Figure 21. Fluorite crystals and barite in situ, lining a fracture at La Cabaña. Raúl Sanabria photo (2006).



pieces he found at La Cabaña in pasture grass, then pack them tightly together with more grass in his backpack, to protect them from damage as he walked up the steep hill known as “Pica del Cuervo” toward his home in Berbes.

Besides digging for specimens to sell, some of these neighbors developed a fascination for the beauty of crystals and built mineral collections of their own. These included Indalecio Prieto (“Lelo”), José María Costales (“El Grelho”) and Carlos Artidiello. Ultimately these collections were sold to outside collectors and mineral dealers.

Many high-quality specimens, some of them still preserved in private collections and illustrated in this work, were found in the 1970s. A large pocket opened in 1970 at El Cuetu I produced a whopping number of specimens—about 4,000—most of which were distributed among the geologists of the technical staff, although some others ended up at Clausthal University in Germany (see the sidebar on *Important Pockets—Cuetu L’Aspa Zone*).

Another exceptional pocket was found at El Cuetu L’Aspa in 1974. José María Costales (“El Grelho”) managed to extract a plate measuring about 40×60 cm, with cubic fluorite crystals to 8 cm on edge isolated on bladed white barite, along with other large pieces from the same discovery. Agapito Casado Margolles, a neighbor from Berbes, recalls that the specimen was sold to a German collector who paid 100,000 pesetas (≈ 500 U.S. dollars) for it, but needed to return to Germany to come back with a bigger car to carry it home (see the sidebar on *Important Pockets—Cuetu L’Aspa Zone*).

According to Jordi Fabre, who is also a mineral collector, the pocket that produced the finest specimens ever found at Berbes was opened in 1980 by Francisco Margolles (see the sidebar on *Important Pockets—Francisco Margolles Pocket*). Three pieces from that find became Berbes icons.

One of the largest pockets, if not the largest in terms both of

size and of the number of exceptional specimens it produced, was found in October 1984 by Indalecio Prieto (“Lelo”) and his wife Concepción Tárano (“Concha”), who shared credit for the discovery with Carlos Artidiello (see the sidebar on *Important Pockets—Lelo, Concha and Carlos Pocket*).

In the same area of La Cabaña, groups of doubly terminated Herkimer-like quartz crystals were found commonly in the pockets. One of the largest known of these specimens was unearthed by “El Grelho” in 1985 (García Álvarez and Sanabria, 2007); it is a cluster of 32 lustrous, colorless and transparent, doubly terminated quartz crystals, some reaching 10 cm, with a total weight of about 6 kg. The specimen was sold on the spot to a German collector known in Berbes by the nickname of “El Capitán.”

Also around that time, and as a consequence of MINERSA’s efforts to collect some fluorspar ore left behind during mining, the pocket-rich lower mineralized zone was exposed again, and some local mineral hunters accessed it by excavating shallow tunnels with hand tools and simple mechanical equipment. In one well-documented case, a tunnel driven by Giuseppe and Michele Agozzino reached a pocket which yielded a number of very beautiful pieces with the highly desired association of isolated fluorite crystals on barite. Other opportunistic collectors, encouraged by the quality of that pocket, kept extending the tunnel around the pocket zone in several directions, collecting specimens all the while, for about six more months.

On December 19, 1987, an 80-cm pocket was found which yielded about 30 specimens of a quality unprecedented until that time. From that pocket, one specimen is among the finest and most aesthetic pieces ever collected from Berbes: it consists of pale blue, totally transparent cubic fluorite crystals on barite, accompanied by a group of large quartz crystals (see the sidebar on *Important Pockets—December 1987 Pocket*).



Figure 22. Freshly collected fluorite specimen from La Cabaña, still covered with pocket clay. Raúl Sanabria photo (2006).

José Manuel Cuesta Aller (“Cuesta”) and Hermenegildo Martínez Rosete (“Gildo”) were a very active team that continuously opened pockets and recovered specimens over several years at Berbes. Literally thousands of specimens were collected by just these two people, who sold them mostly at the Playa de Vega campground, owned by the Cuesta family. The campground was, and still is, a base camp and gathering point for the countless mineral collectors who have come in waves and hordes to search for Berbes treasures. Gildo used to keep some excellent specimens in his home, but unluckily he was killed in an accident during the heydays of Ribadesella. José Manuel Cuesta continues to operate the Playa de Vega campground, and he still collects specimens. Other mineral seekers continue to try their luck in what is left of the Los Cobayos zone.

Among the most recent big finds was the so-called “Coquera del Llisu” Pocket, discovered in 1993 after a large block of rock fell off the cliffs at the eastern end of the La Cabaña zone, and split into several pieces, revealing a large pocket inside which produced about 150 high-quality specimens (see below under *Fluorite—Coquera del Llisu Pocket*).

GEOLOGY

Regional Geology

The Caravia-Berbes district is a major fluorspar-producing area. Fluorite occurs as stratabound lenses, or *mantos*, replacing breccia-conglomerates of the Middle Permian Caravia Formation and as veins and irregular replacement bodies in the unconformably underlying limestone of the Late Carboniferous Caliza de Montaña Formation (Julivert *et al.*, 1969; García Iglesias, 1972; Jullien, 1974; Kuchelka, 1974; Huber, 1976; Díaz Gonzalez, 1978; Tejerina Lobo and Zorrilla Bringas, 1980; Martínez García, 1981; Peña Barbero, 1981; Vazquez Guzmán, 1983; Aramburu and Bastida, 1995; Luque Caval *et al.*, 2010).

Fluorite deposits can be formed by a variety of genetic processes in a range of tectonic settings. However, two styles of mineralization

are prevalent in the Berbes-Caravia region: (1) deposits hosted in sedimentary rocks, mostly carbonates, with characteristics akin to Mississippi Valley-type Zn-Pb-Ba deposits; and (2) deposits in veins associated with alkaline-peralkaline igneous activity. Early geological studies of the Caravia-Berbes deposits suggested that both syngenetic and epigenetic processes were responsible for their genesis (Tejerina and Zorrilla Bringas, 1980): geochemical evidence from the ore minerals and from fluid inclusions implied that the ores were formed when rising hot, reducing connate brines of Paleozoic age mixed with descending, oxygenated, meteoric seawater of Mesozoic age. Sánchez *et al.* (2009) speculated that the Caravia-Berbes fluorite deposits were formed between the Late Triassic and Late Jurassic periods.

The Ana, Vulcano, El Frondil and in particular the Cuetu L’Aspa areas, including the easternmost package of fluorspar mining concessions consolidated by MINERSA, are perhaps the most emblematic fluorite collecting sites of the Berbes-Caravia district. The mineralized fault hosting the Ana vein shares the same strike direction and importance in the district as the other economically mined Obdulía and Aurora veins. These three veins are the most important source of fluorspar ore in the Caravia-Berbes fluorspar district, but the Obdulía and Aurora veins are outside the scope of this article and are only mentioned here for contextual reference.

The La Cabaña-Cuetu L’Aspa fluorspar deposit extends for about 1,000 meters in strike length in a northeast-southwest direction, and is about 400 meters wide (Peña Barbero, 1981). It is constrained between the Suevo Thrust Fault to the south and the Cantabrian Sea to the north. Fluorspar mineralization apparently extends under the sea to the north. The mineralization is hosted primarily by the Caliza de Montaña Formation of Carboniferous (Namurian) age, unconformably overlain by a Triassic sequence. In the rest of the district, by contrast, the more calcareous member of the Triassic red-facies sequence hosts the bulk of the economic fluorspar mineralization.

There mineralization is strongly controlled by structural features, especially along the direction N35°W, which parallels the Ana vein

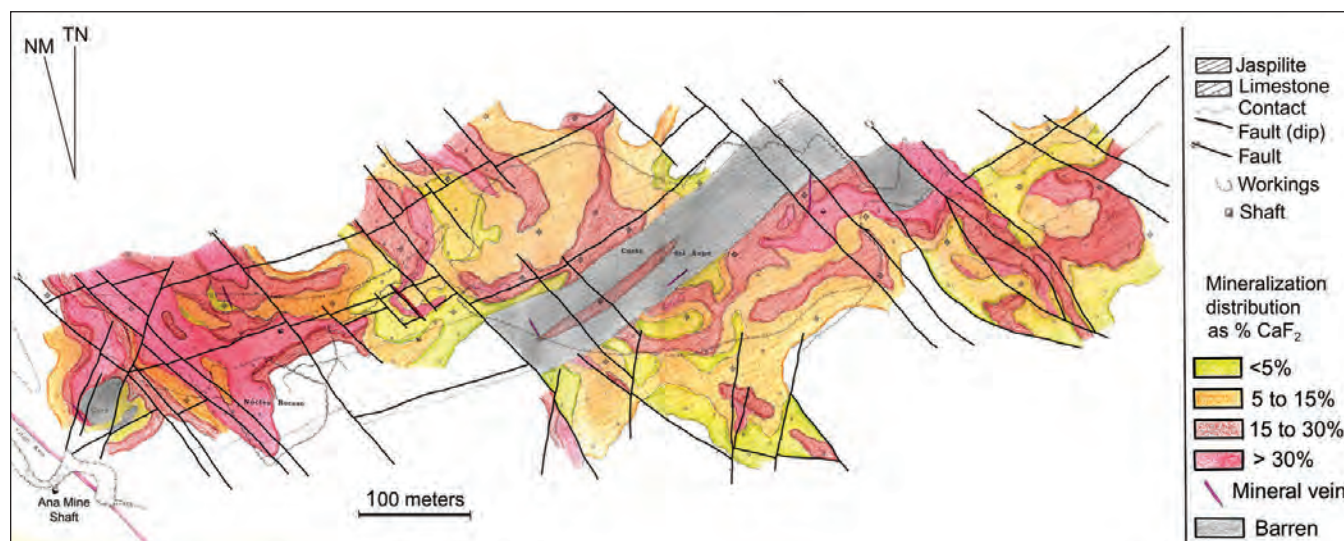


Figure 23. Fluorite ore grade distribution at the Cuetu L'Aspa mine. Unpublished map by Peña Barbero (1981).

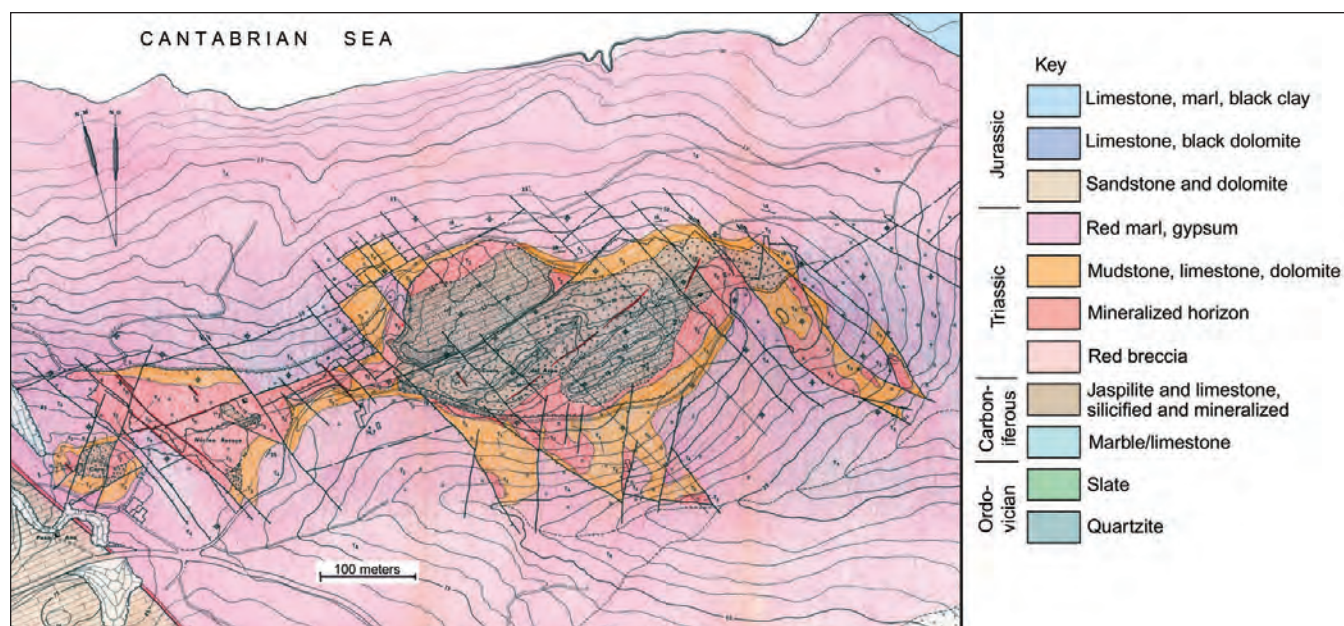


Figure 24. Geological map of the La Cabaña-Ana-Cuetu L'Aspa mines area. (Peña Barbero 1979, unpublished).

and which bounds the deposit's westernmost part. On the two sides of this boundary there are two different stratigraphic sequences which distinguish the two adjacent economically mineralized areas: (1) the El Frondil-La Cabaña area and (2) the Cuetu L'Aspa area.

Fluorspar mineralization forms partial replacements of the Caliza de Montaña limestone formation. Of the Triassic footwall unit of "red breccias," the preferred host of other economically important fluorspar deposits, there is just a small zone of Triassic sediments (marls, limey sediments, limestones and dolostones), replaced by mineralization, which crops out at the deposit's westernmost end, in the El Frondil-La Cabaña area. The mineralization processes, consisting of complex interactions between the Triassic-age calcareous units and the Paleozoic-age limestones, resulted in fluorspar-rich zones up to 40 meters in thickness.

Stratigraphic Sequence—Cuetu L'Aspa

Of the two sedimentary sequences on opposite sides of the

above-mentioned N35°W-striking fault, the sequence on the east in the Cuetu L'Aspa area is the one that contains the largest reserves of economic fluorspar mineralization. It includes the following lithologies (from Peña Barbero, 1981):

(1) **Caliza de Montaña limestone "jasperoids."** The Caliza de Montaña limestone is a dark gray, laminated to massive limestone, with locally greenish, fine-grained slate beds. It has an internal banding which varies from gray to black, probably from varying contents of organic matter. Near the middle of the formation there are intercalated siliceous lenses described in old mine reports as "jaspilites," although more accurately they should be called "jasperoids"—a term which has been applied to rocks that consist mainly of silica and have formed by replacement, in this case by replacement of limestone. Major uncertainties about such jasperoids include the source of the silica; the nature of the solutions which dissolve, transport, and precipitate the silica; and the mechanism

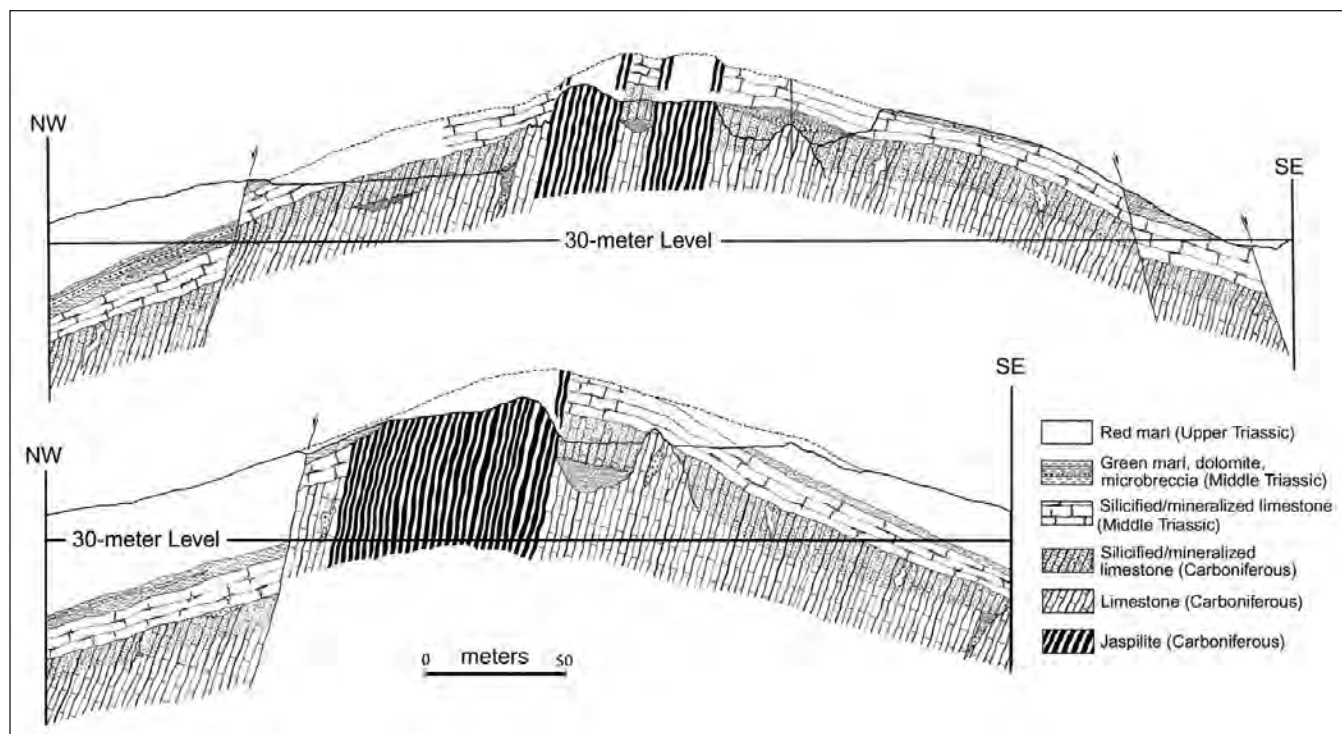


Figure 25. Geological cross-sections of the Cuetu L'Aspa area (from Peña Barbero, 1981).

by which the silica replaces the limestone. These silica-rich lenses can reach up to 50 meters in thickness, have a strike direction of N65°E, and show a pale brown to black banding which dips steeply to the northwest. This set constitutes the Paleozoic basement which served as the active horizon for the mineralization processes, including stages of dissolution, silicification and replacement by fluorite.

(2) **Lower zone.** This is the Caliza de Montaña limestone itself, outside the jasperoids, which was also affected by the processes named above, and so is partially silicified and mineralized. Relicts of subvertical bedding are visible in the limestone. The intensity of the mineralization varies, with vertical zones of it ranging from 5 to more than 22 meters in thickness.

(3) **Silicified and Mineralized Horizon.** This is the “carrier horizon” of the bulk of the fluor spar mineralization, and in a few places appears as a massive gray limestone. Normally it can be seen as an almost wholly silicified zone, mineralized with fluorite and barite. It commonly shows breccia facies and dissolution cavities filled by quartz, fluorite, barite and calcite. This horizon is roughly 10 meters thick, and locally up to 16.5 meters thick in the western sector.

(4) **Upper Marl.** A marly unit, averaging about 3 meters thick and grading laterally into dolostones or finely layered dolomite micro-breccias, constrains the fluor spar mineralization toward its top, with weaker mineralization having formed concretions of fluorite, quartz, barite and calcite. The marls are green in color, with intercalated sandstone beds and with finely disseminated pyrite. In addition to epigenetic fluorite, there is an earlier stage of fluorite mineralization seen as thin, alternating beds within remnants of the original partially silicified host rock. The cavity formation processes in this unit do not reach the extensive development seen in the main carrier horizon. Where observed, cavities reach horizontal dimensions of up to 2 meters and vertical dimensions on the order of half a meter. They are oriented roughly concordantly with stratification, and contain purple fluorite, quartz, barite and

calcite. Collapse breccias are common, indicating the importance of dissolution processes.

(5) **Red Marl.** These are variably calcareous red clays, argillites and sandstones.

Stratigraphic Sequence—West of Ana Vein

West of the Ana mine vein/fault there is a different stratigraphic sequence than that just described for Cuetu L'Aspa:

(1) **Caliza de Montaña** limestone—as described above for Cuetu L'Aspa.

(2) **Lower Calcareous Sequence.** This unit is comprised of limestone-dominant breccias, with some local zones of clastic quartzite cemented by reddish calcareous limestone. Within this unit there are also red argillites and pale, finely bedded limestones and dolostones. The micro-breccia units, and in general the whole sequence, present little lateral continuity, and clearly they overlie the limestone unconformably.

(3) **“Red Breccia.”** The “Red Breccia,” as it is known in the local mining jargon, is economically important in the mining district and in other producing or past producing mines. Because of its stratigraphic position and constituent lithofacies, it would be equivalent to the La Riera Conglomerate, a part of the Villaviciosa Basin. This is a limestone-dominant unit of sedimentary breccia which marks the beginning of the Middle Triassic Period (Muschelkalk). In this sequence it appears as a massive, variously sized, poorly sorted breccia comprised of Paleozoic-age limestone and sometimes quartzite clasts embedded in a red calcareous cement.

(4) **First (or lower) Silicified and Mineralized Horizon.** This is a pale gray or yellowish calcareous bed grading laterally to dolomitic or marl facies. The rock contains dissolution cavities lined by calcite and quartz, and in them some of the best fluorite specimens known from the deposit have been found. This can be considered the most prolific subunit for production of collector-quality fluorite and other specimens.

