50th Anniversary Issue!

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THE MINERALOGICAL RECORD

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The Piedmont Mine

Yavapai County, Arizona

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The Piedmont mine is famous among Arizona mineral collectors because of a single pocket of beautiful, drusy quartz-coated pseudomorphs of malachite after azurite crystals discovered there by a collector in 1955. But the exact spot of the discovery remains unknown, and further searches of the area by many collectors since then have been unsuccessful at finding any more.

INTRODUCTION

The Piedmont mine in Yavapai County is the source for some of the most iconic copper minerals ever found in Arizona. From a single find made in 1955, scarcely 50 specimens exist. Yet these specimens—pseudomorphs of malachite after blocky azurite crystals coated by drusy quartz—are highly sought after, rarely available, and always expensive. They have been referred to as a Holy Grail for enthusiastic Arizona mineral collectors.

HISTORY

The Piedmont mine lies just west of Bloody Basin, along the Bloody Basin Road (Forest Service Road 269) in the Tonto National Forest near the east end of Yavapai County. It was a heavily promoted but poorly producing copper/gold/silver group of claims located to the north of Copper Creek, within sight of Brooklyn Peak.

The mine lies in high desert, with rolling hills to the east and south, some of them basalt-capped. Vegetation consists of sparse grasses, prickly pear cactus, scattered juniper and scrub. The altitude at the mine is about 4,000 feet. The local geology consists primarily of medium-grained granite cut by a series of subparallel quartz dikes striking northwest to southeast. The age of the granite has not been definitively determined, and is variously reported as either Paleozoic or Tertiary,

The original six claims of the Piedmont mine (called the Copper Queen No. 1 through 6), located in 1892 and never patented, are located in the NW¼, of Section 33, T10N, R4E. The mine was a

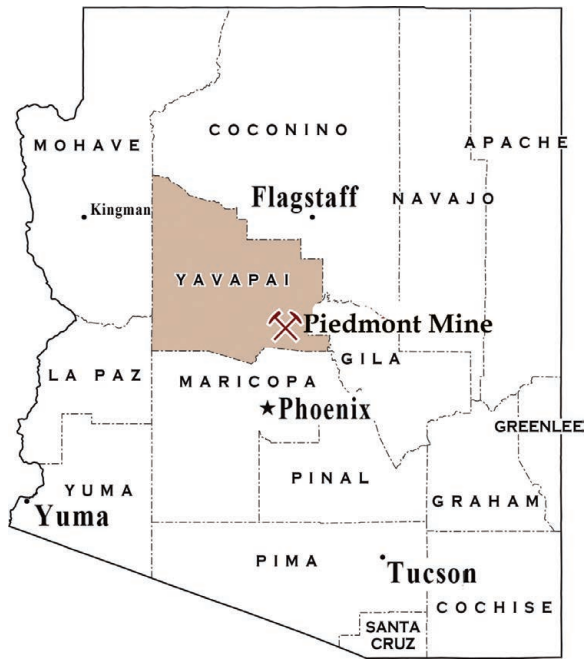

Figure 1. **Location map showing the Piedmont mine in eastern Yavapai County. W. W. Besse map.**

Figure 6. **View of a trenched area at the Piedmont mine. On older maps, this was indicated as the site of the mine's adit. Barbara Muntyan photo.**

Figure 7. **Quartz vein near the Piedmont mine showing malachite and chrysocolla staining; gad pry bar for scale. Barbara Muntyan photo.**

Figure 8. **Chrysocolla, 5 cm across, *in situ* on the Piedmont shaft dump. Barbara Muntyan photo.**

Into the early 1930s, the property was known as the "Copper Queen" or the "Arizona Copper Queen." The name even appears on USGS topographic maps from 1929 and 1933. One could ask what the connection might have been to Phelps Dodge's famous Bisbee Copper Queen mine. James Douglas of Bisbee had two sons: Walter, the elder son, took over management of Bisbee's Copper Queen mine in 1901. His younger brother, nicknamed Rawhide Jimmy, was sent to Jerome to look after the operations there. There is no evidence that any of the Douglas family members even knew of the existence of the Piedmont, *a.k.a.* Arizona Copper Queen. But perhaps copying the name of the great Bisbee Copper Queen mine, and thus acquiring its aura, might have added some promise to the poor country cousin. It didn't.