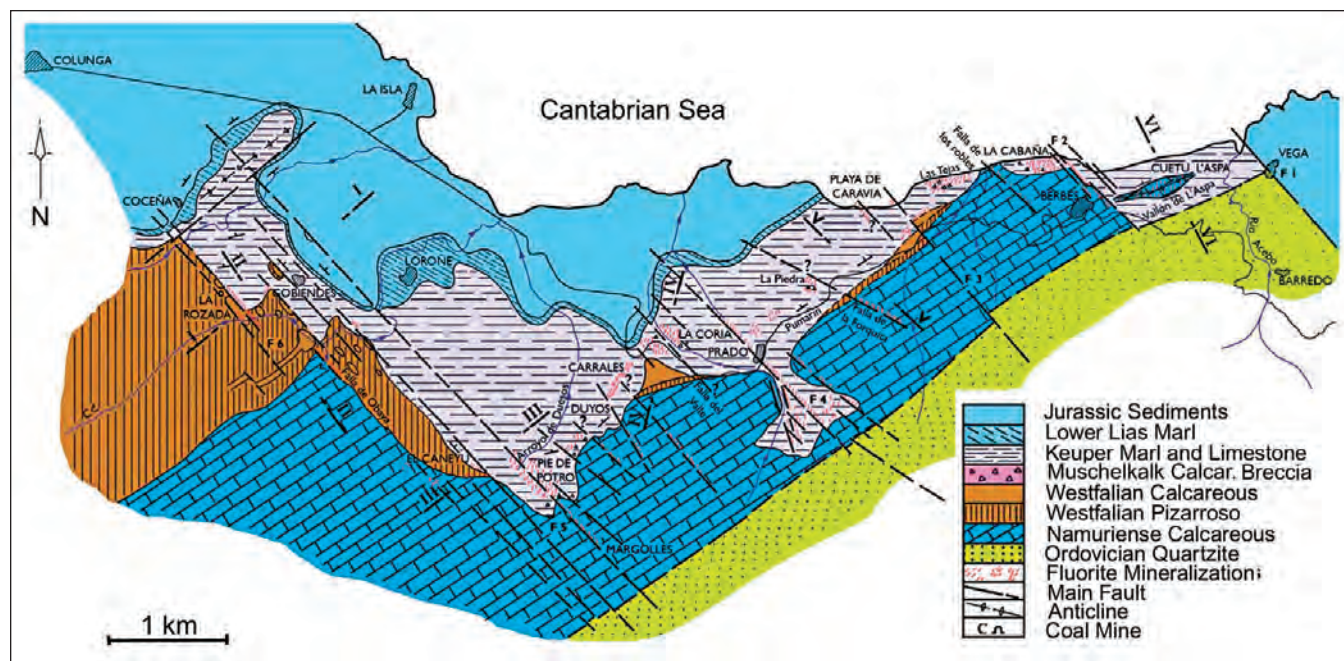


Figure 26. Geological map of the Caravia-Berbes mining district. Modified from Jullien (1974).

(5) **Upper Marl-Calcareous Sequence.** This forms a red and green pelitic section alternating with limestone and dolostone beds.

(6) **Second (or upper) Silicified and Mineralized Horizon.** This is an intensely silicified and brecciated limestone-dolostone unit. It was greatly affected by karst dissolution processes which created cavities and caves, some interconnected and of considerable size. These open spaces in the host rock are conspicuously lined with druses of very tiny quartz crystals and by well crystallized fluorite and barite. The cliffs in its eastern part are informally known as “Los Cobayos” or “La Paredona.”

(7) **Red Marl.** These are red calcareous clays and argillites with some sandstones. Doubly terminated quartz crystals are observed frequently in the immediate contact of this unit with the underlying one. In some areas, such as “Las Picas,” the abundant quartz crystals ranged in dimension from less than 1 cm to 20 cm.

Fault Systems

The fault systems of the Cueto L’Aspa area were key in the fluorspar ore-forming process. The individual faults, listed in order of importance, strike N35°W, N70°E, N20°E and N70°W. In a regional geological context, the northwest-southeast fault system is linked to a north-south compression phase that caused large strike-slip displacements, such as the Ventaniella Fault, to occur at the end of Variscan folding and the Permian extensional events. Locally, the initial compressive stage is reflected as vertical schistosity coincident with the orientation of the jasperoid lenses seen in the Cueto L’Aspa area (Kuchelka, 1974; Peña Barbero, 1981; Martínez García, 1981).

Topographically the Cueto L’Aspa site presents a series of small hills—Cueto, Núcleo Rocoso and Coro—which seem to coincide structurally with a horst: a geological block lifted upwards as a result of a compressive stress regime between two reverse faults. The longest dimension of the Cueto L’Aspa horst is about 800 meters in the east-northeast direction. The horst is bounded by the faults of the N70°E system, most evident in the northern part of the deposit. The N35°W faults are parallel to the longest dimension of the structural block, especially in the easternmost part, where the Ana vein is located. Near the eastern limit of the deposit there is another

fault of the same system, with vertical and horizontal offsets on the order of 10 to 20 meters. Likewise, these N35°W faults produce a series of trenches oblique to the main set; the most evident of the trenches lies between the Núcleo Rocoso and Coro zones.

The N35°W faults are the oldest and most widespread in the deposit area. The fault that hosted the Ana vein is part of this system; as earlier noted, a sedimentary sequence can be identified on each side of it. In the westernmost part of the fault, corresponding to the area of El Frondil-La Cabaña, there is a transgressive sequence interpreted to have begun in the early Middle Triassic, whereas in the eastern side, or Cueto L’Aspa, the same sedimentary units are stratigraphically higher. Therefore, during the Middle Triassic the western zone was sinking at the same time as sedimentation was occurring. Other, similar microbasins related to other parallel faults of this system in the Cueto L’Aspa area have been observed. They are found between the Núcleo Rocoso and the Coro hills, where the green marl and red-green clay units are missing. Frequently these N35°W fractures are mineralized and present horizontal grooves indicating the post-mineralization reactivation of the faults. The faults of the N70°E system, which formed later than those of the N35°W system, are also frequently mineralized. N70°W faults postdate the two systems just mentioned, and they are very rarely seen. The N20°E fault set is the youngest; its faults offset all of the previous faults.

In Summary

In summary, the Cueto L’Aspa deposit is related to the Variscan structures of the Sueve Thrust Complex, structures which have an east-northeast strike direction and which determine the general trend of mineralization, indeed of the fluorspar mineralizations of the whole Berbes-Caravia district. The mineralized horizon rests unconformably over the Caliza de Montaña Limestone with its subvertical jasperoid lenses. There are lithological and structural features which distinguish the Cueto L’Aspa deposit from other large economic fluorspar deposits in the district. Comparison of the stratigraphy on both sides of the Ana mine fault/vein reveals a 20-meter displacement, and there is a stratigraphic unit, the “Red Breccia,” that marks the beginning of the Triassic transgression. The implied picture is of a paleosurface emerging in early Middle Triassic time. The N35°W fault strike direction could be related

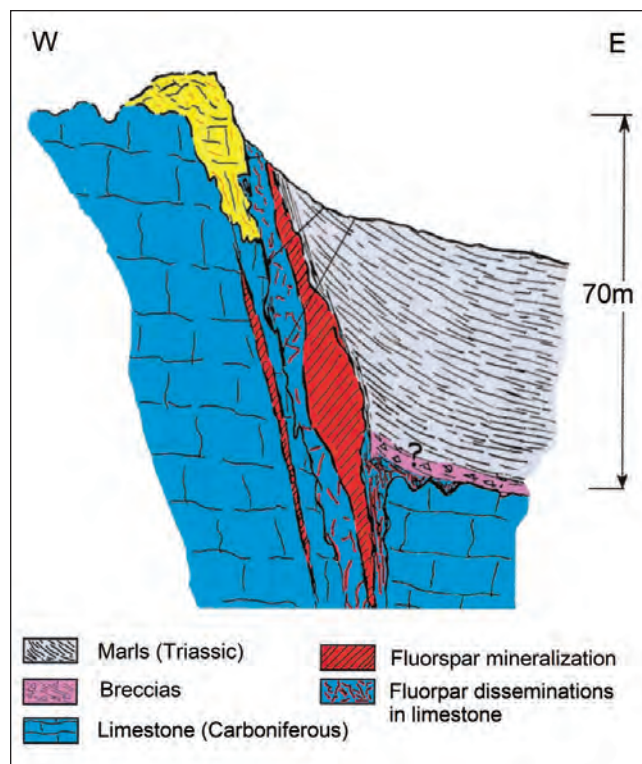


Figure 27. Idealized cross-section of the mineralization at the Ana mine deposit. Modified from Julián (1974).

to the Sueve Fault, which might have caused the fault to slip as it did, and sink the westernmost block. It is also worth noting that the mineralized levels themselves on both sides of the fault differ in some respects. Everything suggests different evolutions in the two domains until the beginning of Upper Triassic time, when conditions seem to have merged.

THE MINERALIZED ZONE

Peña Barbero (1981) described two different parts of the mineralized Cuetu L'Aspa zone: a fluorite-bearing stratabound horizon (the "carrier horizon") and a lower, silicified and mineralized part with relicts of discordant subvertical stratification. Where the carrier horizon has not been affected by silicification and fluorite mineralization processes it appears as a massive, fine-grained gray limestone, sporadically crossed by fine veinlets of quartz, fluorite, barite and calcite. Despite the calcareous nature of the horizon, quartz, together with microcrystalline or cryptocrystalline forms of silica, are common in it, as is white and purple fluorite in massive or crystalline form. The fluorite can be very dark purple to almost black, and sometimes forms euhedral crystals which line the walls of dissolution cavities and open fractures, with quartz, barite and calcite. Very rarely it is possible to find disseminated pyrite, copper sulfides and copper carbonates.

The carrier horizon ranges between 7 and 16 meters thick. The silicified limestone zone, ranging from 4 to 23 meters thick, sometimes extends above and below the economically mineralized zone, and is even found in areas where mineralization is absent. There is no direct relationship between the thickness of the carrier horizon and the vertical extent reached by the silicification and mineralization processes in the Caliza de Montaña limestone. The average chemical composition of the carrier horizon is 20.75% CaF_2 , 9.64% BaSO_4 , 56.03% SiO_2 and 10.65% CaCO_3 (Peña Barbero, 1981). In the deposit as a whole, mineralization is markedly heterogeneous, even though the fluorite-bearing carrier horizon shows an almost

constant content of about 20% CaF_2 , and a sharp decrease in CaF_2 uniformly marks the transition to the silicified zone. Furthermore, there are two sections of the transition zone itself, an upper one with fluorite grades close to 10% and a lower zone with around 3% fluorite.

Certain areas of the Cuetu L'Aspa zone, e.g. the eastern and north-western sectors, show a trend toward increasing fluorite content. The most striking feature is the area of the "Coro graben," where there is a positive correlation between fluorite mineralization and the structural $\text{N}35^\circ\text{W}$ strike direction, reaffirming the role that these fault zones have played as feeders of pathways for fluorite mineralization. The same correlation occurs with fractures of the $\text{N}70^\circ\text{W}$ system.

Where the carrier horizon shows intense silicification, mineralization of the surrounding limestone also presents a complex structure characterized by the presence of breccias, impregnations, large sub-horizontal dissolution caves, banding and vein stockworks. The mineralized areas are essentially made up of silica, fluorite, quartz, barite and calcite of epigenetic origin. Green marls with finely disseminated pyrite are found consistently in the top hanging wall zone, passing laterally to green or red argillites, dolostones and microbreccias. The lower part of this unit, lying immediately above the carrier horizon, is commonly both silicified and mineralized.

The lower contact of the mineralized horizon presents greater delineation difficulties, and can be distinguished in several different ways:

- (1) In the most common case, silicification of the limestone host rock occurred gradually and diffusely; it is difficult to delineate the contact with the carrier horizon because silicification and mineralization have masked or erased it.

- (2) In some areas the contact may be found by locating horizontal dissolution surfaces, such as stylolites and dissolution cavities, which may reach several cubic meters in volume and may contain purple fluorite and black clay.

- (3) In the absence of a silicified and mineralized area of the Caliza de Montaña limestone, the contact will be discordant, and there will be a marked topographic irregularity—a product of karst dissolution of the former surface. These features are visible in areas near the Núcleo Rocosó and in certain areas on the northern and southern ends of Cuetu L'Aspa area. Dissolution features include hills or prominences 1 to 5 meters high, which seem to cross the mineralized horizon; they may also include wells or depressions less than a meter wide, commonly filled with clays or with blocks of collapse breccias.

Cavities and caves are best developed in the vertical direction and can reach large dimensions. The caves show the $\text{N}35^\circ\text{W}$ and $\text{N}70^\circ\text{E}$ preferential orientations, coincident with the main directions of vein-type mineralization, as previously mentioned, and commonly they are filled with materials of diverse origins, such as clayey sands and very sticky dark brown clays mixed with limestone and jasperoid fragments. There can also be large breccia fragments made of corroded silicified material which came from the mineralized zone. Some caves are totally filled with massive or crystallized white fluorite, barite, and quartz. Finally, there is a type of cave in which the horizontal dimension (about 20 meters) is slightly greater than the vertical dimension (from 5 to 10 meters).

At mine or deposit scale, the absence of the carrier horizon in certain jasperoid zones at the Coro Zone and along a 320-meter-long zone in the Cuetu L'Aspa area is noted. There is also a sharp change between the complete absence of the carrier horizon in these areas and an abrupt transition to thicknesses ranging from 9 to 14 meters in the jasperoid-limestone contact area. These two features indicate the existence of a paleosurface in the limestone and jasperoid zone located between the Coro and Cuetu L'Aspa areas. In that area, the

carrier horizon preserves its average thickness, explained by the structural effects introduced by the faults associated with the N35°W system; these faults have slightly depressed certain areas—tectonic trenches—with offsets on the order of 10 meters. A similar situation occurs at the eastern boundary of the Cuetu L'Aspa area, where a fault of the N35°W system caused late-stage lateral displacement, although it acted first as a normal fault. The sinking of the entire eastern sector allowed deposition of the carrier horizon on both the limestone and the jasperoid zone.

The thickest section of the carrier horizon is seen to the south and north of a paleosurface around the jasperoid zone of the Cuetu L'Aspa area, which, as a matter of fact, is barren of any fluorspar mineralization. The thickness of the carrier horizon is therefore a sign of a Paleozoic paleosurface which was affected by extensive karst dissolution. Structural factors are superimposed on this initial setting, especially in the N35°W direction, lifting the Coro as a horst block like that of the Cuetu L'Aspa area.



Figure 28. Calcite crystals surrounding a 1-cm cubo-dodecahedral fluorite crystal from somewhere between the Cuetu I and Cuetu II areas, Berbes. Jordi Fabre specimen and photo.

Figure 29. Barite in typical chisel-shaped crystals, 9 cm, from the La Cabaña area, Berbes. #MVM specimen and photo.



On a finer scale, the mineralization shows quite irregular geometry, grading continuously from high-grade fluorspar ore to barren areas. This irregular distribution of fluorite in mineralized zones is a function of local factors, such as the existence of fractures, the massive nature of the carrier horizon, and the presence or absence of caves within the horizon.

MINERALS

Barite BaSO_4

Barite, a component of the main mineralizing process, is ubiquitous at Berbes. Where crystallized, barite mainly occurs as pearly white to ivory-colored, bladed and flattened composite crystals with poorly defined faces and rounded edges. The crystals form hemispherical to lath-shaped aggregates of parallel to divergent blades as well as rosettes to 15 cm in diameter. Barite may form very attractive isolated groups on silicified limestone, or may entirely cover the walls of a crystal pocket or even completely fill the pocket.

Barite was precipitated at different times during the deposit's evolution. It has been observed overlying different generations of early, high-temperature fluorite. Commonly the barite of La Cabaña is covered by a thin, very late layer of quartz microcrystals, producing a "dusting" effect. In the Cuetu L'Aspa zone, particularly at Coro and Núcleo Rocosó, barite is commonly covered by a layer of larger quartz crystals measuring from 5 mm to 1 cm.

There are only two very localized special cases worth mentioning. In just one part of the deposit, during the 1960s and sporadically thereafter, a brown, vitreous, stalactiform, banded variety of crystalline barite was observed; referred to as "Oakstone" (García García and Calvo, 1998), it resembles barite from Abor Low, Derbyshire, England. Also, in the Busteriza zone, in the easternmost pit of the mining camp, and only at this location, sharp, yellowish, thick-tabular barite crystals with the classic "ax" shape form parallel aggregates on purple fluorite.

Calcite CaCO_3

Calcite from Berbes does not, as a rule, occur in collector-quality specimens; it is fairly abundant only in the upper calcareous sequence. Most of the calcite crystals are simple scalenohedrons rarely exceeding 2 cm and lacking transparency and luster. The



Figure 30. Barite of typical tabular to lenticular habit, with fluorite and minor iron staining, 18.5 cm, from La Cabaña, Berbes. Crystal Classics specimen; Olga Kaspera photo.

next most common crystal habit is the (0112) twin composed of two flattened scalenohedrons. Calcite is also seen as cave formations which grew, not only in caves but also in mine workings (García García and Calvo, 1998).

Fluorite CaF_2

Morphology

Fluorite is the most iconic mineral species found at Berbes. The habit is dominated by the cube (100), commonly modified by the dodecahedron (110), with stepped, rough edges produced by differential growth of cubic faces on edges equivalent to the (110) faces of the same crystal.

Stepped and mosaic crystal faces due to interference and differential speeds in crystal growth are a conspicuous characteristic. Larger crystals occur as a result of parallel growth of several stacked individuals, resulting in composite crystals exceeding 20 cm on edge.

The latest generation of low-temperature, low-salinity fluorite

exceptionally shows combinations of crystal forms, e.g. cube+octahedron, cube+hexoctahedron, and cube+dodecahedron+octahedron. Crystals with such combinations of forms do not exceed sizes greater than 1 cm. They are colorless, rarely show any color zoning, and are more common and better developed in other mines, southwest of Berbes, which are outside the scope of this work (specifically the San Lino, Jaimina and Emilio mines).

Color

At Berbes, fluorite is typically colorless to pale blue and purple (Calvo, 2006; Calvo and Calvo, 2006). The purplish hues range from pale purplish pink to lavender, deep purple and almost black. The darkest, most intense purple color, usually seen in early-stage fluorite, is thought to be an effect of the highest temperature and salinity formation conditions in the deposit (García Iglesias and Touray, 1977; García Iglesias, 1978; Loredo Pérez, 1981; García García and Calvo, 1998). The blue to colorless fluorite formed at the lowest temperatures, and zones with these colors have commonly

Figure 31. Barite with fluorite, 12.5 cm (crystals to 2 cm) from Ricardo's Pocket. Jordi Fabre collection; Joaquim Callén photo.



grown over darker, higher-temperature cores after marked interruptions in crystal growth caused by changes in the mineralizing fluids.

Indeed, fluorite mineralization at Berbes did not occur in a single pulse but in several discrete pulses: different generations of fluorite crystallization can be recognized as functions of stages in the evolution of the deposit. It is common to see dark purple, early-stage, higher-temperature fluorite cores overgrown by later, lower-temperature stages ranging from colorless to very pale blue (homoepitactic fluorite on fluorite), resulting in very showy specimens. And commonly the colorless to pale blue fluorite crystals overlie other, earlier minerals such as barite.

The mechanisms that generate color are attributed to various physiochemical and optical properties (Nassau, 1978, 1980; Verveek, 2006). The so-called “color centers” (Bill and Calas, 1978), also known as the “Frenkel defect,” are produced by the absence of certain ions, such as F^{-1} . In this scenario, voids in the crystal lattice are produced by the empty spot left when a fluorine ion has moved to another, unstable position, and energy has been absorbed or emitted,

causing the color—this is the most widely accepted mechanism to explain the blue-violet coloration present in many fluorites. Another possibility is associated with the “Schottky defect,” where two ions of different polarity are missing: these voids in the crystal lattice can also produce the characteristic purple color so common in fluorite. A very dark blue uniform color throughout the entire fluorite crystal can be caused by colloidal calcium (McLaughlan and Evans, 1968; Hayes, 1974), but there may also be complex color centers as described above. In some very specific areas of the Cueto L’Aspa, fluorite of a rare, very dark purple, almost black color occurs; this coloration is due to the presence of trace levels of radioactive elements (J.R. García, personal communication). Fluorite from Berbes is generally not fluorescent; only a handful of fluorite specimens found at Los Cobayos fluoresce red in longwave ultraviolet light.

Color zoning is one of the most attractive features of Berbes fluorite from a collector standpoint. Subtle changes in the chemistry and/

(Text continued on page 59)

IMPORTANT POCKETS

La Cabaña Zone Fluorite

The La Cabaña zone (including the La Paredona, Los Cobayos, and Valdelmar areas) is the most prolific part of the deposit, and the zone most frequently visited by “rockhounds” and mineral collectors. The upper mineralized level at La Cabaña (known informally by the locals as “Los Cobayos” or “La Paredona”) is the place where the largest caves and pockets, lined with large, deep purple fluorite crystals, are exposed in cliffs facing the ocean.

It is a difficult area for collectors to work in because the silicified host rock is extremely hard, making extraction of the fragile fluorite crystals using conventional hand tools challenging. And there is also the risk of falling from the high cliff faces! However, some noteworthy specimens have been recovered, with large, isolated fluorite crystals to 5 cm or more on edge, some accented with isolated barite rosettes on the silicified matrix. The luster of some larger fluorite crystals is moderate to silky, but most of the crystals have been dulled by surface weathering or by very late deposits of silica on their surfaces.

Some pockets in the La Cabaña zone, when freshly opened, have yielded floater specimens of very rich purple color, in the form of flattened plates that detached from the pocket walls during crystal growth. The upper sides of these specimens consist of sharp, interlocked, larger crystals sometimes to 10 cm on edge, while the reverse sides show smaller, rehealed, interlocked crystals. When backlit to show off color zoning and other aesthetic effects, these specimens are very attractive.

Smaller pockets in the La Cabaña zone are more common, of course, and have yielded literally thousands of beautiful specimens to amateur crystal diggers; at one time it was easy to collect specimens showing sharp, lustrous, cubic fluorite crystals from 5 mm to 1 cm on edge, grouped in druses covering large plates, along with isolated barite rosettes. Less frequently it was possible to find isolated crystals set directly on drusy quartz pocket linings. The most highly prized specimens, however, were always the beautiful thumbnail, miniature and small cabinet-size pieces with later-stage fluorite crystals perched on barite rosettes. There is a myth that suggests that these highly prized specimens correspond to the specific region of Valdelmar in the La Cabaña area. Whether true or not, most of the finest, gem-quality pieces from the La Cabaña area have been documented as originating from the Valdelmar area.

Cuetu L’Aspa Zone Fluorite

The specimens found at Cuetu L’Aspa (including the Cuetu I and Coro zones) have easily recognizable characteristics by which they differ slightly from those found at La Cabaña. For one, the matrix is almost always comprised of coarser drusy quartz than that which lines the pockets of both the upper and lower mineralized levels at La Cabaña. Also, the limestone matrix at Cuetu L’Aspa is usually whiter and much more silicified than that at La Cabaña, and the pockets, which can reach several cubic meters in volume, are not always filled with the sticky brown clay so conspicuous at La Cabaña.

Barite at Cuetu L’Aspa forms rougher crystals, generally with dull luster and slightly corroded appearance. Fluorite comes in a variety of colors and crystal sizes, with some isolated examples reaching very large sizes. The larger crystals have stepped or mosaic growth surfaces and show moderate to low luster (with some exceptions), whereas the smaller crystals tend to be very

sharp cubes with well developed dodecahedron faces, glassy luster and good transparency. The fluorite colors range from deep purple to colorless, the more intense colors making for a strong contrast with the white quartz matrix.

Silicification processes are most intense in this part of the deposit, and both fluorite and barite at Cuetu L’Aspa are commonly coated by a thin layer of drusy quartz forming sugary dustings, or, in some instances, by coarser quartz crystals forming complete epimorphs and perimorphs.

Mother of All Fluorite Pockets (April 1980)

In 1980, in the midst of the heyday of specimen-collecting efforts in the La Cabaña-Valdelmar zones and during the mining period oriented to industrial production of fluorspar ore, an exceptional pocket was opened in the prolific lower mineralized part of the Valdelmar zone, on the edge of a cliff face. This pocket contained isolated clusters of barite crystals on the silicified matrix, and on top of the barite were some of the finest fluorite crystals ever found at Berbes. These crystals, exhibiting topmost luster and total transparency, are characterized by an earlier generation of lilac-colored fluorite with closely spaced phantoms preserved in their cores, followed by a sharp change to transparent, pale blue outer zones, also with strongly marked phantoms. In some of the crystals there are inclusions of clay and carbonaceous material trapped between the two generations of fluorite. Some of the later generation of fluorite is seen as isolated crystals over the pearly white barite.

Specimens from this pocket are exceptional for their aesthetics and general quality, although many fell off the cliff when the pocket was opened, and only a small number were preserved. The better specimens were kept in a house and not totally cleaned until they were offered to a mineral dealer in 2020, 40 years after being found! The best of them is pictured here—a matrix plate over 30 cm wide with fluorite crystals to 5 cm on edge.

Francisco Margolles Pocket (1980)

Francisco “Paco” Margolles, even though he doesn’t live in Berbes but in Ribadesella, was one of the most renowned crystal diggers in the golden years of mineral specimen hunting at Berbes. Among his multiple finds, there was one pocket at the Los Cobayos (La Paredona) area, opened in 1980, that produced the finest specimens ever found at Berbes—this opinion is shared by many people, including mineral dealer Jordi Fabre, who purchased the pocket.

Three pieces from that pocket became iconic. The best of them, pictured here, is a hemispherical cluster of barite crystals hosting fluorite crystals, the largest fluorite measuring 5 cm on edge and showing a deep, saturated purple color and exceptional transparency, with delicate-looking phantoms. The specimen, now in the José Ramón García collection in Oviedo, has been illustrated on the front cover of the book *La Fluorita: Un siglo de minería en Asturias*, and on the cover of the mineral magazine *Mineral Up!*

The second-best piece from the pocket, also shown here, boasts exceptional color and transparency; it is now in the Jordi Fabre collection. The third significant piece is a highly aesthetic specimen of fluorite on quartz brought to the 1980 Munich Mineral Show by Jordi and taken to the U.S. for sale by New York mineral dealers Miriam and Julius Zweibel.

The whole pocket produced no more than 50 pieces, but all of them are of extraordinary quality.

IMPORTANT POCKETS

Carlos, Concha and Lelo Pocket (October 1984)

One of the largest pockets, if not *the* largest, in terms of size and number of exceptional specimens recovered, was opened at La Cabaña in October 1984 by Indalecio Prieto (“Lelo”) and his wife Concepción Tárano (“Concha”), who shared credit for the discovery with Carlos Artidiello Celorio. A total of more than 600 specimens were collected, some of which went to public collections such as the Sorbonne mineral museum at the University of Paris and the Natural History Museum in London, while others went to some of the best private European collections. This find put Berbes on the map for world-class fluorite specimens.

The best pieces were found as floaters, crystallized all around and skillfully pulled from the pocket without any damage. The specimens from the main pocket and from a series of interconnected satellite pockets are very distinctive, with pinkish cores surrounded by sharp color zones and with veils of microscopic gaseous and fluid inclusions along octahedral planes, producing a criss-cross mesh, all enclosed by a colorless outer rim with sharp, navy-blue and dark purple phantoms. The fluorite crystals very rarely exceed 5 cm, but they are remarkable for their colors, varying from pale pink to saturated mauve to lilac, and for their bright luster. In this pocket, too, it was common to see late-stage, isolated, colorless fluorite crystals less than 1 cm on edge overlying the barite aggregates, adding extra character to the specimens.

The fluorite crystals from this pocket are always associated with clusters of bladed white barite crystals. The pocket produced several very large specimens, but numerous smaller, satellite pockets were also found, at sites along an approximate N35°W strike direction from this discovery, coincident with the main trend of the mineralization. Almost all of these smaller finds were comparable in quality to the big one, and all helped to make the year 1984 one of the most prolific for specimens at La Cabaña.

Carlos and Lelo pockets (1984–86)

Carlos Artidiello and Indalecio Prieto (“Lelo”) were very active mineral collecting partners, and during the 1980s and 1990s they were the most prominent suppliers of mineral specimens to collectors. Their most successful collecting years were between 1984 and 1988. Carlos used to have his mineral collection on display at his residence in the Caravia Hotel, very close to Berbes and to the mining/collecting sites. For years, collectors and crystal hunters stopped at the hotel to enjoy some *fabada* (hearty bean stew), drink local cider and share collecting stories.

Carlos and Lelo opened countless pockets of diverse quality before and after the “big one” of October 1984 (see above). Of those very many pockets, one found in October 1986 stands out. It was not very big, and only a handful of specimens were recovered. The fluorite crystals, to 4 cm on edge, show sharp beveled edges formed by dodecahedron faces; they are pale lavender, totally transparent, lustrous, and have ethereal-looking phantoms. Ivory-colored barite completes the color contrast.

Ricardo’s Pocket (1987)

The discovery of Ricardo’s Pocket in 1987 was a typical case of a local mineral hunter, not one of the best-known crystal diggers, finally getting lucky after years of trying and opening up a good crystal pocket. The finder was Ricardo Fernández Covián from San

Esteban de Leces, a small town near Berbes. It only produced a handful of specimens, but some are of very good quality and highly aesthetic. Ricardo, proud of his find, kept all of the specimens at his house and never wanted to sell any of them. The specimen shown here is the best of them all, and it took Jordi Fabre more than two years to convince Ricardo to sell it. During that time Jordi often visited Ricardo, his charming wife and his daughter Susana at their home, enjoying many fine meals and becoming good friends with them. At last, after endless negotiations between these two stubborn people (Ricardo and Jordi), the sale was completed in October 1992.

December 1987 Pocket

On December 19, 1987, José Ramón García (known as “J. R.”), a collector and dealer from Oviedo, was assisting a local mineral hunter when they hit the jackpot—opening a 60×75×80-cm pocket filled with a very sticky brown clay. Many of the pieces inside the pocket were loose floater specimens which they pulled out effortlessly, with just their bare hands. The pocket yielded about 30 pieces of an exceptional quality consisting of barite, fluorite, and groups of lustrous, transparent, doubly terminated quartz crystals. The fluorite crystals are colorless to pale blue and totally transparent in the smaller sizes, with glassy luster; the dominant habit is cubic, with little to no development of dodecahedron faces beveling the edges. The bigger fluorite crystals show cloudy, pale lilac-colored cores surrounded by navy-blue zones grading into pale blue in their outermost parts. The association of these fluorite crystals with clusters of doubly terminated quartz crystals makes these specimens the dream of any mineral collector. The senior author and many other connoisseurs consider the quartz cluster with water-clear pale blue fluorite and pearly white barite found there (shown here) to be the finest specimen ever recovered from this locality.

Giuseppe and Michele Agozzino Pocket (1988)

There is a curious story about the pocket that Giuseppe Agozzino and his brother Michele located in Berbes. Guided only by pure instinct, they decided to search in the area known as “Los Cobayos” at La Cabaña. After about three months of preparatory work, they began digging through the rubble to reach the hard rock of the lower mineralized horizon, where excellent pockets had been found in the past. While they were digging their exploratory tunnel, bemused locals kept questioning them. After two unfruitful months of work the tunnel had reached 25 meters in total length. Then, one day in September 1988, a pocket was finally opened at the tunnel face. It produced several very beautiful specimens with isolated fluorite crystals on barite.

Coquera del Llisu” Pocket (1993)

The so-called “Coquera del Llisu” pocket (in Asturian-dialect mining slang, the “faulted block pocket”) was among the latest and more significant finds at La Cabaña. The pocket was given that name after a period of heavy rain in March 1993, when a large block of rock fell off the cliffs at the eastern end of the La Cabaña zone, into the El Frondil zone. During its fall, the large block split into several pieces, revealing a large pocket inside which produced about 150 specimens, all of very high quality, with fluorite crystals of the distinctive purple to pale blue color that Berbes fluorite is known for.



Figure 32. Fluorite and barite, 11.8 cm, from the Coro zone at Cuetu L'Aspa (1980). Jordi Fabre collection; Joaquim Callén photo.

Figure 33. Fluorite with quartz and barite, 12.5 cm, from Cuetu L'Aspa, Berbes District. Jordi Fabre collection; Joaquim Callén photo.



Figure 34. Fluorite crystals to 1.8 cm on quartz, from Cuetu L'Aspa, Berbes District. Jose Ramón García collection; Joaquim Callén photo.





Figure 35. Fluorite on quartz, 15 cm, from Cuetu L'Aspa, Berbes District. Marcus Budil specimen; Malte Sickinger photo.



Figure 36. Fluorite crystal, 5 cm on edge, showing zoning, from the La Cabaña area. Raúl Sanabria collection and photo.

Figure 37. Fluorite on barite, 14 cm, found in March 1993 at the Llisu pocket, La Cabaña, Berbes. Raúl Sanabria collection and photo.

Figure 38. Fluorite crystals to 2 cm on matrix from the Llisu pocket at La Cabaña. Jordi Fabre collection; Joaquim Callén photo.



Figure 39. Fluorite crystals with barite, 15 cm, from the Carlos, Concha and Lelo Pocket, La Cabaña, found in 1984. The purple color is more intense than usual for Berbes. Raúl Sanabria collection and photo.



Figure 40. Fluorite crystals with barite, 23 cm, from the Carlos, Concha and Lelo Pocket, La Cabaña, found in 1984. The pinkish tint is more intense than usual for Berbes, but the purple to navy-blue zoning is typical. Raúl Sanabria collection and photo.





Figure 41. Fluorite with barite, 13 cm, from the Carlos, Concha and Lelo Pocket at La Cabaña, (found 1984). The fluorite shows mosaic surfaces and stepped growth patterns, with purple-blue color zoning accented by an orange band colored by clay inclusions. Raúl Sanabria collection and photo.



Figure 42. Fluorite with barite, 20 cm, from the Carlos, Concha and Lelo Pocket, La Cabaña, showing the characteristic pinkish core and transparent outer zone with deep blue and purple color zoning. Mineral collection of Sorbonne Université Collection; Alain Jeanne-Michaud photo.

Figure 43. Fluorite crystal cluster on barite, 10.2 cm, from the Carlos, Concha and Lelo pocket (1984), La Cabaña. Jordi Fabre collection; Joaquim Callén photo.



Figure 44. Fluorite with typical barite rosettes, 23 cm, from the Carlos, Concha and Lelo pocket (1984), La Cabaña. Raúl Sanabria collection and photo.





Figure 45. Purple, transparent, color-zoned fluorite in cubic crystals with barite on silicified limestone matrix, 10.5 cm (crystals up to 2.8 cm) from La Cabaña. Raúl Sanabria collection and photo.

Figure 46. Fluorite on barite, 5.5 cm, from La Cabaña, Berbes. Creighton Beery collection; Mark Mauthner photo.





Figure 47. Fluorite with barite, 17 cm, mined from the La Cabaña zone in November of 1993 by the José Manuel Cuesta and Hermenegildo Martínez Rosete. Jordi Fabre collection; Joaquim Callén photo.



Figure 48. Fluorite crystals with two delicate outer purple and blue color zoning phantoms, 14 cm (crystals to 4 cm), attributed to the Agozzino Pocket at La Cabaña shortly after it was found in September 1988. Raúl Sanabria collection and photo; ex Lloyd Tate collection.



Figure 49 (above). Fluorite crystal cluster on barite, 13 cm, from the October 1986 pocket at La Cabaña. The specimen is a complete floater. Raúl Sanabria collection and photo.



Figure 50 (above right). Fluorite on barite, 7 cm, from the La Cabaña zone, Berbes. L. R. Terente collection; Jeff Scovil photo.



Figure 51 (right). Transparent, pale pinkish purple fluorite on barite, 15 cm, from the La Cabaña area. Raúl Sanabria collection and photo.



Figure 52. Fluorite on barite. 11 cm, from an early find in the La Cabaña zone (1979). Crystals of this type and quality were limited to just a few pockets in the lower zone, mostly dating from the late 1970s to early 1980s. Thereafter that area was buried in rubble from workings in the upper part of the zone. Mim Mineralogical Museum, Beirut (no. 1742), ex Crystal Classics, ex collection of Peter Bancroft (1916-2015); Augustín de Valence photo.



Figure 53. Fluorite on barite, 7 cm, from La Cabaña, Berbes. Raúl Sanabria collection and photo; ex José Ramón García collection.

Figure 54. Fluorite crystal cluster, 20 cm (crystals to 5 cm), from the “La Paredona” collecting area, La Cabaña. The transparency and color zoning are revealed by backlighting. Raúl Sanabria collection and photo.





Figure 55. Fluorite on barite, 5.3 cm (crystals to 1.8 cm), from the pocket found by Giuseppe and Michele Agozzino in September 1988 at the “Los Cobayos” collecting area in the La Cabaña zone. Jordi Fabre collection; Joaquim Callén photo.



Figure 56. Fluorite on barite, 6.5 cm, from the La Cabaña zone. Anton Watzl Minerals specimen; Albert Russ photo.



Figure 57. Fluorite on barite, 5.8 cm, from the La Cabaña zone. Martin Zinn collection (2009), ex Charles Lawrence collection; Jeff Scovil photo.

Figure 59. Fluorite (pink) crystal, 3.8 cm, from the La Cabaña zone, Berbes. Scott Rudolph collection; Jeff Scovil photo.



Figure 58. Fluorite crystal, 1.3 cm, on barite from the La Cabaña zone, Berbes, collected in 1983. Mario Miglioli collection and photo.

Figure 60 (right). Fluorite on a quartz crystal, 8.2 cm, from the Paco Margolles collection, found in 1979–1986 in the La Cabaña zone. Jordi Fabre collection; Joaquim Callén photo.



Figure 61 (bottom right). A group of large, sharp fluorite crystals to 5 cm on edge forming an isolated cluster on a slab of silicified limestone, 23 cm, found at the La Paredona (Los Cobayos) collecting area in the La Cabaña zone in April 2005. Raúl Sanabria collection and photo.

Figure 62 (below). Fluorite on barite, 3 cm, from the La Cabaña zone, Berbes. Dan Weinrich specimen and photo.





Figure 63. Fluorite and barite, 6 cm, from the Carlos, Concha and Lelo Pocket, La Cabaña zone, Berbes. #MVM collection; Joaquim Callén photo.



Figure 64. Fluorite on barite, 9 cm, from the La Cabaña zone, Berbes. Anton Watzl Minerals specimen; Albert Russ photo.



Figure 65. Fluorite crystals on barite, 8 cm, from the La Cabaña zone, Berbes. Fabian Wildfang collection and photo.



Figure 66. Fluorite crystal cluster on barite, 6.5 cm, from the La Cabaña zone, Berbes. Dan Weinrich specimen and photo.



Figure 67. Fluorite crystal cluster, 8 cm (crystals to 5 cm), from an unnamed pocket in the La Cabaña zone. José Ramón García collection; Raúl Sanabria photo.

Figure 68. Fluorite, 10.2 cm, from the La Cabaña zone, Berbes. Stuart Wilensky specimen and photo.





Figure 69. Fluorite on barite, 4 cm, from the La Cabaña zone, Berbes. Marcus Budil specimen; Malte Sickinger photo.

or temperature of the mineralizing fluids are reflected as variations in color or morphology as the crystals grow discontinuously. The crystals also may trap clays or hydrocarbons at standstill moments during discontinuous growth. Nearly every fluorite specimen from Berbes shows parallel, concentric phantoms to mark color zoning. In even the darkest crystals the phantoms are of a uniform, very dark purple color.

Color zoning can also be produced by accumulation of fluid or gas inclusions, creating a cloudy effect. The gaseous and fluid inclusions form veils which are not parallel to (100) or (110) crystal forms but are distributed randomly within the crystals.

In the large number of specimens recovered from the large pocket found in 1984 by Indalecio Prieto ("Lelo") and his wife Concepción Tárano ("Concha"), the cores of the fluorite crystals show a

unique pinkish color, and there is an inner zoning formed by veils of microscopic fluid inclusions which follow dodecahedron (110) planes, producing a criss-cross mesh; then there is a colorless, 2 to 3-mm outer rim with sharp navy-blue to dark purple phantoms. Clayey material was deposited in the gap between these two zones when crystal growth temporarily stopped.

In many of the fluorite crystals recovered in the Valdelmar zone, the distinct cloudy pink core of the fluorite from the famous 1984 pocket (described above) can also be seen in the inner cores, but in these Valdelmar crystals the zone is overgrown by a later generation of pale blue to colorless, totally transparent fluorite with deep purple and navy-blue phantoms, betraying a series of intermittent pulses of mineralizing fluids.

(Text continued on page 68)



Figure 70. The finest fluorite crystal on barite, 6 cm, from the December 1987 pocket in the Valdelmar zone of the La Cabaña zone. José Ramón García collection, Joaquim Callén photo.

Figure 71. This 9-cm specimen of fluorite and barite with crystals to 5 cm is one of the best pieces recovered from the Paco Margolles Pocket in 1980 at the Los Cobayos (La Paredona) area of the La Cabaña zone. It was pictured on the front cover of *Mineral Up!* magazine in 2007, and on the cover of the book *Fluorite, a Century of Mining in Asturias* (2009). José Ramón García collection; Raúl Sanabria photo.





Figure 72. Fluorite with barite and quartz, 32.5 cm (crystals to 5 cm), from the La Cabaña zone. It was nicknamed “the mother of all fluorites,” and ranks amongst the finest ever recovered from Berbes in this size. It was discovered in April 1980. Raúl Sanabria collection and photo.



Figure 73. Fluorite “floater” crystal cluster, 12.5 cm (crystals to 8 cm), an old-timer from the Valdelmar area in the La Cabaña zone, Berbes. The cubic crystals have an outer transparent zone over an inner cloudy white zone, and edges beveled by the dodecahedron form. Raúl Sanabria collection and photo.



Figure 74. Fluorite on barite, 12 cm (crystals to 3 cm), the second best specimen recovered from the Paco Margolles pocket of 1980 at the Los Cobayos (La Paredona) area at La Cabaña zone. Jordi Fabre collection, Joaquim Callén photo.

Figure 75. Fluorite crystal cluster, 24 cm, showing a unique habit for Berbes, initially labeled as coming from the Ana mine to prevent competition by other mineral hunters, but actually from La Cabaña. Very large, deep turquoise-blue crystals are covered by a second generation of parquet-habit stepped/mosaic growth. The composite crystals measure up to 12 cm on edge. Raúl Sanabria collection and photo.



Figure 76. Blue fluorite crystals with a lilac core and delicate blue and purple color zoning, with barite, 14 cm (4.5-cm crystals), from the Valdelmar zone of La Cabaña. A late generation of smaller colorless fluorite crystals rest on the barite. at the front part of the specimen. Raúl Sanabria collection and photo.



Figure 77. Fluorite crystal cluster, 16 cm (crystals to 5 cm), of a dark but transparent purple color on a sea-blue crystal base, collected from the Valdelmar area of the La Cabaña zone in 1980. Raúl Sanabria collection and photo.





Figure 78. Fluorite with barite, 11 cm (crystals to 3 cm), an old-timer recovered at the Valdelmar area of the La Cabaña zone. The complex color zoning begins with a pastel lilac core (like crystals from the October 1984 Concha and Lelo Pocket) overgrown by a transparent to pale blue zone with tightly parallel purple and navy-blue color zoning, followed by a layer of colorless fluorite with fine purple and blue zoning. Raúl Sanabria collection and photo.

Figure 79. Fluorite crystals to 6 cm on edge from the Valdelmar area at La Cabaña, showing complex zoning typical of specimens from that zone. Raúl Sanabria collection and photo.



Figure 80. Fluorite crystal group, 12 cm (crystals to 6 cm), from the Valdelmar zone, 1987 pocket, Berbes. José Ramón García collection; Joaquim Callén photo.



Figure 81. Fluorite on barite, 6.5 cm, from the La Cabaña zone, Berbes. Mim Mineralogical Museum collection (no. 1862), Beirut; Augustín de Valence photo.



Figure 82. Fluorite on barite, 12 cm (crystals to 4 cm), collected in the late 1970s from the Valdelmar area by Pedro Rodríguez ("El Nene"). It shows that beautiful specimens were abundant during the early days of fluorspar mining at Berbes. #MVM collection; Joaquim Callén photo.

Figure 83. Fluorite crystal group, 12 cm (crystals to 6 cm), collected ca. 1980 by Agapito Margollés in the Valdelmar area of the La Cabaña zone, where the best blue colors and highest crystal quality were produced. Raúl Sanabria collection and photo.





Figure 84. Fluorite on barite, 4.3 cm, from the Valdelmar area of the La Cabaña zone at Berbes. Will Johnson collection, ex Eric Asselborn collection; Tom Spann photo.



Figure 85. Fluorite with yellowish barite, 12.4 cm, found only at the La Busteriza zone near Berbes in the late 1980s. Jordi Fabre collection; Joaquim Callén photo.

Figure 86. Quartz crystal (“Herkimer” habit), 6 cm, on amethyst with barite, 13 cm, from the La Cabaña zone, Berbes, mined ca. 1980. Raúl Sanabria collection and photo.



Quartz SiO_2

The La Cabaña area is known for some exceptional doubly terminated quartz crystals, referred to as “Herkimers” by the local collectors (in allusion to the famous “Herkimer diamond” quartz crystals from the Middleville area of New York). At Berbes, these crystals are found only in certain specific regions of the La Cabaña area, in solution cavities in the host Caliza de Montaña Limestone; they have not been found in any other parts of the deposit, such as El Frondil or Cuetu L’Aspa.