In 1944, the mine and surrounding area was visited by mining engineer B. W. Brown for the Arizona Department of Mines and Mineral Resources, and he referred to the mine as the "Piedmont." Brown's field report, dated April 28, 1944, is found in the Department's files. Under a man named N. F. Stevens, the Copper Queen had been renamed the Piedmont mine, and in 1944 the development company was called the Piedmont Gold Mining Company. The property at that time consisted of 13 unpatented claims, with

Figure 18. **Malachite-after-azurite pseudomorphs with drusy quartz coating, 25 cm, from the Piedmont mine. Les and Paula Presmyk collection, ex Donald Wayne Thompson, Edward Swoboda, and Jim and Dawn Minette collections; Jeff Scovil photo.**

Figure 19. **Malachite-after-azurite pseudomorphs with drusy quartz coating and a cluster of small quartz crystals with minor hematite, 4.5 cm, from the Piedmont mine. Evan Jones collection, ex Donald Wayne Thompson collection, ex Wayne A. Thompson, collection; Jeff Scovil photo.**

that there were at least four different vugs. The specimens available for examination show major differences in their appearances. The matrix for the various specimens ranges from hematite-included breccia to larger, flattened, gray-white quartz crystals, to tan to red-brown to dark-gray rock, both breccia and andesite. The drusy quartz ranges from white, fine-grained crystals to larger, clear quartz crystal points. The underlying malachite pseudomorphs range from forest-green to emerald-green, grass-green, pale green and nearly white. The combination of rich green malachite pseudomorphs coated with gemmy quartz druses against dark matrix makes them a unique and beautiful occurrence in a state famous for beautiful malachite pseudomorphs. There are also a handful of quartz-coated malachite "worms" after an unknown mineral, probably monoclinic, from this locale.

Azurite $Cu_3(CO_3)_2(OH)_2$

Sky-blue to medium-blue chalky blebs and coatings of weathered azurite occur in some quantity in the rubble surrounding the collapsed Sunshine shaft. No unaltered azurite was found near the Piedmont shaft; it has completely altered to fibrous malachite. Such altered azurite crystals occur as compressed pseudo-rhombic crystals up to 3.5 cm on edge. The appearance is similar to that found in azurite/malachite crystals from the New Cornelia pit in Ajo, Arizona.

Barite $BaSO_4$

A few tiny, tabular, pale tan crystals of barite to 3 or 4 mm were found at a prospect pit north of the Bloody Basin Road on the newer claims.

Figure 22. **Malachite-after-azurite pseudomorphs with drusy quartz coating, 9 cm, from the Piedmont mine Mark Hay collection, ex Monnie Speck, ex Sandi Aston collections; Jeff Scovil photo.**

Figure 23. **Cluster of milky quartz crystals, 4.5 cm, from a vug in rubble found near the Piedmont shaft. Barbara Muntyan collection; Christi Cramer photo.**

a mixture which include hematite. No specular hematite nor any larger hematite crystals have been found.

Jarosite $KFe_3(SO_4)_2(OH)_6$

Jarosite is found to the north of the Bloody Basin Road with quartz and feldspar.

Malachite $Cu_2(CO_3)(OH)_2$

Malachite occurs as coatings or crack fillings in quartz or feldspar with some regularity at the Piedmont mine. In the pseudomorph specimens, malachite completely replaces azurite, forming lustrous, fibrous, sub-parallel sheaves resembling damask embroidery of an emerald-green color. In a very few places, both to the west of the Piedmont shaft and also south of Copper Creek, some tiny, blocky malachite crystals after azurite with satin luster to 4–5 mm have been found. Evan Jones has a miniature specimen from Donald's portion which was obtained by Wayne first and then sold to Evan Jones; the specimens show similar malachite crystals, coated by a transparent crust of drusy quartz. I have one malachite specimen obtained with the Piedmont shaft study material. It is a rounded, slightly flattened mass of short-fiber malachite lying between two masses of coarsely crystallized, subhedral quartz crystals. If one waxed poetic, it looks a bit like a green hamburger slider!