Crystal sizes vary from less than a millimeter to individuals up to 20 cm long (García Iglesias, 1975; García García and Calvo, 1998; García Álvarez and Sanabria, 2007), but the average size is between 1 and 3 cm. The crystals are of simple habit, with short prism (1010) faces and well-developed rhombohedron (1011) and (0111) faces. Crystals showing asymmetric development of the rhombohedron or prism faces are common, but scepters and reverse scepters are

Figure 87. Quartz with fluorite, 8.8 cm, probably from the La Cabaña zone at Berbes. Steve Smale collection; Jeff Scovil photo.



Figure 89. Quartz with fluorite, 8 cm, from Los Cobayos, mined by Hermenegildo (Gildo) in 1996. Jordi Fabre collection; Joaquim Callén photo.



Figure 88. Quartz on fluorite with barite, 14.8 cm, found at the Valdelmar area by Carlos Artidiello in 1987. Jordi Fabre collection; Joaquim Callén photo.



Figure 90. Quartz crystal cluster “floater” (crystals to 10 cm) with color-zoned fluorite crystals to 2 cm, from the La Cabaña zone, probably mined in the early 1980s. Raúl Sanabria collection and photo.

Figure 91. Quartz crystal (“Herkimer” habit) with some iron staining, 6.7 cm, from Berbes. Rudolf Watzl (Saphira Minerals) specimen and photo.



Figure 92. Quartz crystal cluster, 10.2 cm, from La Cabaña. Jordi Fabre Collection; Joaquim Callén photo.



Figure 93. Fluorite with quartz (two views), 10 cm, the finest quartz cluster with fluorite and barite from the December 1987 pocket dug by José Ramón García at the Valdelmar zone. José Ramón García Collection; Raúl Sanabria photo.

rare. Clusters with crystals radiating in every direction are common; most of these are floaters, with no point of attachment to matrix. It is very unusual to find a matrix quartz specimen at La Cabaña.

Quartz crystals are typically found in zones where the host rock contains high amounts of organic matter or hydrocarbons (García Iglesias and Touray, 1977, 1978; Loredó Pérez, 1981; Gutiérrez

et al., 2009). Commonly these impurities are trapped as solid, gas and fluid inclusions in the crystals during crystal growth. The two-phase gas or hydrocarbon fluid inclusions are normally visible to the naked eye, and in some cases the bubble can move several centimeters inside some of the larger crystals. The inclusions show intense yellow-green fluorescence.



Figure 94. Quartz crystal “floater” cluster, 13.5 cm, found at Los Cobayos in 1994. Raúl Sanabria collection and photo, ex Carlos Pareja and Jordi Povill collections.

Figure 95. Malachite curls with azurite in quartz, 1.5-mm view, from Berbes (probably the Cuetu L’Aspa area). Harald Biecker collection and photo.

Other accessory minerals

Azurite and malachite can be found in some areas of the Cuetu L’Aspa area as impregnations, crusts and more rarely as millimeter-size crystals. They form as a result of surface weathering of small amounts of disseminated copper sulfides and sulfosalts present in very localized areas of the mine (García, 1992; García García and Calvo, 1998). Tetrahedrite, stibiconite, cinnabar, pyrite and marcasite occur as accessory minerals rarely exceeding microscopic size (García García and Calvo, 1998; Gutiérrez Claverol *et al.*, 2009).

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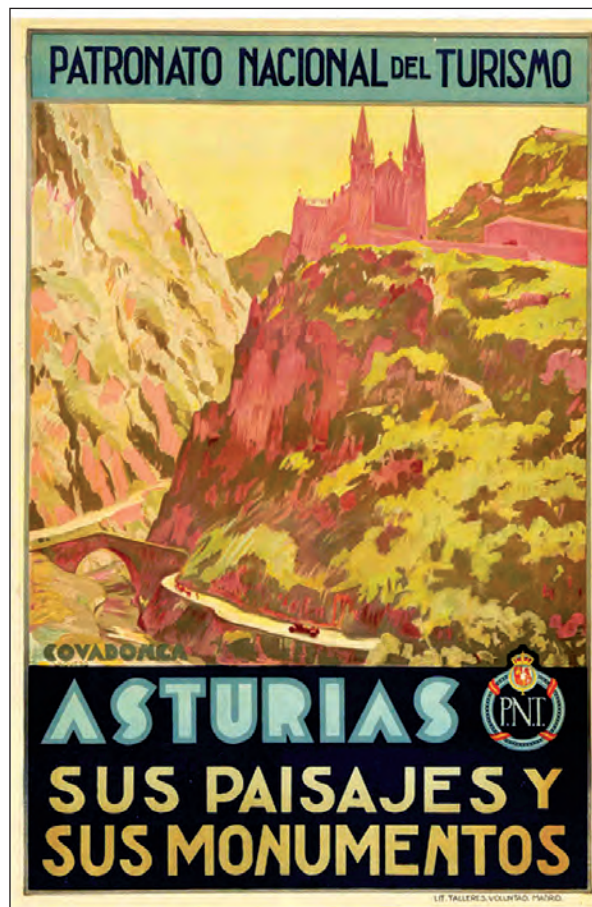
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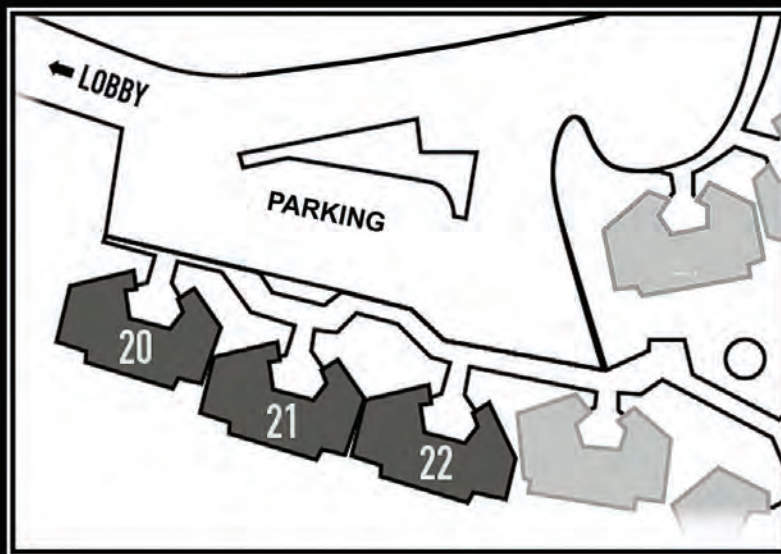
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[September 9 – September 18]

Some of us mineral people who now live in Tucson but have spent earlier years and decades in cooler climes find September in this town annoying—the month persists in a summery slog, with daytime temperatures in the mid to high nineties, and hopelessly hot, clear, boringly chrysocolla-blue skies. Where, at long last, is *autumn*?

Ah but then, being mineral people, we know that early September brings the country's number-two mineral show—indeed, by now, a Tucson-like complex of shows—to Denver, and *that* is where we can go to find something at least approximating fine autumn weather. So it was that in early September 2023, Chris Stefano and I drove for 14 straight hours through southeastern Arizona and up through all of New Mexico and a good bit of Colorado to check in finally at our Denver hotel, from which, in the mornings during the show, we undertook vigorous autumnal walks (with pauses for breakfast) all the way to the 14th Street frontage of the Colorado Convention Center in the heart of downtown. There, as in the two years before, Christoph Keilmann's "Hardrock Summit" mineral show occupied a lower floor, while the Denver Gem & Mineral Show (with emphasis on Colorado displays and dealers) occupied much of the floor above it. This year, no separate hall had been set aside downstairs for gemstone and jewelry dealers à la last year's "Sparkle and Joy"; instead, the gem people occupied a third or so of the space of a single big hall while the mineral people of Hardrock held the other two-thirds (no unpleasant border incidents were noted to have occurred).

In the lobby just outside the hall, Chris Stefano sold books, subscriptions and back issues at the Mineralogical Record table, while I found it convenient to bring exemplary what's-new specimens out from the hall, and down from the "Denver" show upstairs, to be photographed by Christi Cramer, who, with Tom Gressman, came up every day from their new home in Colorado Springs to lend important kinds of assistance. I hope such logistic convenience will also characterize our arrangements next year, when the Hardrock show will have moved to the Westin Hotel in Westminster, "a stunning location," the website says, "just a few minutes north of Denver." Whether the Denver Gem & Mineral Show will also relocate has not yet been decided.

Out by the airport was this year's edition of the Rocky Mountain Gem & Mineral Society's Colorado Mineral and Fossil Show at the Crowne Plaza hotel (15500 East 40th Avenue), where 145 dealers in minerals, fossils, gems, lapidary items, New Age-y whatnots, etc., were set up in one huge chamber as well as in several smaller "ballrooms" and in a row of regular hotel rooms behind the restaurant/bar area. In this labyrinthine prospect I found a good number of what's-new mineral scoops, while, all about me, everything percolated with good-natured, true-believing enjoyment and fun, providing a bit of a break from the more high-end feel of the Hardrock experience downtown.

Within an easy walk of the Crowne Plaza show was the Just Minerals & Crystals Show at the Denver Airport Marriott hotel at Gateway Park—this, with its 17 dealers, being a somewhat expanded version of the Just Minerals Show held at the Elks Club in Tucson each February. By all accounts, Just Minerals & Crystals, managed by Leonard Himes and Isaias Casanova, was very well attended and busy throughout its three days of operation, but I must report with regret that I missed it, as it ended on September 11, when Chris and I were just setting out on the long road trip from Tucson. Several important dealers from Just Minerals & Crystals set up later as well at Hardrock, so I got to see their wares after all, but still it would have been nice to get to *all four* of the fine shows just described here. (Hey, Isaias and Leonard, how about holding your show on the *following* weekend so that visitors who want to make it to all of the major shows, plus perhaps to the circussy earth-science scene at the Coliseum, won't have to spend a full week and a half hanging out in the Denver area, autumnally bracing though it may be? Just saying . . .)

What's New in Minerals

Beginning, as is my Denver Show custom, in Colorado, I can



Figure 1. Phenakite crystals, 3 cm, from Lake George, Colorado. *Crystal Roots* specimen; Christi Cramer photo.

Figure 2. Phenakite crystal, 1.5 cm, from Lake George, Colorado. *Crystal Roots* specimen; Mark Jacobson photo.



report an exciting new find of **phenakite** specimens at a site, so far undisclosed in detail, near Lake George, a town in Park County about 55 miles south-southwest of Denver—the labels simply say “Lake George.” The find was made on May 1, 2023, by Zach Bernhardt and Josh Gilliam, the latter of *Crystal Roots* (721 Main Street, Fairplay, CO). These eager field collectors took out about 60 loose, thumbnail-size phenakite crystals and a few small-miniature-size crystal groups, the phenakite crystals appearing just a little bit different from the classic ones, known for decades, from Mount Antero, 50 miles or so to the west (both localities lie within the Lake George Intrusive Complex of alkali pegmatites in the granitic Pikes Peak Batholith of the central part of the state). The short-prismatic phenakite crystals, the largest of which approach 3 cm long, are transparent to milky white with slight tinges of orange. Most examples are loose, doubly terminated single crystals, although a minority are drill-bit twinned in familiar phenakite fashion. Intriguingly, a small number of the crystals show blue microcrystal inclusions of the very rare beryllium-scandium silicate species bazzite, as do a very few Mount Antero phenakites too, though none (or none that I’ve ever seen) show the bazzite so distinctly as do these new “Lake George” examples. At the Crowne Plaza show, Zach and Josh had a couple of flats of the new phenakites, mostly loose, single crystals, these priced from \$200 to \$4,000; however, a couple of the best miniatures could set you back as much as \$9,000. It’s pleasant to report here that another significant occurrence of Colorado phenakite has come to light.

Also at the Crowne Plaza show, Everett Harrington of *Minerals Plus* (jesus-everett@hotmail.com) offered about 20 miniature to small-cabinet-size specimens of something new from the well-known Sweetwater mine, Ellington, Reynolds County, Missouri: **epimorphs of chalcopyrite and pyrite after anhydrite crystals**. These were found just seven weeks before the show. Brilliant pyrite-gold, faintly iridescent spherules and curving tubular aggregates composed of densely packed chalcopyrite and/or pyrite microcrystals enclose long, flat, hollow spaces once occupied by bladed crystals of what was probably anhydrite. The most interesting of the specimens show the internal voids distinctly whereas other

specimens, sea anemone-like, are rough spheres with little sulfide tentacles rising from them all over, the light weight of these pieces betraying the hollowness at their centers. The best of the specimens go for low to medium three-figure prices—good bargains for such attractive novelties from the old lead-zinc mine (opened in 1968, shut down briefly in the mid-1980s, and now again producing ore, plus surprises like this for mineral collectors).

Figure 3. Chalcopyrite and Pyrite epimorph after anhydrite, 8.5 cm, from the Sweetwater mine, Ellington, Reynolds County, Missouri. *Minerals Plus* specimen; Tom Moore photo.



Figure 4. Rutile, 6.5 cm, from Graves Mountain, Georgia. *Leonard Himes Fine Minerals* specimen; Tom Moore photo.



From the 2023 Tucson Show, I passed on word from Jonathan Feigin of *Minerals of the World* by Jonathan (jonjet25@yahoo.com) concerning some new collecting in progress at an old New England pegmatite locality, the Hayes Ledge Prospect, Greenwood, Oxford County, Maine. Jonathan demonstrated in Tucson that specimens showing quite small but also quite sharp, translucent blue-green hexagonal-tabular crystals of **fluorapatite** were emerging, and at the Crowne Plaza show in Denver he had a few miniature-size matrix pieces on which not-quite-so-small—to 1 cm—fluorapatite

crystals repose on concentrations of silvery muscovite in the pegmatite. These specimens, taken out in summer 2023, are still not fluorapatite “killers” but are extremely promising for future work; the best of them are priced around \$300.

In their booth at the Hardrock show, Leonard and Linda Himes (LhimesFineMinerals.com) had an impressive stash of 15 **rutile** specimens, all of them mined in the 1990s at Graves Mountain, Lincoln County, Georgia—known since the 19th century as one of the best, indeed in some estimations *the* best, rutile locality in the world. Most of the Himes’ fine Graves Mountain rutiles are loose, equant crystals, sharply formed and as lustrous as you could wish, with almost no dings or chatter. These loners are of thumbnail to miniature size but then there are specimens showing one to five rutile crystals, to 4 cm individually, lightly embedded in pieces of hard black matrix to small-cabinet size. The prices of these excellent, dignified-looking specimens range from \$350 to \$2,900.

The Milpillas mine, Cuitaca, Sonora, Mexico continues to dazzle us with fine, surprising new offerings of secondary copper species *besides* azurite. Evan Jones of *Unique Minerals* says that the sparkling blue specimens of **shattuckite covered by drusy quartz** which he and his partner Marc Miterman brought to the Hardrock show were found on the mine’s 992 level at intervals during 2018 and 2019; a few hundred specimens of the material came out in all, of which Evan and Marc had about 25 of the best in Denver. The specimens are matrix plates on which microcrystals of blue shattuckite pile up to form fairly thick coatings (some surfaces of the coatings are botryoidal), and there are green malachite and diopside accents around the edges. The aforementioned sparkle, which is quite lively, comes from uniform coatings of quartz microcrystals over the surfaces of the shattuckite. As laid out on a glass shelf in a standing case in the *Unique Minerals* booth at Hardrock, these specimens were major eye-catchers which ranged in price from \$300 for a miniature to \$10,000 for a dramatic plate about 20 cm across.

All regular showgoers knew Elmer Ramos Cabrera, the affable, good-natured Peruvian dealer who offered wholesale lots and



Figure 5. Shattuckite covered by drusy quartz, 15.8 cm, from the Milpillas mine, Cuitaca, Sonora, Mexico. *Unique Minerals* specimen; Christi Cramer photo.



Figure 6. Tetrahedrite with galena and fluorite, 11.1 cm, from the Huanzala mine, Huallanca District, Bolognesi Province, Ancash Department, Peru. *Diego Minerals* specimen; Christi Cramer photo.

countless individual fine specimens from his native country at the Tucson, Munich, Denver and other shows for many years. In April 2021 Elmer died at age 54 of Covid (see his obituary in the November–December 2021 *Mineralogical Record*), and thereafter his company was not heard from for a while . . . but in Denver

in 2023, his brother Urbano Ramos Cabrera appeared in the role of manager of a brand-new dealership called *Diego Minerals, S.R.L.* (diegominerals.peruvian@gmail.com). In his alcove at the Hardrock show, with a young Peruvian lady assisting him with English translations, Urbano had two standing cases laden with

Figure 7. Fluorite, 20 cm, from Fazenda do Centro near Castelo, Espírito Santo, Brazil. *Brazarte* specimen; Tom Moore photo. For more information on the blue fluorites of Espírito Santo, see the article in the previous issue, pages 730-733.

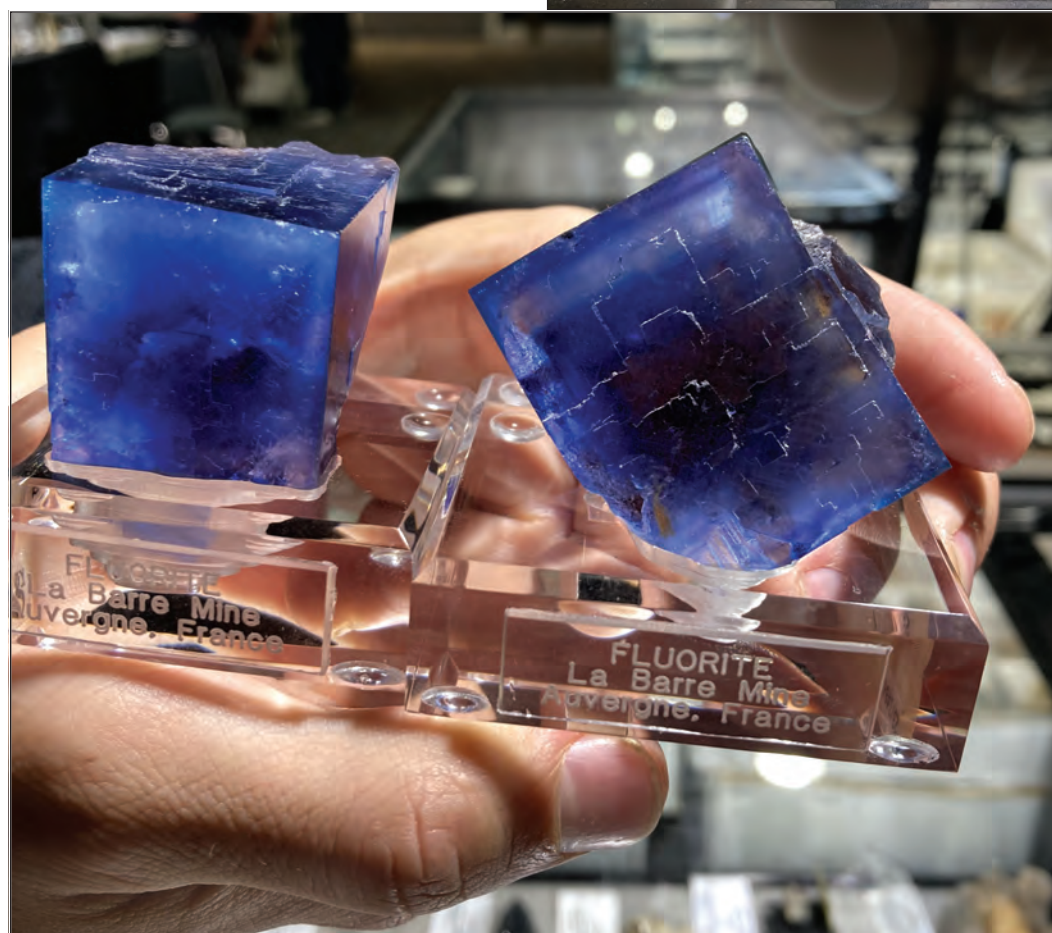


Figure 8. Fluorite, 3.2 and 4 cm, from the La Barre mine, St.-Jacques d'Ambur, Puy-de-Dôme, France. *Jonathan Feigin* specimens; Tom Moore photo.

hundreds of fine specimens of, well let's see, golden barite from Warihuyn; octahedral green fluorite on sulfides from the Milpo mine; epidote from the Coayllo mine; rhodochrosite from Pasto Bueno; enormous showboat pyrite clusters from the Huanzala mine; and other beautiful if more or less familiar things. But there was also something *new*: about 20 large-miniature to large-cabinet-size plates of white calcite mixed with massive black tetrahedrite, all completely covered by interlocked crystals of tetrahedrite, galena and fluorite. The galena appears as sharp, skeletal crystals to 2 cm and the fluorite as colorless, transparent, stepped octahedrons to 2 cm, but the star of the show is the **tetrahedrite**, which forms razor-sharp, lightly striated, brilliant metallic black tetrahedral crystals to *more than* 2 cm. Urbano said that these specimens were collected in April 2023 in the Huanzala mine, Huallanca District, Huanuco Department, Peru—the world's most prolific producer of well crystallized pyrite—and I would say that the great flashing plates of tetrahedrite *et al.* were among the biggest hits of this Denver show. After such a debut for *Diego Minerals*, we certainly wish Urbano total success in the future, and will be on the lookout for him at the Munich and Tucson shows.

Of the several offerings of nice new **fluorite** specimens around the show, the first such lot that I happened to see was at the Crowne Plaza show in the keeping of Rivany DaSilva's *Brazarte* dealership (rivaminerals@gmail.com). This is a *pegmatitic* fluorite occurrence, with hunks of chowdery-looking pegmatite measuring from 6 cm to more than 35 cm, hosting somewhat rough cubic crystals of greenish blue fluorite to a remarkable 20 cm on edge, together with sizable crystals and cleavage sections of very pale green "amazonite" microcline. The locality, called Fazenda do Centro, near the town of Castelo in Espírito Santo state, Brazil, either gave up these specimens only once, about two years ago, or yielded them at intervals during the past two years—no one at *Brazarte* seemed entirely sure. The uncommon color of the translucent, somewhat distorted and wavy-faced fluorite crystals—green-blue but leaning to blue—plus their occurrence in a pegmatite facies, make the specimens easily odd enough to be interesting, although the more elephantine ones are more impressive for size than for beauty. *Brazarte* priced these specimens from the low to mid four figures.

Seven years ago at the Tucson Show (see that report in the May–June 2016 issue of this magazine) we were quite delighted to see beautifully crystallized **gold** in generous numbers of specimens from a new locality in Mato Grosso state, Brazil. The specimens, mostly thumbnails although a few approach 5 cm, were offered by several dealers, Alvaro Lucio having had the most. Reportedly the gold specimens had been recovered from surficial rubble piles formed of decomposed granitic rock which had once contained gold-bearing quartz veins; several individual claims have been named (see Mindat), but the best general locality designation is Serra do Caldeirão, Pontes e Lacerda, Alta Floresta region, Mato Grosso, Brazil. Since 2016, these Brazilian gold specimens have grown very much rarer on the market, but at the 2023 Hardrock show in Denver, Italian dealer Marco Tironi (marcotironi.com) set out 18 superb examples which, he specified, are all at least two years—some much longer—out of the ground. The lustrous groups of mildly distorted, medium-gold-colored, octahedral and cubic crystals to 1 cm, with some areas of dendritic growth, are priced by Marco at \$3,500 to \$5,000 for thumbnails and up to \$11,000 for miniatures. These are very high quality specimens, and they are distinctive, looking *different* somehow from gold from anywhere else.

I have already mentioned that Denver in 2023 was fairly heavy in **fluorite** (a fashionable species among collectors these days), and here's an example of the "old classic" kind from Europe. At the Crowne Plaza show, the aforementioned Jonathan Feigin of *Minerals of the World* by Jonathan had two loose single crystals and



Figure 9. Cobaltite, 4.8 cm, from Håkansboda, Örebro County, Västmanland, Sweden. Dan Z Rockshop specimen; Christi Cramer photo.

two cabinet-size clusters of transparent, inky-blue cubic crystals of fluorite from the long-dormant La Barre (or La Martinèche) mine, St.-Jacques d'Ambur, Puy-de-Dôme, France. The single crystals measure respectively 3.2 and 4 cm on edge and cost \$2,000 and \$5,000 whereas the gorgeous cabinet-size groups both are priced around \$9,000. The luster is high, the transparency is near-total, and the deep blue color is broodingly beautiful. Besides, the La Barre mine stopped working commercially in the early 1960s, so that any more recent discoveries must be credited to collectors' snooping around in old underground workings or on the dumps, although according to Mindat (as cited in *Moore's Compendium of Mineral Discoveries*), "In 2000 the underground adits were closed, and collecting on mine dumps is now prohibited." Jonathan says that his specimens came from a "small pocket" recently opened somewhere in the mine.

There is only one other item from Europe, this one also of the "old classic" kind: **cobaltite** from Håkansboda Lindesberg, Örebro, Västmanland, Sweden (see Stig Adolfsson's long-ago note on collecting cobaltite crystals at Håkansboda in the January–February 1972 *Mineralogical Record*). At his booth in the "Denver" show, upstairs in the Convention Center, Dan Zellner of *Dan Z Rockshop* (DanzRockshop.com) laid out ten old Swedish cobaltite specimens, once in the Anders Lyckberg collection, including single, loose, thumbnail-size crystals, a couple of larger loose singles, and even a couple of matrix specimens showing cobaltite crystals to 2 cm partly embedded in dark matrix material. The crystals are sharp, metallic gray (with pinkish overtones) cubes and dodecahedrons—splendid examples of the cobalt arsenic sulfide from what is probably the world's-best occurrence of the species. A fine thumbnail-size crystal could be picked up from Dan for around \$1,000.

Reliable Christophe Gobin is still strong in African minerals, most recently in spectacular specimens of hot-pink **cobalt-rich calcite** from the Mashamba West mine, Mutshatsha, Lualaba (formerly "Katanga"), Democratic Republic of Congo. In the first half of 2023, this famous mine—mostly known heretofore for its wonderful malachite and cuprite specimens—gave up about 25 miniature to



Figure 10. Cobalt-rich calcite with malachite, 11.3 cm, from the Mashamba West mine, Mutshatsha, Lualaba, Democratic Republic of Congo. Christophe Gobin specimen; Jeff Scovil photo.



Figure 11. Copper on cobalt-rich calcite, 9.8 cm, from the Mashamba West mine, Mutshatsha, Lualaba, Democratic Republic of Congo. Christophe Gobin specimen; Jeff Scovil photo.



Figure 12. Cobalt-rich calcite with malachite, 4.6 cm, from the Mashamba West mine, Mutshatsha, Lualaba, Democratic Republic of Congo. *Christophe Gobin* specimen; Jeff Scovil photo.

Figure 13. Fluorite specimens to 6.5 cm, from the Erongo Mountains, Namibia. KARP specimens; Christi Cramer photo.



cabinet-size pieces sporting blankets of lustrous pink calcite crystals to 5 cm over matrix. Additionally, there are two specimens, both about 10 cm across, showing shallow vugs in which very bright, very thin wires of **copper** lie lightly on the pink calcite linings: as far as anyone knows, this wire copper association with calcite is a first for Mashamba West. Christophe had a handful of specimens of the pink calcite at the Hardrock show, and we may, he says, optimistically look for him to bring more to Tucson in 2024.

Ready for another unusual **fluorite** occurrence? In December 2022, somewhere in the mineral-rich Erongo Mountains north of Usakos, Namibia, a pocket yielded about 200 specimens, thumbnail to cabinet-size, which are clusters of elongated crystals of fluorite with individuals measuring between 2 and 10 cm. The crystals are distorted dodecahedrons and spiky spinel-law twins attached in jackstraw and subparallel arrangements devoid of matrix; the two basic colors are dark green and dark purple, but translucent to transparent, backlit specimens show what seems every possible interplay of green and purple, with irregular zonings and meldings of colors creating kaleidoscopic effects. At the Hardrock show, the KARP dealership (karp.cz) filled a whole standing case with these odd-looking fluorites, including thumbnails and miniatures for \$50 to \$400 and a few dramatic cabinet-size pieces priced well into four figures.

Over quite a few years now, shoppers at mineral shows have seen boxes and flats full of hundreds—thousands?—of thumbnail-size floater crystals of opaque, chocolate-brown **dravite** from a locality given as something like “Gujarkot, Bheri Zone, Nepal.” These are HQLP-type sidelights usually priced around \$15 apiece, but they are sharp, complete crystals (hexagonal short-prismatic, with hemimorphic terminal faces such as mark all of the tourmaline species), and likable in their humble way. Well, at the 2023 Crowne

Plaza show the *Brazarte* dealership had a flat of floater Nepalese dravite crystals from what is said to have been a recent find, and these are radically more attractive (and more expensive) than their opaque brown brothers; the morphology is the same, but these crystals, from 2 to 4 cm, are pale yellow-green and *gemmy*. The new locality—if indeed it is “new”—is given as Pajaru, Jajarkot District, Karnali Pradesh, Nepal, and *Brazarte*’s examples were priced between \$250 and \$420 (and a single one 4.5 cm long was priced considerably higher than that). Gem-quality dravite from Nepal is certainly new, at least to Western collectors; let’s hope to snare good numbers of these pretty crystals before evil gem cutters can snare too many away.

David Ziga of *Ziga Mineral* (ZigaMineral.com) has latched onto a handful of miniatures from a limited find of unusual and attractive **pink calcite/mesolite** specimens in an aggregate quarry at Pithampur, Madhya Pradesh state, India. The discovery in May 2023 produced a small number of these specimens of what Dave calls “moldy raspberries,” which is a pretty good description, as the specimens show equant pink-red calcite crystals to which white sprays of mesolite “mold” are lightly attached. Five of the miniatures were available in the Ziga booth at the Hardrock show, and some newly prepared ones are due to hit the market (Dave says) at the Mineral City Show in Tucson in February 2024.

For a while, beginning in the mid-1980s, we thought that the

supply of **cavansite** specimens from the Wagholi quarry complex at Pune, Maharashtra, India, would be endless (or “endless” as these things go, anyway: think Moroccan vanadinite or Peruvian or Spanish pyrite). That was fine with us, as these otherworldly-looking specimens showing spheres and sheaves of screamingly blue **cavansite** with snow-white stilbite crystals could hardly have been more beautiful. But since about the year 2000, diminishing quantities of the beautiful stuff have appeared on the market, while prices have

Figure 14. Dravite, 2.5 cm, from Pajaru, Jajarkot District, Karnali Pradesh, Nepal. *Brazarte* specimen; Christi Cramer photo.



Figure 15. Orange thomsonite grading to white mesolite sprays to 1.5 cm, from near Deshgaon, Madhya Pradesh, India. This occurrence (described in last year’s Denver Show Report, page 167), is not the same as the Pithampur, Madhya Pradesh, locality for specimens shown in the following two photos. *Alan’s Quality Minerals* specimen; Jeff Scovil photo.





Figure 16. Calcite with Mesolite, 5.9 cm, from Pithampur, Madhya Pradesh, India. David Ziga specimen; Jeff Scovil photo.

Figure 17. Calcite on Mesolite, 6.5 cm, from Pithampur, Madhya Pradesh, India. David Ziga specimen; Jeff Scovil photo.



steadily increased. No doubt that melancholy trend will continue until it is time to declare the occurrence exhausted and grant its cavansites “old classic” status; word is, indeed, that only one quarry in the Wagholi complex ever produced the cavansite specimens, and in that quarry the cavansite-bearing horizon is no longer being worked. All bad news . . . however, at the Denver Hardrock show in 2023, K.C. Pandey of *Superb Minerals India* (superbminerals.us) had a dozen cavansite miniatures and small-cabinet pieces collected in August 2023 at a building construction site in the near-neighborhood of the Wagholi quarries. These specimens show spherical cavansite clusters to 2 cm in diameter spotted at intervals over drusy quartz, with tiny white stilbite crystals. The specimens range from 4 to 12 cm and are priced from \$3,000 to \$18,000. And just to repeat: they did not come from the *quarry* which was the source of earlier cavansite specimens, but rather from a nearby construction site that had penetrated the cavansite-bearing horizon. The warning seems to be that if you don’t have your ultimate Wagholi cavansite yet you had best make your move before too long.

For the first of *four* new items from China we return to the *Brazarte* dealership at the Crowne Plaza show, where about 15 miniatures from a new find of **scheelite on fluorite** from the Yao-gangxian mine, Chenzhou, Hunan Province, were laid out enticingly in a flat. Very sharp, brownish orange pseudo-octahedral crystals of scheelite to 1 cm are sprinkled on plates consisting of small, pale purple, intergrown fluorite crystals with dustings of pyrite. These pretty specimens top out in size at 12.5 cm and cost between \$250 and \$750.

Rather cognate in appearance and equally pretty are the new Chinese specimens of **barite on fluorite** from the Xiefang mine,

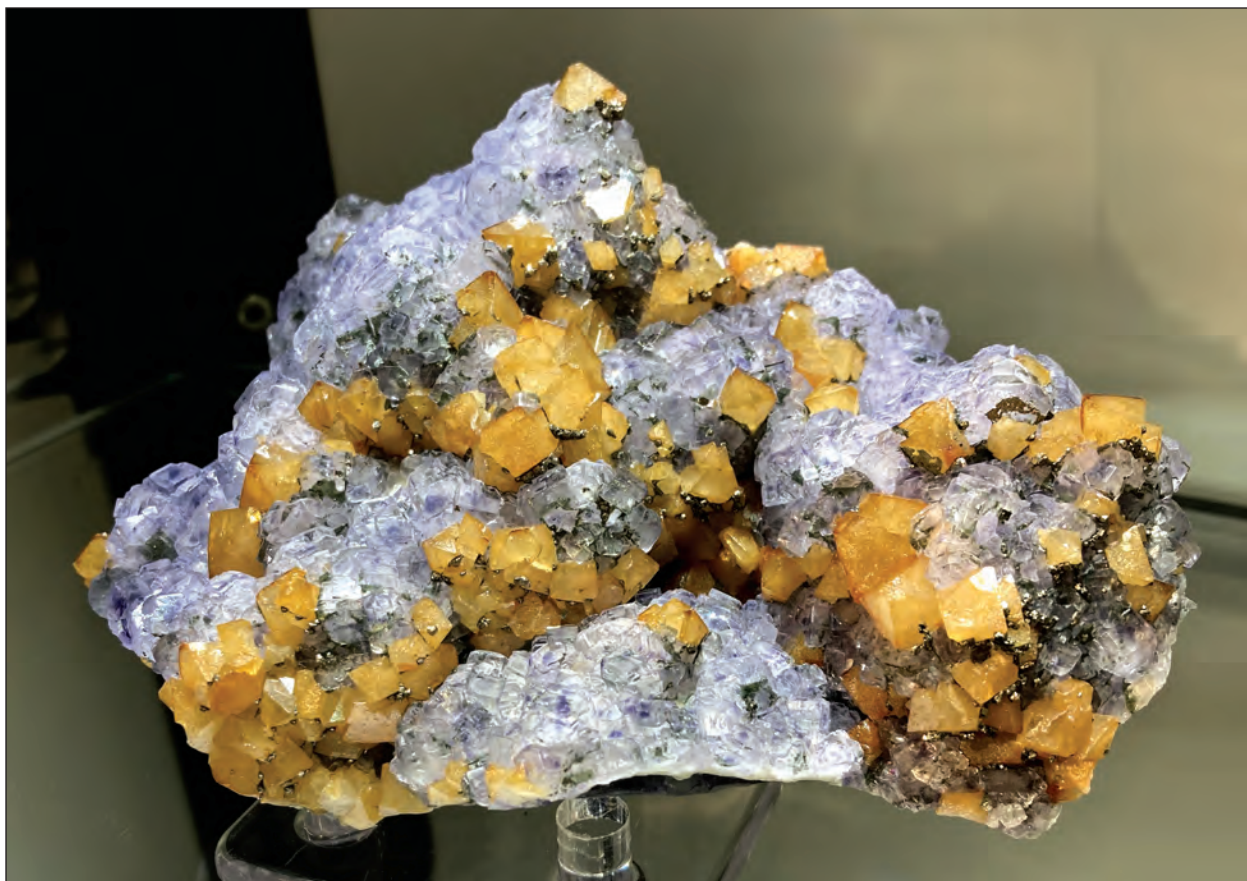


Figure 18. Scheelite on fluorite, 12.5 cm, from the Yaogangxian mine, Chenzhou, Hunan, China. Brazarte specimen; Tom Moore photo.



Figure 19. Barite on fluorite, 11 cm, from the Xiefang mine, Ganghou, Jiangxi, China. Alan's Quality Minerals specimen; Jeff Scovil photo.



Figure 20. Autunite (meta-autunite) crystals with greenish copper-rich centers on smoky quartz, 10.5 cm, from the Nanjingquiao deposit, Pingjiang County, Yueyang, Hunan, China. Dan Z Rockshop specimen; Christi Cramer photo.

Figure 21. Fluorite groups to 4.5 cm, from Changshan County, Quzhou Prefecture, Zhejiang Province, China. Mintang specimens; Christi Cramer photo.



Ganzhou, Jiangxi Province, offered by *Alan's Quality Minerals* (alansqualityminerals.com) at the Hardrock show. Alan and Elise Benson had hundreds of the barite/fluorites, mostly cabinet-size pieces showing gemmy orange barite crystals from 1 to 2 cm resting flatly on plates of tightly intergrown, cubic, apple-green fluorite crystals. The occurrence has produced fine orange barite before, notably in very large sizes (see the 2022 Tucson show report in May–June 2022), and according to Alan the locality is still going strong, this new lot having come out in April 2023. Prices ranged from \$250 for a petite miniature to \$12,000 for a plate about 30 cm across.

Specimens from the third Chinese discovery to be noted here, brought to the Denver show by Dan Zellner of *Dan Z Rockshop* (see above under Swedish cobaltite), bespeak a Chinese connection for secondary uranium minerals which might be unfamiliar

to many Western collectors. But yes, the Nanjingquiao uranium deposit, Pingjiang County, Yueyang, Hunan, produces **autunite** specimens which clearly rival the better-known ones from the Daybreak mine, Washington or from the uranium mines of central France. The locality is an example of “quartz vein-type uranium mineralization occurring in the contact zone of a granite intrusion,” as Mindat describes the old Streuberg, Saxony, locality for autunite/uranophane. Dan Zellner’s ten matrix miniatures from the Nanjingquiao deposit, all gathered within the last two years, feature typical yellow-green “books” and sheaves of autunite crystals in rich coverages over drusy seam linings of smoky quartz in the granite matrix. In Denver these specimens were priced at \$600 to \$3,500, and their likes will probably be emerging no longer: Dan says that the Chinese government has now officially declared the

Figure 22. Chrysocolla on copper, 12.5 cm, from East Java (?), Indonesia. Mineral Classics specimen; Christi Cramer photo.



Nanjingquiao deposit “closed.”

For the fourth Chinese—and fourth **fluorite**—entry in this report we have a selection of gorgeous fluorite thumbnails and miniatures from a new, unnamed mine somewhere in Changshan County, Quzhou Prefecture, Zhejiang Province, which has been yielding specimens just for the past year. And who but Safaa Yu of *Mintang* (safaaYu0202@gmail.com) would we expect to know about such an occurrence and bring prizes speedily out from it? Safaa did not have a booth at Denver this time; instead, she strolled around the Convention Center (with her rambunctious, never-bored little son) in quiet search of collectors who would be eager to see what treasures she had in her backpack. Mostly the backpack contained these superb little fluorites, with transparent, lustrous, super-sharp cubic and dodecahedral crystals ranging from colorless to palest purple and palest green. In the larger pieces the fluorite crystals reach 4.5 cm or so, but I preferred the exquisite thumbnails with brilliant, perfect, icy cubes to 1.5 cm resting lightly on thin matrix plates of white drusy quartz. Priced at \$200 to \$500, these prizes from a new—yet *another*—Chinese fluorite locality made for a nice mini-show at, say, one of the lounging areas in the lobby just outside the Hardrock chamber (for it was in that milieu that I happily purchased one of Safaa’s best thumbnails myself).

At the 2022 Munich Show (see that report in January–February 2023), the French dealership *Merveilles de la Terre* surprised showgoers with specimens of **chrysocolla on native copper** from a locality given only as “Bacan Island, Indonesia.” The dealership had just five cabinet-size examples of this unusual material in Munich, but six more showed up at the 2023 Denver Hardrock show in the keeping of Brian Kosnar of *Mineral Classics* (minclassics.com), who gave the locality as “East Java.” (But note: Bacan Island lies fully 1700 km to the northeast of the eastern tip of the island of Java in the immense archipelago of Indonesia.) The specimens are jumbles of curving copper leaves, some partially enfolding shards of gray-brown igneous rock, with bright, fresh-looking, sky-blue chrysocolla overlying most of the copper. Brian said that he had a flat at home containing more such specimens, and this implies that at upcoming shows we should look for more—they are very

striking to look at—while also pestering dealers to obtain consistent, reliable locality information.

That’s it for the mainstream world tour of “what’s new” . . . and now for some special goodies . . .

HQLP (High Quality, Low Price) Observations

Many and various high-quality mineral specimens costing \$200 or less are on the market at all times, as this sub-report has long demonstrated. The unchanging principle is that you *can*, if you are patient and well-informed in your shopping, take home plenty of first-rate, even “connoisseur”-level, specimens for \$200 or less.

You can, for example, examine closely the smaller, less conspicuous items hanging around on the edges of big, new, spectacular specimen lots. Among the hundreds of specimens of the new purple-and-green Erongo **fluorite** (as noted above) which were brought to the Hardrock show by the KARP dealership, there were some very fine thumbnails and miniatures showing lustrous, transparent, elongated purple-green fluorite crystals to 3 cm crossing at various angles in matrix-free groups. For only \$50 to \$150 you could have chosen a fine-looking one of these to make a distinguished addition to your fluorite suite.

Even very rare minerals can sometimes be offered in specimens greater than micromount size which qualify as HQLPs. Mikhail Anosov of *Russian Minerals Company* (rusmineral.ru) brought to the 2023 Crowne Plaza show a handful of thumbnails of the complex rare-earth-bearing carbonate **burbankite** which were collected in summer 2022 in the Kirovskiy mine, Kukisvumchorr Mountain, Khibiny Massif, Kola Peninsula, Russia, and he was offering them for just \$30 to \$125 each. The specimens consist of dull yellow, opaque to translucent burbankite crystals and partial crystals to 3 cm in grayish matrix; Mikhail admits that they do not represent the best of the find (another dealer got hold of those: stay tuned for future reports), but nevertheless they are bargain-priced examples of an extremely rare mineral species.

Then there is ever-affable Marco Bolaños, honcho of the *Bolaños Mineral Company* (adolfo.bolanos@yahoo.com), who comes to Denver, Munich and Tucson—see my accounts of him and his



Figure 23. Pyrargyrite, 2 cm, from the Porco mine, Agua de Castilla, Antonio Quijarro, Potosí, Bolivia. Bolaños Mineral Company specimen, now in the Tom Moore collection; Christi Cramer photo.

Figure 24. Quartz gwindel, 8 cm, from the Kullu District, Himachal Pradesh, India. Matrix India specimen; Christi Cramer photo.



Bolivian offerings (including a few large old Unificada mine phosphophyllites) in all three of the latest of these show reports in the *Mineralogical Record*. Again in Denver in 2023, Marco had a standing case full of his characteristically casual, unlabeled litters of intermittently excellent specimens, most notably, this time, dozens of thumbnails and miniatures of silver species from the Porco mine, Agua de Castilla, Antonio Quijarro Province, Potosí Department (Porco is “the oldest important silver mine in Bolivia,” as Mindat has it, from which some very nice things have been trickling out during the past few years). The best of Marco’s Porco mine specimens were some small groups of sharp, totally black but highly lustrous **pyrargyrite** crystals to 2.5 cm individually, and I picked

up one of the finest of these for just \$200, as, of course, any other HQLP-minded shopper could have done too.

High-End Notes

Customarily we define “high-end” specimens as those costing \$20,000 or more—and these too are plentiful beyond counting at any show-of-shows as big as this one. Below are a few descriptions of high-end sightings in Denver which, besides being top-quality for their kinds, are also in some way unusual in appearance, provenance or scientific significance. Come ogle with me awhile . . .