Mottramite $PbCuVO_4(OH)$

Massive mottramite has been found in small amounts along the quartz dikes, and has been confirmed by Raman analysis.

Quartz SiO_2

Quartz is widespread at the Piedmont mine. It forms dikes extending hundreds of feet in length, but these dikes have little vugginess or crystallization. Near the Piedmont shaft, at the side of the trail leading to the headframe foundation, a few quartz boulders the size of watermelons exhibit some partial quartz crystals in crude vugs. Two small specimens with quartz sprays of 1 cm and 3 cm were collected. A number of the pseudomorph specimens formed on flattened, gray-white quartz crystals. I now own the pseudomorph purchased by Rukin Jelks from Wayne Thompson and donated

The San Manuel Mine

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In terms of total ore production, the San Manuel mine was the largest underground mining operation in North America, but most mineral collectors have never heard of it. Nevertheless, San Manuel has produced some superlative specimens over its 44-year history; you just have to look a little harder to find them. Though few in number, extraordinary examples of azurite, malachite, cuprite, native copper and pyrite rank among the treasures of Arizona mineralogy.

INTRODUCTION

During its operating lifetime, the San Manuel mine was a major copper producer in Arizona. By the time mining ceased in 1999, it had produced over 4.6 million tons of copper, over 73 tons of molybdenum and lesser amounts of gold and silver. In terms of total ore production, it was the largest underground mining operation in North America, but most mineral collectors have never heard of it. Even among collectors in Arizona it has remained largely below the radar. This is for two reasons. First, because of the method of mining, few mineral specimens were recovered. Second, collectors lucky enough to have good San Manuel pieces are reluctant to part with them, so they are rarely available on the specimen market. However, San Manuel has produced some superlative minerals over its 44-year history; you just have to look a little harder to find them.

The San Manuel mine is located in a mountainous region of south-central Arizona near the towns of San Manuel and Mammoth in Pinal County. It sits at an elevation of 3,450 feet, with the Galiuro Mountains to the east, the towering Santa Catalina Mountains to the southwest and the gently rolling Black Hills to the north and west. The San Pedro River, reported on Wikipedia as "the last major, free-flowing undammed river in the American Southwest," is 3 miles east of the mine. The city of Tucson lies 45 miles to the southwest. The San Manuel mine is in the Old Hat Mining District, only a mile from the famous specimen mines at Tiger, but it could

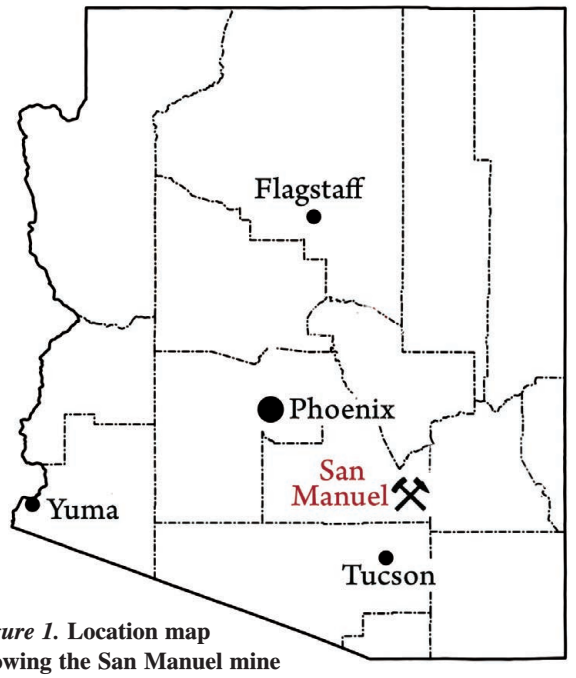

Figure 1. **Location map showing the San Manuel mine in southeastern Pinal County.**