Within the past two or three years, **quartz gwindels** from Alpine-type clefts in the mountains of India and Pakistan have popped up



Figure 25. The Collector's Edge case of fabulous beryl specimens. Christi Cramer photo.



Figure 26. Sperrylite, 5.5 cm, crystal 1.7 cm, from the Broken Hammer deposit, Wisner Township, Greater Sudbury, Ontario, Canada. Dave Bunk Minerals specimen; Christi Cramer photo.

Not far from the *Matrix India* booth in the Hardrock show was the booth of J.C. Pandey's *Superb Minerals India*, where, besides the lovely new cavansite specimens from the Wagholi area described above, Dr. Pandey had a **faden quartz** specimen lately found in a cleft, 15,000 feet above sea level, somewhere in Himachal Pradesh, and this qualifies easily as another high-ender, withal Dr. Pandey declined to name his price for it. From a quartz matrix 16.5 cm across there rises a colorless, flattened quartz crystal with a sharp, milk-white faden line running down through it all the way: this is surely the most spectacular faden quartz specimen I have ever seen.

Let us stay for one more paragraph in the mountains of central Asia, as one of the several showcases set up at Hardrock by the *Collector's Edge* dealership contained several extraordinary **aquamarine beryl** specimens from those mountains, together with other beryls including a gemmy Brazilian **morganite** crystal about a foot across, edged with whiskery black tourmaline inclusions ("price on request"), and a couple of large matrix specimens showing deep green, gemmy **emerald** crystals, from the Kagem emerald mine in Zambia. Here, in other words, was a whole case stocked with nothing but gemmy, jumbo high-end beryl specimens. I come back, though, to the kingly aquamarine/feldspar specimens in the case, these from finds one to two years ago in digging sites in the Shigar Valley, Gilgit-Baltistan, Pakistan, one of those sites very near the cliffside excavation where the great "King of Kashmir" aquamarine (see the front and back covers of the November–December 2020 *Mineralogical Record*) was found. The biggest of the *Collector's Edge* aquamarine/feldspar specimens features a spray of prismatic crystals of aquamarine to about 25 cm long, but I liked even better a loose, thick, well terminated single crystal, luxuriantly deeply colored and astonishingly almost flawless within for all of its bulk, which Bryan Lees priced at \$50,000.

This seems a good place to mention as well that the lavish *Col-*

at shows to rival the classic gwindels from Switzerland, France, and the Polar Urals of Russia. And at the 2023 Hardrock show in Denver, Sami Makki of *Matrix India* (matrixindiaminerals.com) had two such exceptional gwindel specimens recently taken from diggings in the Kullu District, Himachal Pradesh, India. One of these dazzlers is a loose, totally colorless "open" (jagged-sided) gwindel measuring 8 cm across and costing \$22,500; the other is an 8-cm matrix of "normal" quartz crystals from which rise two colorless open gwindels, one just behind the other and offset from it a little, this beauty is priced at \$37,000. It seems fair to say that the vast Himalayan mountain system might soon surpass the much smaller Alps in production of superstar gwindels—among the most popular and desirable manifestations of crystallized SiO₂.



Figure 27. Mimetite crystals, 2 cm, from the Milpillas mine, Cuitaca, Sonora, Mexico. *Unique Minerals* specimen; Mark Mauthner photo.



Figure 28. Mimetite crystal group, 2.5 cm, from the Milpillas mine, Cuitaca, Sonora, Mexico. *Unique Minerals* specimen; Mark Mauthner photo.

lector's Edge spread at Hardrock included several cases devoted to deaccessions from the Spann Collection, which Jim and Gail Spann decided to release to the dealership for resale. These 300 or so miscellaneous specimens from what Jim described as “half-forgotten flats” in the Spanns’ basement in Texas included a wide range of species, specimen sizes, and even prices, but all are of top quality, and significant numbers of them were, by the rubric applied here, high-enders. To wander dazed and amazed through *Collector's Edge* territory at this Hardrock show was a High-End Experience

indeed (and more such Spann deaccessions are to be expected at the 2024 Tucson Show).

Sperrylite specimens from the Broken Hammer deposit, Wisner Township, Greater Sudbury, Ontario, Canada, are newer but very much less numerous than the famous sperrylites of Talnakh-Noril'sk, Siberia, and some are almost as fine as the best of the Russian examples. At the Hardrock show, Dave Bunk (davebunkminerals.com) had a Broken Hammer specimen (marked “repaired”) carrying a sharp, brilliantly lustrous (of course), smooth-surfaced



Figure 29. Jim and Gail Spann’s rough-and-cut case (“All facets of beauty”) at the Denver Gem and Mineral Show. Christi Cramer photo.



Figure 30. Jim and Gail Spann’s case of favorite specimens at the Hardrock Summit Show. Christi Cramer photo.

sperrylite crystal 1.7 cm across on a 5.5-cm matrix. This little killer, which bears a price tag of \$20,000, grabbed me with its laser-like metallic-luster rays from a few feet away from where it lay on the bottommost shelf of one of Dave’s display cases.

I have saved for last in the High-End listing two specimens which I thought were the most amazing of all the high-enders in Denver—and no, they are not “amazing” simply because they are thumbnails and I’m a thumbnail collector, no, they are amazing because they show absolutely world-class gemmy yellow **mimetite** crystals, and because they are not from the famous 1972 “gem pocket” at Tsumeb but rather were recovered very recently from an unmined pillar in the Milpillas mine, Cuitaca, Sonora, Mexico. Now, wait (you say), Milpillas is a *copper* mine; no lead minerals at all are listed in the Table of Species in our special “Milpillas”

issue of September–October 2021; so, what are terrific specimens of a secondary lead species doing in that environment? Well, not even Evan Jones of *Unique Minerals*, who brought these two thumbnails to Denver, can say . . . they simply “are what they are,” as the platitude goes, and even though Evan was keeping the specimens semi-concealed in a box below his display case during the Hardrock show, word about them soon spread. The larger thumbnail, 2.5 cm across, shows three water-clear yellow mimetite crystals, the largest about 2 cm tall, rising from a small, platy matrix. The smaller piece, measuring 1.5 cm, consists just of two of the crystals joined at an acute angle near their bases. In both specimens the crystals themselves are sharp, lustrous, short-hexagonal prisms of a rich, totally gemmy yellow; they differ from the Tsumeb “gem pocket” mimetite crystals in that they are opaque in their pyramidal



Figure 31. David and Karen DeBruyn's case of specimens from the Montreal mine, Wisconsin. Christi Cramer photo.



Figure 32. Marc and Janis Countiss' case of minerals. Christi Cramer photo.



Figure 33. Phil Gregory's case of miniatures. Christi Cramer photo.



Figure 34. Jim Gebel's case of fluorite specimens from the Elmwood and Gordonsville mines, Tennessee—in honor and memory of Steve Neely (1945–2022) (see March–April 2023). Christi Cramer photo.

termination zones. Evan has not yet firmed up prices for these two exceptional Milpillas mimetite specimens.

Displays

In 2022 the downstairs lobby area in the Convention Center, just outside Hardrock and “Sparkle and Joy,” held two extensive and lavish displays (of major gold specimens, and of a shipwreck—see the Denver report in the January–February 2023 *Mineralogical Record*). In 2023, though, displays of fine minerals and other lovable objects appeared in long rows of cases upstairs, inside the “Denver” show, and downstairs, along a back wall of the Hardrock hall. Both arrays of cases were laden with wondrous things, but the summary listing below refers only to the more strictly mineral and gem-oriented cases—with apologies to happy hobbyists of other sorts who mounted displays not saluted here.



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At the “Denver” show, there was a spiffy case of aquamarine specimens from Namibia and Pakistan, centered on a huge crystal cluster from the latter country (Carolyn Manchester); there was a case with 22 super “mixed” miniatures (Phil Gregory); there was a generously comprehensive case of minerals from Wisconsin’s long-defunct Montreal mine, including some specimens which were

pictured in the Montreal mine article in this publication (May–June 2020) (Dave and Karen DeBruyn). Benjamin Murphy and Anne Fulton put in “A Celebration of Colorado Corundum”; Nancy Kimber showed us many superb beryl specimens (“One Mineral, So Many Colors”); the Hutchinson family put in a case showing spoils from its 2023 field-collecting season, as well as a second case of Colorado rough-and-cut gems, all collected, cut and designed between 1988 and 2023. A predictably dazzling case of “mixed” mineral specimens (“All Facets of Beauty”) was put in by Jim and Gail Spann; a dreamlike case dedicated to mineral collecting on Mount Antero (specimens, cut gems, photos, posters, a poem) was offered by Dick and Cyndy Plambeck; “A Good Week on Mount White,” with lots of cut aquamarines, was the contribution of Jeff Self and Donna Ware. Gem-potential crystals of many mineral species (“Woulda-Shoulda-Coulda Might Be Gems”) were shown by Sherman Marsh; self-collected quartz specimens were shown by Chuck Borowa; faceted gems (special emphasis on varicolored quartz from Georgia) came from the Tellus Science Museum; and an organization whose website is PeopleLovePyrite.com created a busy, golden-hued case of pyrite, “Rough, Cut and Otherwise,” in which everything rested on a blingy bed of hundreds of little loose pyrite crystals. More rough-and-cut crystals and gems were displayed by Donald E. Ricks; replicas of famous faceted diamonds were shown by the Lizzadro Museum of Lapidary Art; and the Denver Museum of Nature and Science had a big, bright, airy case stocked with gem-quality topaz crystals, text about topaz occurrences in Brazil and Colorado, and faceted topaz gems, *especially* the “Dalí Topaz,” a giant colorless faceted beast of 10,588 carats once owned by Salvador Dalí (whose surreally grimacing visage looked down on all of that topaz from the back wall of the case).

The displays along the back wall of the Hardrock show were fewer in number but just as much fun to look at and linger over. One of the most educational of them was Phil Persson’s case of “Gem

Minerals as Represented in Antiquarian Mineralogy and Geology Books and Ephemera,” with old books open to color plates showing specimens, 19th-century dealers’ catalogs, letters, purchase invoices, etc. Another, likewise erudite case, put in by Mark Jacobson, *Collector’s Edge*, and the Mines Museum of Earth Science (of the Colorado School of Mines), showed “historic” mineral specimens from Colorado, together with catalogs, photos and letters related to the Colorado activities of A.E. Foote (1846–1895) and to the diverse contributions of Colorado mineral dealer Jesse Summers Randall (1858–1934). Then there were “Minerals With Bling” (specimens showing interesting accessory species) (Alfie Norville Gem & Mineral Museum, Tucson); “Spann Favorites” shown by Jim and Gail Spann, with miscellaneous pieces including a giant Pakistani aquamarine, backstage center, and their superb, lust-inspiring thumbnail of Cornish liroconite, downstage right. Marc and Janis Countiss had a chock-full, bright, extremely well-designed case with showstopping mineral specimens arrayed around a Hallelujah Junction quartz scepter which looked to be about two feet tall. The New Mexico Bureau of Geology and Mineral Resources had a case celebrating a “New Find at Hansonburg,” this consisting of big, beautiful fluorite specimens recovered recently in the old Blanchard mine. The Mines Museum of Earth Science offered “Miss Colorado 1947,” displaying her crown, together with samples of the gems and precious metals which went into its making. And finally, Jim Gebel mined his extensive fluorite collection to fill a case exclusively with spectacular fluorites from the Elmwood and Gordonsville mines, Tennessee, this very impressive case dedicated in honor and sadness to the late Steve Neely, who specialized in the wonderful fluorites of those mines, located not far from his house.

So that seems to be IT from Denver . . . and I’ll be seeing many of you in winter-balmy Tucson quite soon.

Tom Moore

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Munich Show 2023 by Thomas P. Moore

[October 26–October 29]

Once more to Munich! It was back in 1972 that the first *Mineralientage München* (Munich Mineral Days) was held on the broad open spaces of the Theresienhöhe (Theresa's Meadow) where the annual Oktoberfest is also held. The show, under the efficient management of Johannes Keilmann, moved to the new fairgrounds in Riem in 1998. In 2007, Chris Keilmann took over from his father as the managing director of the show; 2023 marked the 60th annual show (actually only the 59th, but the Covid-cancelled year must be included in the chronology), and the 50th year at the Messegelände (Fairgrounds), now called Messe München.

This year the *Mineralogical Record* team-on-the-scene consisted of editor Chris Stefano and me, and while Chris this time elected to stay in a hotel out on the eastern edge of the city, conveniently near the show, I opted, as I've done these many years, to make the Marienplatz, in the heart of downtown, my headquarters. Those who come for the first time may well prefer to put up at one of the spiffy hotels just one stop away on the U-Bahn (subway) from the huge hangarlike buildings of the Munich Trade Fair Center where *Mineralientage München* holds forth; by contrast, to get to the show



Figure 1. Marienplatz in the morning. Tom Moore photo.



Figure 2. Christoph and Johannes Keilmann, two generations of show managers.

from Marienplatz by the U-Bahn's S4 and U2 lines takes about half an hour—but for me this slight inconvenience is well compensated for by the ambient beauty of Marienplatz as it greets one on chilly October mornings. Most striking of all, on the northern side of the *Platz*, is the great spreading frontage of fretted gray stone which is the neo-Gothic façade of the *Neue Rathaus* (New Town Hall), much more than a century old (built in 1874) despite that *neue*. Around this vaunting edifice, more prosaically, are close-packed streets of restaurants, shops, and high-rise department stores, and just to the east of the *neue* Town Hall is the *alte* (old) one, destroyed in World War II but now rebuilt as a *Spielzeugmuseum* (toy museum). Then there is all the casual imagery of the Marienplatz at eight or so in the morning—cafes not yet opened but with mazes of tables already hopefully spread out into the open space; still-sleeping newsstand gazebos and fresh-fruit and hot-chestnut stands under red and white awnings; tentative morning scouting parties of tourists; serious street-sweeping machines, with big whirling brushes, driven by workaday-droopy city employees; urban pigeons clucking and scrounging along the stone ground for whatever litter looks good. In the center of all there rises from a four-cornered fountain the benignant *Mariensäule* (“Mary’s Pillar”), bearing the golden figure of (says the legend) Munich’s protectress from pestilence, hunger and war . . . and just as solemnly, only a couple of blocks away and easily visible from the *Platz*, are the onion domes of the 15th-century *Frauenkirche*, the city’s cathedral. Visitors may favor other perspectives on Munich, of course, but this is the one I choose whenever I come to the hands-down greatest mineral show in Europe (and arguably the *world’s second-greatest* mineral show, although you may want to say this in whispers in Denver).

In 2020, the Munich Show had to be cancelled because of the Covid pandemic, but in its three editions since then the show has rebounded in quantum jumps, and by now it has come very near to matching the size, variety and vitality of its pre-Covid self. All right, in 2023 the popular, very loud, all-seats-taken beer garden and cafeteria which one used to enjoy in Hall 5 was still missing, and not *quite* as many dealers from worldwide countries showed up—but the main exhibit, called “Art d’Objet,” was altogether fabulous (see later). This year, for the first time, Tuesday and

Wednesday, not Wednesday and Thursday as earlier, were set-up days for the dealers, with much “professional” commerce transpiring during that time, and then, from official Opening Day on Thursday all through Sunday’s closing hour, the visiting crowds were thick. Possibly because the euro remained at a convenient 1:1 ratio to the dollar (specimen prices here will thus be reported in euros only), Americans strolling about were unusually numerous. And one American dealership, Rob Lavinsky’s *The Arkenstone*, had a row of four standing cases with 79 superb specimens from the Erika Pohl-Ströher Collection which Rob will offer soon on his auction website (MineralAuctions.com): a placard in one of the cases urged showgoers interested in the auctions to “register now to get notified.”

Yet more pleasant marginalia: the weather through most of the time of the show was clear, cool and comfortable; the jewelry and gemstone show in the building next door looked well-attended; food trucks did good business in the courtyard between the buildings; and back in Hall 6 the genial Italians of the “Bologna Show” snack bar sold drinks (alcoholic and not), sweet pastry treats, *Bolognese* lasagna and cabinet-size hunks of Parmesan cheese to take home in one’s luggage. Perhaps best of all, lots of eager rockhounding children were brought to the parts of Hall 5 where geode-cracking, gold-panning and fossil-hunting features were set up for their enjoyment, and where they could ogle “Willard,” the largest Triceratops skeleton ever assembled, being shown publicly here for the very first time.

Some statistics about this year’s show were provided by Chris Keilmann: The total number of unique attendees was 35,366. (If multi-day tickets by individual visitors and the exhibitor passes are counted, the total goes up to 39,956 visitor entries.) And there were 1,012 exhibitors and dealers from 62 nations.

What’s that you say—*minerals*? Well, besides the what’s-new things described in the survey below, this Munich Show offered, as shows everywhere always do, exciting if subtle surprises for the discerning observer. Few observers indeed are more discerning than Chris Stefano, who, despite being stuck by necessity, most of the time, at the *Mineralogical Record* stand, discovered one day an item of major importance for his rare-species collection. One of the dealers in gem-crystal specimens came to Chris with

Figure 3. Merelaniite as black fibrous inclusions in a tanzanite crystal, 2.5 cm, from the Merelani mines, Manyara Region, Tanzania. Chris Stefano specimen and photo.



Figure 4. Tizenite, 3 cm, from the Molinello mine, Val Graveglia, Liguria, Italy. Webmineralshop specimen (now Chris Stefano collection); Chris Stefano photo.

Figure 5. Tizenite, 10 cm, from the Molinello mine, Val Graveglia, Liguria, Italy. Webmineralshop specimen; Chris Stefano photo.



a question about some of their specimens, and while inspecting those, Chris noticed a black filiform mineral showing up as inclusions in a tanzanite crystal from the Merelani mines of Tanzania, and, after bending over his loupe for some time, Chris announced his near-certainty that the inclusions were *merelaniite*, an exceedingly rare, molybdenum-essential sulfosalt (!), described from its type locality, Merelani, in 2016. He then proceeded scrupulously to examine all of the *other* tanzanite crystals that the dealer had, finding no more merelaniite filaments in any of them. Of course, Chris happily purchased the otherwise unremarkable tanzanite crystal with the merelaniite in it, and for the rest of the show was describing his find, frequently at some length, to passers-by at our stand. I for one was glad to have learned something new, and you, showgoer, if you keep your wits and relevant expertise about you, might well be able to make such a discovery at any big show—that being the moral of this little story.

Now let us proceed to explore what *else* there was new in min-

erals at Munich:

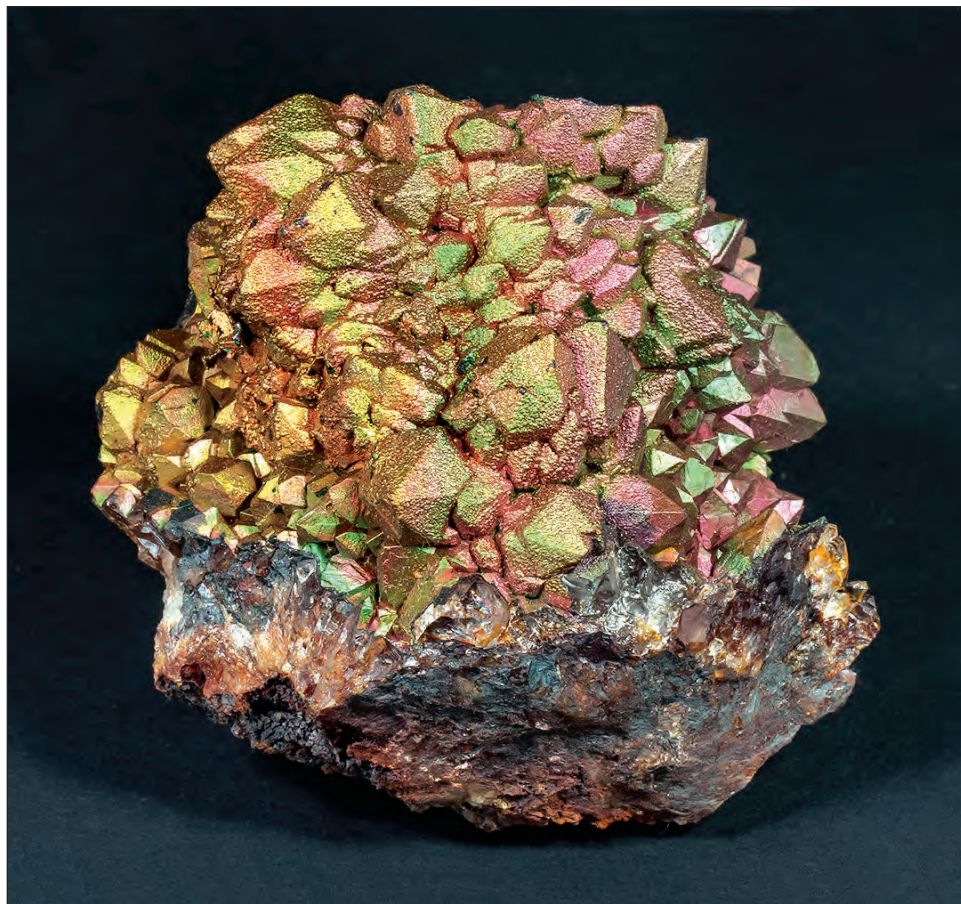
What's New in Minerals

Germany is my usual starting-off point for these reports from the Munich Show, but in 2023 nothing new from *der Vaterland* (nothing new that I saw, anyway) was on hand. Instead, we begin with a



Figure 6. Corundum, 10 cm, from the Sivec quarries near Prilep, Macedonia. Jože Lenič specimen; Chris Stefano photo.

Figure 7. Quartz coated by goethite, 8 cm, from the San Valentín quarry, Murcia, Spain. Miguel David Martínez specimen; Jordi Fabre photo.



fine new find of the rare species **tinzenite**, a triclinic Ca-Mn-Al borosilicate of the axinite group, from the Molinello mine of the Val Graveglia District, Liguria, Italy. In the *Mineralogical Record*'s "Val Graveglia" issue (September–October 2001), Marco Marchesini and Renato Pagano wrote of "extraordinary" tinzenite specimens from veins up to 20 cm thick and several meters long, with the capstone statement that tinzenite from this locality "is probably the best in the world." But the same authors wrote as well that although Val Graveglia was producing specimens of rare species as late as 1976, all of the mines there (except the Gambatesa) were closed. Twenty-two years later, enter Giuseppe Tannoia, honcho of *The Webmineralshop* (webmineralshop.com), who in the summer of 2023 explored some remains of the old Molinello mine and emerged with about 500 tinzenite specimens, including a dozen miniatures which he describes as truly superb, though unfortunately he did not bring these to Munich. However, he did bring a few almost-superb miniatures and ten very good cabinet-size specimens, plus a couple of flats of lesser pieces. The tinzenite forms lenticular crystals to a few millimeters grouped tightly into bulbous mounds and rosettes, and these in turn rest in seams in quartz matrix with multicolored spottings of other species including saneroite, braunite, ganophyllite and rhodochrosite. The tinzenite is an appealing, bright, peachy yellow-orange, and the finest of Giuseppe's large-miniature to small-cabinet-size specimens are priced only in high-two to low-three figures.

Rose-pink, non-gemmy specimens of **ruby corundum** have come since about 1925 from the Sivec marble quarries on Sivec Mountain, 8 km north-northeast of the town of Prilep, Macedonia (part of Yugoslavia until the civil wars of the 1990s, now an independent republic bordering Greece on the north). And apparently the quarries are still active today, as the clusters of pink corundum crystals that they produce—some very large—show up fairly regularly at min-

Figure 8. Microcline, 10 cm, from Mount Sinai, Egypt. Mirko Bonechi specimen; Chris Stefano photo.



Figure 9. Alumovesuvianite coating vesuvianite, 8.5 cm, from the Kayes Region, Mali. Laurent Gautron specimen; Chris Stefano photo.

eral shows, especially in Europe. An excellent lot of Macedonian corundum specimens was up for sale in Munich in 2023, at the stand of Slovenian dealer Jože Lenič (info@ze-min.com), who said that these 15 miniature-size single crystals and several cabinet-size groups had been gathered within the past four years. The thick, hexagonal-tabular crystals with just slightly rough basal faces and rounded edges reach a remarkable 6.5 cm across individually, and Jože had groups to large-cabinet size. Such specimens cause one to alter one's notion of what collectible "rubies" look like . . . here are no pigeon-blood Burmese wonders a few millimeters across and costing hundreds of thousands of dollars per carat; instead, here are whopping big groups of pretty pink crystals which would be prime eye-catchers on the glass shelves of anyone's showcase.

On October 7 and 8, 2023—two weeks or so before the Munich Show opened—some beautiful and unusual specimens of **goethite-coated quartz** were collected in the San Valentín quarry in Murcia, Spain. The otherwise routine clusters of quartz crystal "points" are covered entirely by films of goethite which render them vividly iridescent: Jordi Fabre remarks that before the find "it had been a long time since [Spanish collectors] had seen any [specimens] with such luminous iridescence." The haul consisted of about 200 pieces in a wide range of sizes, of which about 15 are of exceptional quality. At the show, Miguel David Martínez (Mineralo17@gmail.com) sold off most of the specimens quickly to customers, most of whom were from Asia, but, of course, strays may appear on the market at any time; those who relish peculiar moods and manifestations of quartz should be on the lookout for them.

The first stop in Africa is—surprise—at Mount Sinai, Sinai Peninsula, far-northeastern Egypt. In this biblical place, around 1980, an Italian engineer (also a mineral collector) took part in the construction of a road and railroad tunnel under the Suez Canal, and there he came on a pegmatite from which he and others collected several hundred specimens of **microcline and smoky quartz**, with shapely crystals of the feldspar to two feet long and of quartz to almost a foot long. The microcline crystals are pleasantly buff-colored and

the quartz crystals, though dull of luster, are largely transparent, medium-smoky, and well terminated. The engineer held on to most of the best of these pieces until selling them recently to Italian collector/dealer Mirko Bonechi (3Bminerals.com), who had about a dozen large-miniature to large-cabinet-size specimens from the discovery at a far end of Hall 6 in Munich. They are not spectacular but not expensive either, and whom do you know, anyway, who has notable mineral specimens from Mount Sinai?

In my report from the 2023 Ste.-Marie-aux-Mines Show (in September–October 2023) I noted a general abundance of very nice specimens of epidote, prehnite and “grossular-andradite” garnet from the Kayes region of Mali. These are familiar material by now, but many dealers, especially French dealers, *especially* Laurent Gautron (3genvt@wanadoo.fr), came to Munich with specimens from recent finds well worth noting. Laurent, e.g., had something quite new from somewhere unspecified in Kayes which had been unearthed, he said, at some time within the past year. About a dozen miniature-size loose clusters of short-tetragonal crystals of typically brown to yellow-brown vesuvianite are thickly, uniformly coated by glassy-bright, apple-green **alumovesuvianite**, a species almost the same as vesuvianite but containing “extra” aluminum and no iron (see Mindat for the full chemical/structural story). Described in 2016 from the famous Jeffrey mine in Quebec, alumovesuvianite is rare (although some “vesuvianites” from Jeffrey may really be this species), and Laurent’s examples from the western scrublands of Mali are pretty, too, and he prices them at 80 to 250 euros.

In the enclave of *Escaut Minerals* (frederic.escaut@wanadoo.fr), a handful of miniature to large-cabinet-size specimens of a new, odd-looking sort of **malachite** from the Mindingi mine, Haut



Figure 10. Malachite, 10.2 cm, from the Mindingi mine, Haut-Katanga, Democratic Republic of Congo. Escaut Minerals specimen; Mark Mauthner photo.

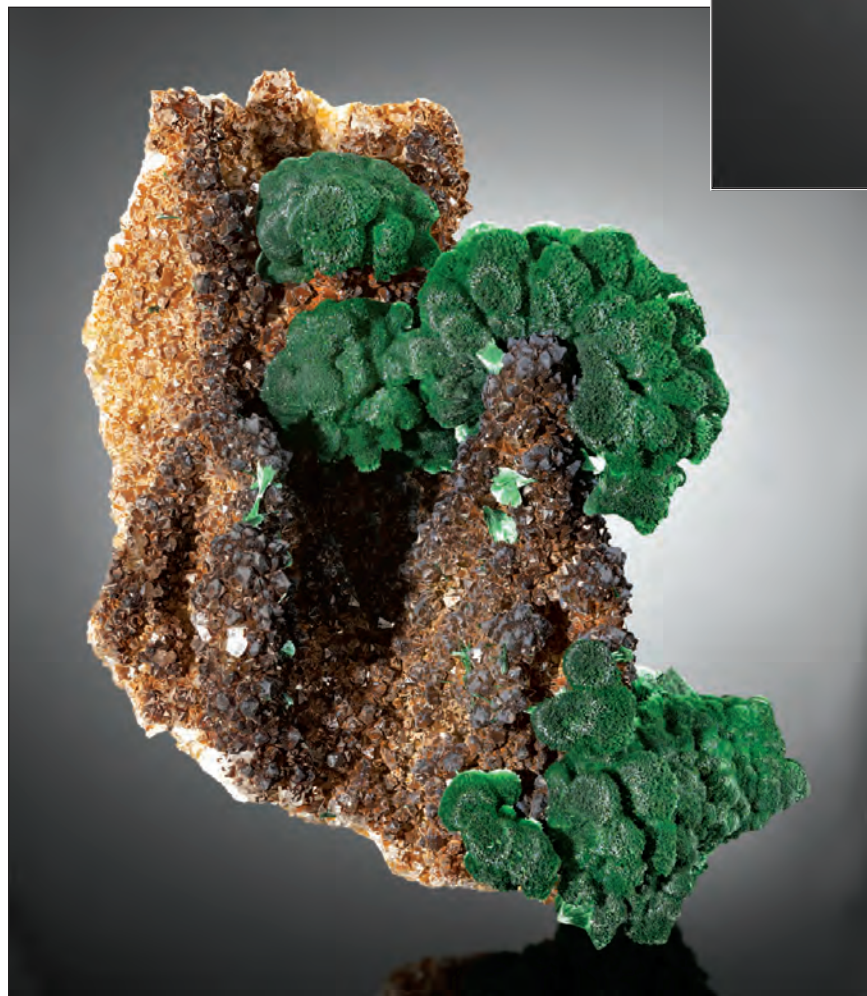


Figure 11. Malachite, 9.1 cm, from the Mindingi mine, Haut Katanga, Democratic Republic of Congo. Escaut Minerals specimen; Mark Mauthner photo.



Figure 12. Barite on malachite, 13.5 cm, from the Lupoto mine, Kipushi, Haut-Katanga, Democratic Republic of Congo. Multiaxes specimen; Chris Stefano photo.

Figure 13. Siderite on quartz, 6 cm, from the Erongo Mountains, Namibia. Mineralien-de specimen; Chris Stefano photo.



Katanga, Democratic Republic of Congo, were offered—Frédéric said that about 50 such specimens were taken out in the late spring/early summer of 2023. The very dark (because goethite-infused) malachite forms globular aggregates built of tightly packed acicular crystals, and the globules rest lightly, well individualized in many cases, on matrix plates of sparkling, microcrystallized quartz. Some of the globules' surfaces have wrinkles that section them off into little sub-globules, creating a cauliflower-head effect, while other specimens have more uniform, larger globules, and still others show stalactiform growths tinted brown in spots by the goethite. These specimens, ranging in size from 5 cm to a dramatic 27 cm, are priced between 1,200 and 12,000 euros. What will the Congo Copper Belt come up with next?

Well, to reply at once to my very own question, not far from the Mindingi mine, the Lupoto mine, Kipushi, Haut-Katanga, Democratic Republic of Congo, has recently yielded about 100 very attractive specimens of **barite on malachite**. These are thin, detached, curving crests of dark green malachite spotted and spangled with sharp little wedge-terminated crystals of colorless, transparent barite, some of the barite bladelets tinted pale green by infused malachite while others show pale orange zoned inclusions of iron oxides. According to Gilles Emringer of *Multiaxes* (gilles.emringer@orange.fr), who brought about 20 of the new pieces to Munich, the specimen strike occurred in August of 2023. The crisp barite crystals which rise at medium angles from the malachite crests measure just 1 to 2 cm, but dozens of them inhabit every small-cabinet-size crest; prices run from 1,850 to 4,500 euros.

From the beginning of the Munich Show in the 1960s, *Lapis*, our fine German sister publication, has been one of the show's central

presences and supports—I mean “presences” literally in part, as for many years the *Lapis* booth has sprawled squarely in the center of the Munich Show, its long tables chock-full of back issues and of important books, in a babel of languages, on mineralogy, mineral localities and mineral collecting. Here I digress to recall that decades ago, when I lived nearby in Bavaria, Christian Weise, the founder of *Lapis*, ran a nice little mineral shop, *Kristalldruse*, at Oberanger 6 in downtown Munich, to which I used to detour on any excuse or rationalization whenever I was in town. But today the mineral business, largely directed by Christian's son Tobias (“Toby”), lives



Figure 14. Siderite on fluorite, 7.5 cm, from the Erongo Mountains, Namibia. Mineralien-de specimen; Chris Stefano photo.

Figure 15. Grandidierite, 1.8 cm, from the Vohibola deposit, Behara, Anosy Region, Madagascar. Christophe Dubois specimen; Chris Stefano photo.

chiefly online, as *Mineralien.de*, and at that generous *Lapis* booth at the Munich Show, every year, the dealership sets out dozens of flats full of small, modest specimens (as well as some not so “modest”) which may be secured, with much friendly chat, from longtime *Lapis* editor Dr. Stefan Weiss. At the 2023 show *Mineralien.de* had seven specimens of what Toby was calling “**umbrella siderite**,” all found, he said, at a site somewhere in Namibia’s Erongo Mountains, sometime in 2017. All of the specimens feature sharp, dull brown, lenticular siderite crystals to 5 cm across resting lightly at miscellaneous angles, like tilting umbrellas, on crystals of other minerals; in six of the pieces the hosts of the siderite crystals are prisms of smoky quartz and/or parallel groups of lustrous black, short-prismatic crystals of schorl, whereas in just one piece the siderite umbrellas cover a group of translucent green fluorite crystals. *Mineralien.de* did not specify prices, but anyway Evan Jones bought all of the specimens at the show and will be reselling them (you might check for them on the website of Evan’s and Marc Miterman’s *Unique Minerals*).

Again in Munich in October, as at Ste.-Marie-aux-Mines in June (see that report in September–October 2023), Christophe Dubois (Lithic2501@aol.com) had a small but sophisticated array of thumbnail and miniature-size specimens, mostly from antique collections, including one-of-a-kind phenomena such as a German lautite, an Italian apuanite, a Quebec uraninite, and what Chris Stefano and I agreed must be one of the finest extant thumbnails of paralaunite from the Touissit mine in Morocco. Besides these older exotica, Christophe offered four outstanding loose, thumbnail-size crystals of **grandidierite** from the Vohibola phlogopite deposit, Behara, Anosy Region (formerly Toliara Province), Madagascar. These crystals are bright blue-green and partially gemmy, and they show partial to complete terminations; they measure from 1.5 to a bit more than 2 cm and are priced from 250 euros for the smallest and least of them, up to 850 euros for a thumbnail crystal as fine



for the species as one could wish. And Christophe tops off with a single *cabinet-size* specimen—5×11 cm—which is a jackstraw mass of prismatic grandidierite crystals to 2.5 cm, some terminated, on matrix. Grandidierite from Madagascar has been showing up on the market of late—some specimen-monger who knows what he’s

Figure 16. Sphalerite, 4 cm, from Otanche, Boyacá Department, Colombia. Jože Lenič specimen; Chris Stefano photo.



Figure 17. Geocronite-Jordanite on fluorite, 7.5 cm, from the Milpo mine, Cerro de Pasco, Pasco, Peru. Burillo Minerals specimen; Chris Stefano photo.

doing is busy down there—but the small lot that Christophe Dubois brought to Munich is the best I have seen to date.

Before heading to Asia we are obliged by what's-new imperatives to take an Atlantic detour to South America. Jože Lenič, the Slovenian dealer mentioned above (under Macedonian ruby corundum), is as cosmopolitan in his offerings as he is English-fluent and affable: in Munich (as well as in Ste.-Marie last June) he had things from Colombia, Myanmar and Malawi as well as from Eastern Europe. In his booth in Hall 6 in Munich, he had seven thumbnails and

miniatures of **sphalerite** from a new occurrence near the town of Otanche, which in turn is near the Cosquez mine in the great emerald-mining district in Boyacá Department, Colombia. Jože had no information on the sort of occurrence this is—a polymetallic ore mine? Mississippi-Valley-type lead-zinc deposit?—but in any case these pretty pieces show equant, transparent, red-orange (“ruby jack”) sphalerite crystals to 1.5 cm; some specimens are simply loose groups of crystals while others show singles perching on matrix with little rhombohedral crystals of off-white dolomite.



Figure 18. Epidote and quartz, 10.5 cm, from the La Verde mine, Cascas District, Gran Chimú, La Libertad, Peru. Hoffmann Minerals specimen; Chris Stefano photo.

This entry could be placed in the HQLP sub-report later on, as the specimens only cost from 100 to 200 euros, but fine sphalerite from Colombia is mainly notable as a “locality” item . . . let’s hope for more specimens, and more information, in the future.

By now we have seen some good selections of the new-ish, beautiful specimens of transparent octahedral green fluorite crystals with metallic black sulfosalts whose precise locality has been identified (by Jaroslav Hryšl) as the Milpo mine, Atacocha District, Cerro de Pasco, Pasco Province, Department of Pasco, Peru. But the precise identity of the sulfosalts has remained unclear, different dealers maintaining (often too rigidly) different things: some say that the species is geocronite and others say it is jordanite, and anyway, all agree, there are further admixtures of bournonite, galena and pyrite. Some of the Milpo mine specimens sport geocronite and/or jordanite crystals which are exceptional for either species, so getting it right is important, but really the matter is simple: jordanite— $\text{Pb}_{14}(\text{As,Sb})_6\text{S}_{23}$ —is arsenic-dominant while geocronite— $\text{Pb}_{14}(\text{Sb,As})_6\text{S}_{23}$ —is antimony-dominant, and so, lacking analysis of a specific piece in question, we should write **geocronite-jordanite** (or jordanite-geocronite) on our labels. At Munich, some very rich specimens of this material which came from a find in March 2023 in the Milpo mine were offered by *Burillo Minerals*. They show transparent, pale to medium-green octahedral (and a few cubic) fluorite crystals to 3 cm with drusy pyrite and knobby partial coatings of geocronite-jordanite crystals with sharp, equant individuals to 7 mm. Luís Burillo’s 35 or so thumbnails, miniatures and small-cabinet specimens cost between 300 and 2,400 euros, and they sold quickly at this show. (In fact, I missed a fine thumbnail by waiting, dithering, for a full day before deciding to go for it—a

rank beginner’s mistake which I have made many times since I was a rank beginner).

A lesser but brand-new Peruvian prize which came to Munich was about 20 flats of excellent **epidote** thumbnails and miniatures taken three months before the show from the La Verde mine, Cascas District, Gran Chimú Province, Department of La Libertad, Peru. The little loose jackstraw clusters of lustrous, wedge-terminated epidote blades, some thin enough to be transparent and pistachio-green around their thin edges, were offered by *Hoffmann Minerals* (hoffmannminerals.com) of Sterling, Virginia—a newcomer to Munich in 2023. The great majority of the epidotes are, as I say, little crystal clusters, and these were being sold wholesale by the flat, but also the dealership had a handful of fine La Verde mine epidote specimens to mid-cabinet size, priced up to 2,500 euros.

A couple of recent show reports have taken account of a find, about a year ago now, of threefold “combination” specimens that can come in very large sizes and then can be downright dazzling: **garnet/hedenbergite/pyrite** from the Gachin salt dome, Bandar Abbas, Hormozgan Province, Iran. The form-rich, brownish red-orange crystals of what we should probably call grossular-andradite are lustrous, gemmy, and reach 5 mm; they show well against backgrounds of dark green columnar crystals of hedenbergite over massive hedenbergite, the whole punctuated with little brown cubes of limonitized pyrite. A few dealers at the 2023 Munich Show had selections of these specimens, but the most and best examples were with Riccardo Prato’s *Cristalli* (cristallirp@outlook.it), whose two big showcases held about 35 specimens, from miniature to very-large-cabinet size, which bore euro prices from high three to low five figures. No photo of this highly photogenic material could



Figure 19. Garnet/hedenbergite/pyrite, 12.5 cm, from the Gachin salt dome, Bandar Abbas, Hormozgan Province, Iran. Cristalli specimen; Chris Stefano photo.



Figure 20. Astrophyllite, 11 cm, from Marchenko Peak, Kukisvumchorr Mountain, Khibiny Massif, Kola Peninsula, Russia. Amzhad Greizi specimen; Chris Stefano photo.

be obtained at the 2023 Ste.-Marie-aux-Mines Show and only a small one appeared with the 2022 Munich report, but Chris Stefano got a good shot of one of *Cristalli's* jumbo pieces in Munich in 2023.

Among the exotic items seen at the small stands of “foreign” dealers in Hall 5 was **astrophyllite** in unusual “free-growing” form, from an August 2021 find on Marchenko Peak, Kukisvumchorr Mountain, Khibiny Massif, Kola Peninsula, Russia. This uncommon K-Na-Fe-Ti fluorosilicate species has not been a collectors’ favorite, since in conventional specimens its dull yellow to brown acicular crystals are all tightly mashed together in formless lumps; however, surprisingly, the new specimens are fairly attractive, as the bronze-brown acicular astrophyllite crystals form tufts and sprays which “grow free,” standing partially up and out from the matted masses below. Most of the specimens show no associated species, but in a few there are regions of pocket-wall matrix on which lie thick-prismatic, pale orange natrolite crystals to 1.5 cm, plus tiny black acicular crystals of aegirine. The specimens were brought to Munich by Amzhad Greizi (minerals-shop@mail.ru), who had about 50 of them in sizes from 3 to 18 cm, all but the largest priced in HQLP territory (under 200 euros).

In my 2022 Munich report (see January–February 2023), I expressed regret that no Chinese dealers had shown up with their familiar white trays bearing litters of unlabeled specimens—among which, we hope, sleepers lurk—of stibnite, calcite, fluorite, pyro-

morphite, etc. But in 2023, in that lower part of Hall 6 which some irresistibly call “Chinatown,” there were again a few such dealerships set up for business—white trays, strewn specimen litters, secret sleepers, and all. At the very interesting stand of *Changsha Stones Culture Communications Co. LTD* (type it in just like that and the website comes up), a nice lady named Wangwei showed me not only the fine group of scheelite miniatures described in the HQLP sub-report below but also about 30 excellent miniatures of **acanthite** from the Hongda mine, Lingqiu County, Datong Prefecture, Shaanxi Province. Distinctive acanthite (and wire silver) specimens from the Hongda mine first reached the West around 2006, but they have remained elusive, and those that Wang Wei had in Munich are likely top-of-the-line. The gray acanthite crystals, dull of luster but sharp-edged and reaching 3 cm, form clusters, some branching and interestingly distorted-looking, to 7 cm, priced from 100 to 500 euros.

Last in this listing come ten large specimens of **botryoidal rhodochrosite** from the Oppu mine, Nishimeya-mura, Naka-Tsugaru-gun, Aomori Prefecture, Honshu, Japan. Yes, this locality is an old-classic one, a mine in a polymetallic deposit where ore exploitation began in the late 17th century and went on sporadically until 1979, although during the 1980s the mine was reworked on a small scale for lapidary rhodochrosite. The big platy specimens which were brought to Munich by Mirko Bonechi (see above under



Figure 22. Rhodochrosite, 17.5 cm, from the Oppu mine, Nishimeya-mura, Naka-Tsugaru-gun, Aomori, Honshu, Japan. Mirko Bonechi specimen; Chris Stefano photo.



Figure 21. Acanthite, 3 cm, from the Hongda mine, Lingqiu County, Datong Prefecture, Shaanxi Province, China. Changsha Stone Culture Communications Co. Ltd. specimen; Chris Stefano photo.

Sinai, Egypt microcline/smoky quartz) came from an old collection, and they are very fine, being a lively medium-pink, nicely lustrous, and dusted with tiny crystals of pyrite. The specimens range between 10 and 25 cm across and are priced from 1,200 to 6,000 euros.