Figure 20. **Chrysocolla coating malachite pseudomorphs after barite, 3.5 cm, from the Oxide pit of the San Manuel mine. Garry Alexander collection; Jeff Scovil photo.**

Figure 21. **Chrysocolla pseudomorphs after gypsum, 4.2 cm, from the Oxide pit of the San Manuel mine. Garry Alexander collection; Jeff Scovil photo.**

Figure 22. **Drusy quartz coating chrysocolla pseudomorphs after gypsum, 4.5 cm, from the Oxide pit of the San Manuel mine. Garry Alexander collection; Jeff Scovil photo.**

Figure 23. **Dendritic copper with cuprite patina, 8.1 cm, from the San Manuel mine. Jordan Fensterman collection; Jeff Scovil photo.**

Figure 24. **Cluster of spinel-law twinned copper crystals, 11.1 cm, collected in 1970 from Panel 50 on the 1715 level of the San Manuel mine. Les Presmyk collection, ex Wayne Thompson collection; Jeff Scovil photo.**

specimens with calcite, gypsum, pyrite and molybdenite, but good crystals are exceedingly rare.

Chrysocolla $(Cu,Al)_2H_2Si_2O_5(OH)_4 \cdot nH_2O$

Thomas (1966) reported that chrysocolla was the most abundant copper mineral in the oxide zone of the San Manuel orebody. Consequently it was found with a wide variety of other minerals including azurite, atacamite, calcite, cuprite, dioptase, gypsum, malachite, quartz and tenorite.

Rich sky-blue botryoidal plates of chrysocolla coated by sparkling drusy quartz were recovered from the Oxide pit, Panel 50 and Panel 7 on the 1475 level. These pieces are very similar to those from the mines in Globe-Miami and Ray, Arizona. Several finds of chrysocolla pseudomorphs after gypsum and after malachite were made in the Oxide pit throughout its history. One of the authors (GA) made several finds of chrysocolla after gypsum in the Oxide pit. One has stout crystals to 4 cm coated with a thin layer of drusy quartz, and another has divergent sprays of delicate pseudocrystals to 4.2 cm with no quartz coating. As often happens, many specimens of chrysocolla exposed to air have darkened over time while those protected by a layer of quartz have retained their original blue color.

Clinozoisite $Ca_2Al_3Si_3O_{12}(OH)$

Clinozoisite was reported by Anthony *et al*. (1995).

Conichalcite $CaCu^{2+}(OH)(AsO_4)$

Conichalcite was found in the Oxide pit as microcrystals.

Copper Cu

Native copper was found in the Oxide pit and underground in the San Manuel orebody. It occurred as dendritic and arborescent groups and rarely as superb spinel-law-twinned crystals, associated primarily with malachite and cuprite.

The Oxide pit produced flattened dendritic groups of copper crystals, commonly coated with a patina of dark reddish brown cuprite

Figure 40. **Cuboctahedral pyrite crystal, 10.4 cm, collected in 1975 from Panel 3 on the 2315 level of the San Manuel mine. Garry Alexander collection; Jeff Scovil photo.**

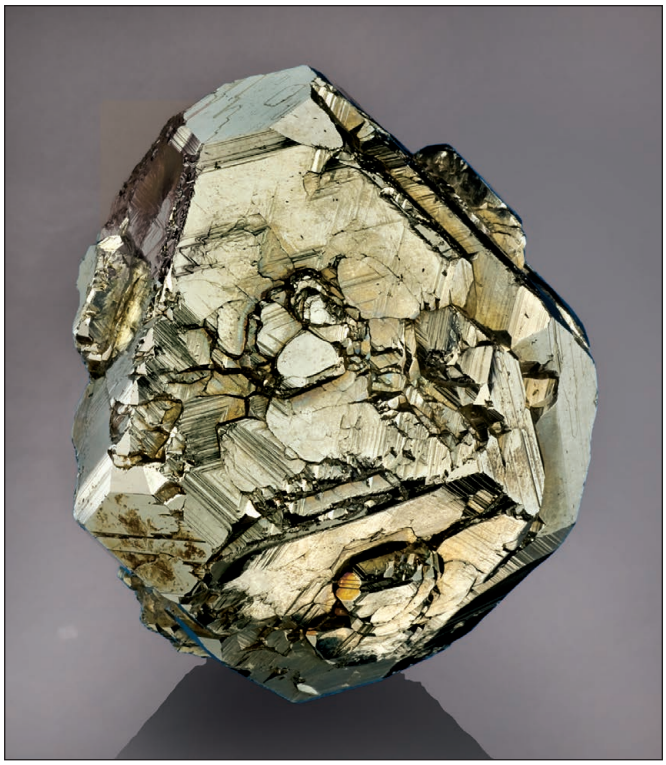

Figure 41. **Cuboctahedral pyrite crystals on matrix, 9.5 cm, from Panel 2 on the 2015 level of the San Manuel mine. Mark Hay collection; Jeff Scovil photo.**

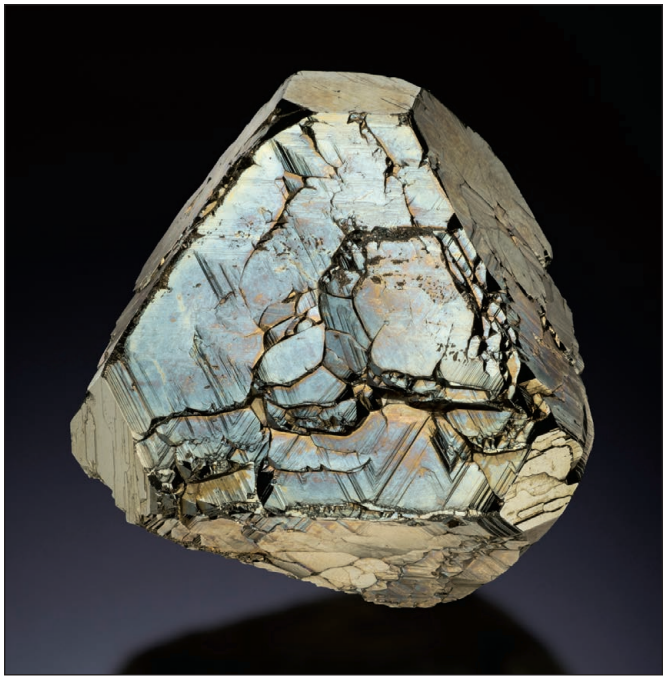

Figure 42. **Octahedral pyrite crystal with cubic modifications, 6.3 cm, collected in 1975 from Panel 3 on the 2315 level of the San Manuel mine. Mark Hay collection; Jeff Scovil photo.**

Figure 43. **Cubic pyrite crystal with octahedral modifications, 1.9 cm, collected in 1991 on the 2615 level of the San Manuel mine. Marty Rex collection; Jeff Scovil photo.**

The Morenci District

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The Morenci District in eastern Arizona is home to many prolific copper mines. Since the first discoveries in 1863, the district has yielded a specimen bonanza of secondary copper minerals, especially azurite and malachite. Over 90 other mineral species have been found there as well, including brochantite, chrysocolla, copper, cuprite, cyanotrichite, and dioptase.

INTRODUCTION

The Morenci District is one of Arizona's oldest mining districts and, in terms of total production, its largest. It is located in eastern Arizona only 16 miles from the border with New Mexico and approximately 115 miles northeast of Tucson. The district includes the towns of Morenci, Clifton and Metcalf, and is also referred to as the Copper Mountain District and the Clifton-Morenci District. It sits along the southern boundary of the Transition Zone physiographic province at an elevation of about 4,750 feet. The Transition Zone is a rugged mountainous region that extends northwest-southeast across the entire state of Arizona and separates the Colorado Plateau on the north from the Basin and Range province to the south.