HQLP (“High Quality Low Price”) Sub-Report

No less at the Munich Show than at any good mineral show anywhere, bargains are to be had, and looking for bargains, and

knowing that you know *how* to look for them, serves up a lot of the pleasure and fun of showgoing if you don’t happen to be a gazillionaire. As faithful readers of these show reports know by now, we define a “bargain” in this context as a specimen of any size which is excellent for what it is and costs \$200 (here, 200 euros) or less. Described below are four examples, selected from a much larger candidate pool at the 2023 Munich Show:

The traditional mini-show in the “Alpine” sector of Hall 5 at Munich is always rich in serendipities that the *Strahlers* came onto during the past summer’s collecting season, and when you ask about specimen prices (which may not even be marked), you often find that you have discovered HQLP bargains. In 2023, in the Alpine domain of Hall 5, the Hofer family of Pinzgau, Austria, whose mineral dealership is aptly named *Alpinmineralien Hofer* (alpinmineralien.com), put out a selection of things that family members, friends and neighbors had recently taken down from the mountains, and of these what impressed me most were about 20 lovely thumbnails and miniatures of **chlorite-coated titanite** from the Felbertal (Felber Valley), Mittersill, Zell am See District, Salzburg, Austria. Very thin, wafer-like, transparent yellow-green, titanite crystals to 4.5 cm form loose, delicate groups all covered to about 75% of their areas by glittering dark green chlorite. The Hofers collected these specimens, about as typically “Alpine” as anything you can think of, from a single cleft in the Felbertal a few months before the show, and in Munich they were pricing them at only 40 to 100 euros.

Back in the mostly “worldwide” world of Hall 6, Nicolas Bouvin of the Belgian dealership *NB Minerals* (nbminerals.be) had about 40 unusual-looking specimens, thumbnail to small-cabinet size, of **quartz** which is vividly tinted both by red hematite and



Figure 23. Titanite coated by chlorite, center specimen 4.5 cm, from Felbertal, Mittersill, Zell am See, Salzburg, Austria. Alpenmineralien Hofer specimens; Chris Stefano photo.

Figure 24. Quartz with chlorite and hematite, 10.5 cm, from Bierghes, Walloon Brabant Province, Belgium. Nicolas Bouvin specimens; Chris Stefano photo.



by dark green chlorite, these from a road-fill quarry near the town of Bierghes, 17 km southwest of Brussels. The quartz crystals are mostly of the “Tessin” habit, i.e. thin, symmetrically tapered, and coming to points, although some of the larger crystals (to 20 cm) are flattened and show conventional rhombohedral terminal faces. All of the crystals have bright red dustings of hematite near the tips and green zones of chlorite inclusions near the bases, and all of the specimens come from a single find, made about a dozen years ago, which was described in a 2012 issue of the French magazine *Le Règne Minéral*. Some specimens from the find were offered

at the 2012 Ste.-Marie-aux-Mines Show (see that report in the September–October 2012 *Mineralogical Record*), but their likes have not been seen on the market since then, as Nicolas has been holding on to what he had. Now, having decided to sell off the whole lot in Munich, he asked only 75 to 175 euros for thumbnails and miniatures which are loose, pert-looking clusters and sprays of the highly distinctive Belgian quartz crystals.

Do we need yet another note on **vanadinite** from Morocco? Well, certainly we do, when another distinctive habit of this beautiful stuff appears, and in Munich it was Gilles Emringer of *Multiaxes*



Figure 25. Vanadinite crystal groups to 6 cm, from Midelt, Morocco. Multiaxes specimens; Chris Stefano photo.

Figure 26. Colorless scheelite, 4.5 cm, from the Dongqiang (?) mine, Jiangxi Province, China. Changsha Stones Culture Communications Co. LTD specimen; Chris Stefano photo.



(see above under Congo malachite/barite) who had the goods: three flats of thumbnails and miniatures from an early-summer 2023 find near Midelt. These are loose, glistening clusters of barrel-shaped, slightly convex crystals ranging in color from yellow-brown through orange-brown to a rich chocolate-brown: to these last you might want to apply the colloquial term “endlichite” but should not, since they are not prismatic like Mexican “endlichites” and since Gilles

has secured analyses showing their arsenic content to be negligible. The specimens are very bright and quite attractive, and Gilles asks only around 30 euros for thumbnails and 50 to 100 euros for miniatures. He also had eight larger pieces, to 8 cm across, priced, still within sight of HQLP territory, at around 300 euros.

And now we return to friendly Wangwei of *Changsha Stones Culture Communications Co. LTD*, who had those fine acanthite

Figure 27.
Pyromorphite,
6.5 cm, from the
Friedrichsseggen mine,
Bad Ems, Rheinland-
Pfalz, Germany.
Kristalle specimen;
Chris Stefano photo.



specimens from the Hongda mine. Also on her table was another white tray which held about 25 miniature-size crystal clusters of gleaming white **scheelite**, unlabeled and casually jostling each other, which, Wangwei said, had been collected sometime in early 2023 from a mine called—she wrote it out for me—Dongqiang, somewhere in Jiangxi Province. Here we confront the usual problems with Chinese locality attributions, perhaps also with Chinese-to-English transliterations, for in my references and on Mindat, I have been unable to find a “Dongqiang” mine, although Dr. Guanghua Liu, in his 2006 book *Fine Minerals of China*, does say that the extensive Dayu mining area in Jiangxi has tungsten deposits productive of good scheelite specimens. Anyway, *these* scheelite specimens are platy groups of very sharp, lustrous, white to colorless pseudo-octahedral crystals with individuals reaching 1 cm; clusters ranging from 3 to 8 cm in size are priced from 100 to 200 euros, and they are among the very best HQLP-type specimens that I saw in Munich in 2023.

High-End Superstar-Specimens

This being Germany, after all, the high-end report leads off with a wonderful old 6.5-cm specimen of green **pyromorphite** from the Friedrichsseggen mine at Bad Ems, Rheinland-Pfalz, Germany

(see the article on this locality in the November–December 1984 *Mineralogical Record*). This superlative “Ems” pyromorphite, once in the collection of Werner Lieber and once shown on a poster for the Bad Ems Show, is now owned by Wayne and Dona Leicht, and it reposed in dignity at their *Kristalle* stand in Munich in 2023. The specimen must be called *perfect* for what it is: ideally composed, fresh-looking as if just out of the ground, and of the rarer green color (the great majority of Bad Ems pyromorphites are brown); no wonder indeed that the Leichts asked \$27,500 for it.

An elegant, slightly darkened space near the center of Hall 6 was lined with wall cases in which many gorgeous high-enders had been put out in soft, reverent-seeming lighting—some of the cases bore specimens from Daniel Trinchillo’s *Fine Minerals International* while others held pieces from *MCP Mineralogical Collection Professionals* (mcp-italy.com). Of all of the wonders here, one of the two of Daniel’s which sang loudest to me is a 12-cm **bournonite** from the Yaogangxian mine, Chenzhou Prefecture, Hunan Province, China. This is among the finest Yaogangxian bournonite specimens I have ever seen (of the many which are around these days), as it has fine, big crystals of quartz and fluorite flanking a giant, brilliantly lustrous, compound crystal of metallic black bournonite which is crowned by a cubic crystal of purple fluorite. Its price



Figure 28. Bournonite, 12 cm, from the Yaogangxian mine, Chenzhou, Hunan, China. Fine Minerals International specimen; Chris Stefano photo.



Figure 29. Fluorite, 13 cm, from the Keng Zi Khou mine, Xiayang, Yongchun, Fujian, China. Fine Minerals International specimen; Chris Stefano photo.



Figure 30. Gold on quartz, 10 cm, from Brusson, Aosta, Italy. MCP Mineralogical Collection Professionals specimen; Chris Stefano photo.



Figure 31. Andradite, variety demantoid, 13.5 cm, from Val Malenco, Sondrio, Lombardy, Italy. MCP Mineralogical Collection Professionals specimen; Chris Stefano photo.



Figure 32. The show theme this year was “Art d’Objet,” minerals as works of art, and many great specimens were on exhibit, accompanied by artworks created depicting them. Here is an emerald crystal on matrix from the Rist mine in North Carolina, and the portrait of it painted by Tama Higuchi-Roos. C. Keilmann photo.

was not disclosed, but for sure it exceeds the \$25,000 which we have arbitrarily set as the “floor” price for high-end specimens to be noted in this sub-report.

The other *Fine Minerals International* specimen over which I went wild is a large-cabinet-size **fluorite** of what is sometimes called the “tanzanite” type because of its vibrant purple-blue color and total gemminess. This one, labeled as having come from the Keng Zi Kou mine near the town of Xiayang, Yongchun County, Fujian Province, China, boasts a towering cluster of tanzanite-colored crystals (cubes with dodecahedral modifications), and it would be a stunning prize for any collector able to pay \$45,000 for it.

An obliging Italian fellow from the MCP organization was happy to tell me that MCP’s 10-cm **gold on quartz** specimen from Brusson, Aosta, Italy, is the best such thing ever recovered from the old, little-known Brusson-area gold mines in the Italian Alps (from which examples still trickle out into the market occasionally). The spongy to dendritic crystallized gold is extremely bright, and two great masses of it sit well on the white quartz of this terrific piece. Not surprisingly, this is a P.O.R., “price on request,” specimen.

In a box in its back room, MCP also had a magnificent specimen of **andradite, variety demantoid**, from Val Malenco, Sondrio, Lombardy, Italy. Medium grass-green, entirely gemmy, vividly lustrous dodecahedral crystals of the garnet to 1.5 cm are lightly embedded on a 14-cm matrix plate consisting of white, densely matted asbestiform amphibole. Most major finds of classic demantoid specimens in Val Malenco are many decades old, but some collecting has happened there recently: the age of this specimen goes unspecified to the casual inquirer (or MCP just doesn’t know

it), but it is hard to imagine a better example of gemmy Italian demantoid crystals, well placed on matrix at that. Here we have another instance of “P.O.R.”

The price of the final item in this high-end sub-report is a “mere” 15,000 euros, but the specimen is mineralogically and historically interesting and its story likable. The story came to me via Alfredo Petrov (alfredo@mindat.org), who usually offers specimens of offbeat little rarities picked up during his many travels in Europe, the United States, South America and Japan. In Munich, Alfredo translated for me what his Spanish friend at a neighboring stand, Josep Sanchez-Lafuente i Mariol (intanpitu@ametrino.com), had to say about what he, Josep, had under his table, namely a world-beating **pyrite** specimen from the Ambasaguas quarries near Muro de Aguas, La Rioja Province, Spain. Now, small, loose, lightly striated, modified-cubic crystals of pyrite from Ambasaguas are familiar HQLP items at many mineral shows, but this cluster of big gleaming crystals, 11 cm wide and brilliantly lustrous, is a different thing altogether. It seems that the famous Barcelona collector Joachin Folch-Girona (1892–1984) once mentored a group of teenagers in mineral collecting, especially field collecting, and it had been under his aegis and by his instruction that Josep, age 17, had found the great pyrite specimen in 1971. At the time he offered it to Folch-Girona, but the great collector told him to keep it, and now, 52 years on, Josep was offering it for sale at the Munich Show—whether or not successfully I don’t know at this writing. Alfredo emphasized that the specimen easily is the best pyrite ever to come out of the marl of the Ambasaguas quarries, and it is indeed a “killer” pyrite from anywhere regardless. Getting to ogle it and to hear its history was



Figure 33. Italian artist Leonardo Scarpelli with his remarkable artwork depicting an aquamarine crystal spray... not with paint but created as a stunning mosaic composed of hundreds of cut and polished bits of minerals. C. Keilmann photo.



Figure 34. American artist Tama Higuchi-Roos standing in front of a display case containing the famous “Rabbit Ears” blue-cap tourmaline from the Tourmaline Queen mine in California (Houston Museum of Natural Science), and her painting of the same specimen. She had a dozen paintings in the exhibit. C. Keilmann photo.





Figure 35. Wendell Wilson's oil painting of a pyrargyrite crystal cluster from Taxco, Mexico; the specimen, from the Terry Wallace collection, was exhibited nearby. Tom Moore photo.

one of my special treats in Munich in 2023.

Displays at the Show

Private collectors, and sometimes hobbyist organizations and local museums, regularly put in small special-topic displays at the Munich Show, with several rows of tabletop display cases laid out in a dedicated space in Hall 5. This year, for the first time, there was an official contest among them for the *schönste Sammlervitrine* (most beautiful collector cases): showgoers could pick up a ballot and vote, and the winner was announced at 10:00 a.m. on the last day of the show: it was the showcase put in by Mateusz Szczepanik (Poland) entitled “A brief history of Pb-Zn mining in the upper Silesia area.”

I checked boxes on the ballot, the better to recall the most appealing of those cases mostly concerned with crystallized minerals (respectfully passing by those concerned with gems, gastropods, thundereggs, polished agate slabs, etc.). My vote went to *all* of the following cases: Calcite from Germany and Southern Europe (Paul and Antonie Weghorn); Galena from Austria and Romania (Markus Varga); Archduke Stephan of Austria and “His” Mineral, Stephanite (Walter A. Weber); Mineral Finds From Portugal (Wolfgang Teufel); Theme SiO₂—from Agate to Twins (Dominik Seidel);

Bavarian Classics—Quartz from Northern Bavarian Sites (Klaus Ludwig); Minerals and Mining of St. Andreasberg, Part 2 (Joachim Dietrichs); Mineral Specimens in Original and Drawn in Acrylic (Edgar Müller); Selected Exhibits from the Juchem Quarry, Niederwörresbach (Dietrich Mayer); A Brief History of Pb-Zn Mining in the Upper Silesia Area (Mateusz Szczepanik); and The Incredible Stories of the MMeV Youth Group (Stefan Kaserer).

Separately, in the “Alpine” area of Hall 5, seven displays addressed Alpine themes, and I voted for all of them: Alpine Fluorite (Andreas Bulla); Alpine Minerals from Nepal (Hari Prasad Timsina); Alpine Minerals (Hannes Hofer); Emeralds from the Habachtal (Claudia and Andreas Steiner); Alpine Collectors’ Minerals (Franco Manavella); Collector Minerals from Austria (Levon Strauss); and Alpine Titanite (Peter Gilber).

Finally, there was the show’s customary “blockbuster” exhibit—this time an array of 145 works of art by 30 artists, past and present, depicting mineral specimens, *together with the specimens themselves*, in an elegant little labyrinth of corridors within an enclosed, hushed space in Hall 6. As hinted at this report’s beginning, a lot of experienced people were ready to say that this was the finest “major” exhibit mounted in Munich for many a year, including for



Figure 36. The famous painting of an Alpine mineral collector, entitled *Der Mineraloge* (“The Mineralogist”), painted in 1883 by the Swiss artist Raphael Ritz (1829-1894) and now in the collection of Marcus Budil. This painting was the cover illustration for the “Art d’Objet” exhibition booklet. Tom Moore photo.

a good number of years before the pandemic setback. The artworks and the mineral specimens which are their subjects had been provided by 58 lenders from everywhere who carried (at obvious risk) their *über*-valuable treasures to Hall 6 of the Munich Trade Fair Center, and the effect of the whole was fabulous both artistically and mineralogically.

Available for showgoers to purchase was a 160-page bilingual booklet—with English text provided by Mark Mauthner, one of the exhibition’s chief organizers—providing extensive details on the lives, careers and techniques of the artists and on the current ownerships of the artworks and specimens. The booklet’s title, *Art d’Objet*, was also the title of the exhibition itself, for reasons

explained in English on an “Introduction” placard: “The additional, albeit subtle, message inherent in the inversion of the phrase ‘Objet d’Art’ is an allusion to the considerable creativity and artistry invested in the final appearance and pictorial impact of the natural objects.” Here, then, were lithographic-plate illustrations of specimens by early authors of mineral books such as Reinhard A. Braun (*Das Mineralreich*, 1906), Friedrich J.J. Bertuch (*Bilderbuch für Kinder*, 1792), and James Sowerby (*Exotic Mineralogy*, early 19th century); numerous paintings of specimens by Claus Caspari (1911 – 1980: 10 paintings), Eberhard Equit (1939–2016: 12 paintings), Tama Higuchi-Roos (born 1999: 13 paintings), Hildgard Könighofer (born 1954: 9 paintings), Frederick C. Wilda (born 1941: 7 paintings); the Ukrainian artist-in-exile Ksenia Levterova (born 1986: 10 paintings), and far too many others to name, although I will say that the publisher and Editor-in-Chief of the *Mineralogical Record*, Wendell E. Wilson, contributed his oil painting, which normally hangs on his wall in Tucson, of a darkly gorgeous pyrrargyrite miniature from Taxco, Mexico. Remember as well that the *specimens* were present too, including famous ones such as the great 20-cm “rabbit ears” elbaite from the Tourmaline

Queen mine, California and the 19.5-cm emerald crystal on matrix from the Rist mine, North Carolina, both now in the collection of the Houston Museum of Natural Science; there was also the 22.5-cm “dragon” of highly etched aquamarine from Pedra Azul, Brazil, owned by Marcus Budil, who *also* painted the watercolor rendition of it, and there was the 3.5-cm stephanite specimen from the Husky mine, Yukon Territory, whose photo appeared on the cover of our January–February 2021 issue and whose wildly iridescent image was captured in pastel pencil by Rebecca Johnston (born 1983). And displayed at the entrance to this labyrinth-full of natural beauty and artistic expression was the famous 1883 painting by Raphael Ritz called *Der Mineraloge*, “The Mineralogist,” now owned by Marcus Budil, showing a *Strahler* examining specimens while his wife looks on and his little son hauls in a boulder of something or other, in the damp shadows of an earthy workroom somewhere in the Alps—the painting which is, if anything is, the emblem of the peculiar fascination which drives us all.

Can the Munich Show possibly top *this* next year? Come and see . . . but that will do it for now from Munich. *Glück auf!*

Eureka!

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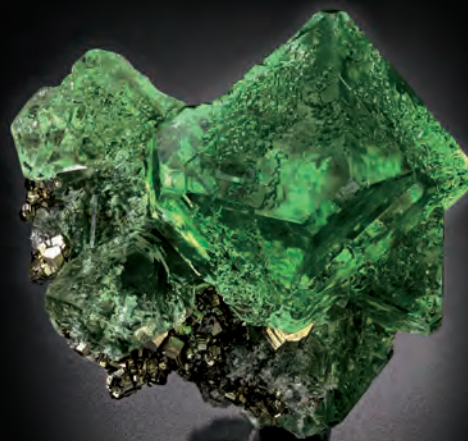
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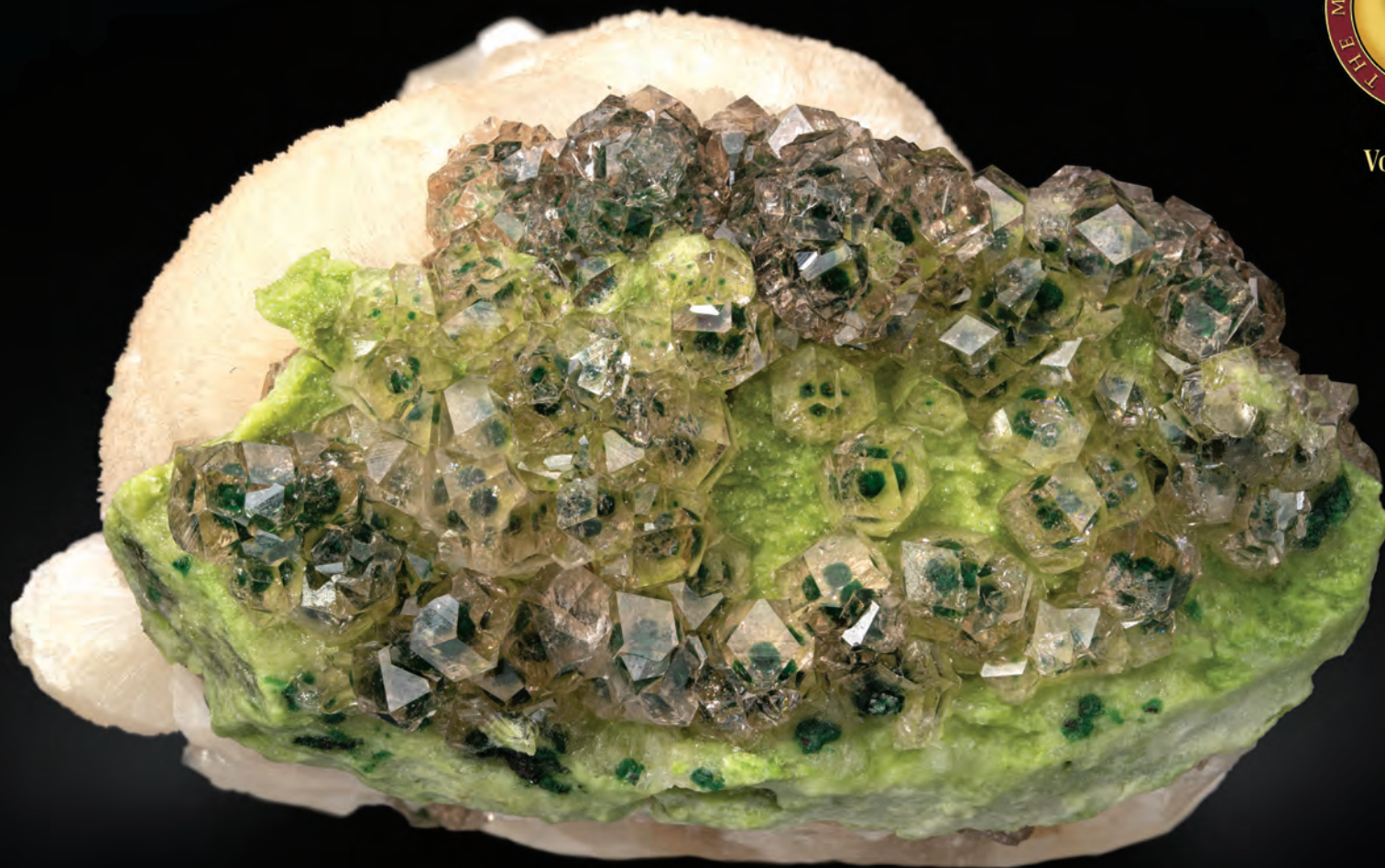
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Tourmaline from Lueshe Mine, Kivu, Democratic Republic of Congo • 6.3 cm high • Photo: Jeff Scovil

Supplement to



Vol. 55, No 1



Grossular Garnet var. Chromium Hessonite, Prehnite
Jeffrey Mine, Val-des-Sources, Estrie, Québec, Canada
7.7 cm

Thomas Spann Photo