HISTORY

Discoveries and Dangers

During the 1840s and 1850s, the Apache tribes in Eastern Arizona generally considered Anglo-Americans to be allies against their bitter enemies, the Mexicans—a situation reinforced by the Mexican-American War of 1846–1848. However, tensions eventually rose as more Americans settled in the area, and in 1861 a dispute caused by an inexperienced Army officer who made an accusation against Cochise, Chief of the Chiricahua Apache, resulted in bloodshed. Several of Cochise's relatives were killed, igniting a 25-year war, made worse when federal troops were pulled out to fight in the Civil War.

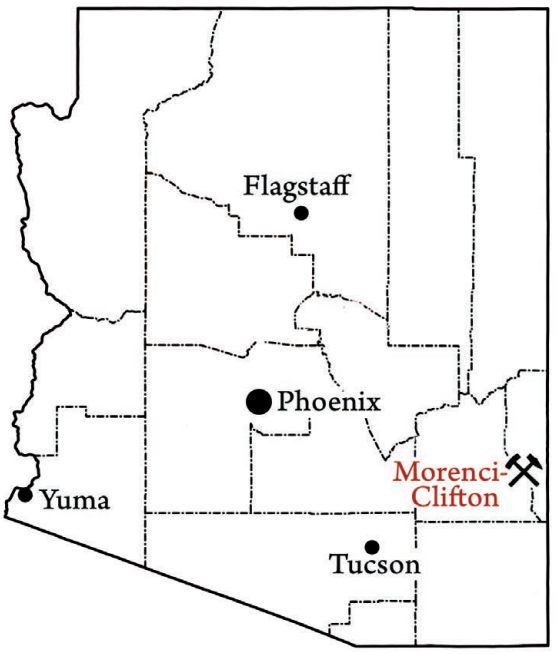
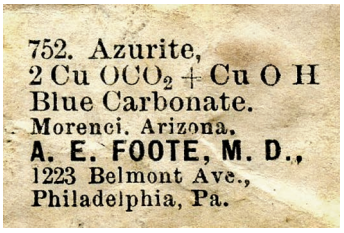


Figure 1. **Location map showing the Morenci-Clifton-Metcalf area in central Greenlee County.**

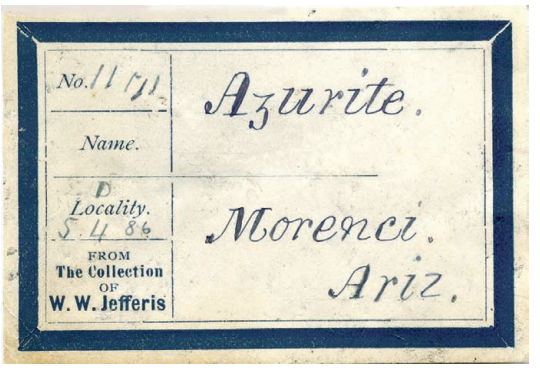
Figure 23. **Botryoidal azurite, 7.2 cm, from "Clifton" (Morenci District), with William W. Jefferis label dated 1886. Carnegie Museum of Natural History collection (no. cm4957); Debra Wilson photo.**

Figure 24. **Globular azurite, 15.3 cm, from Morenci, with A. E. Foote label ("Blue Carbonate") with Belmont address (1877–1890) and William W. Jefferis label dated May 4, 1886. Carnegie Museum of Natural History collection (no. cm4947); Debra Wilson photo.**



He describes "beautiful stalactitic masses of malachite and azurite formerly found in the Detroit and Manganese Blue mines."

Today there are numerous Morenci azurite specimens in museums and private collections that were owned by prominent collectors of the late 19th and early 20th centuries. An extraordinary example is owned by Arizona collector Tony Potucek. It has lustrous, dark blue, 2.5-cm crystals on a black matrix of botryoidal manganese wad. It was originally in the collection of the French mining geologist Edouard Cumenge (after whom cumengeite was named), later acquired by the Natural History Museum; museum records indicate that it was personally collected by Cumenge in 1884.



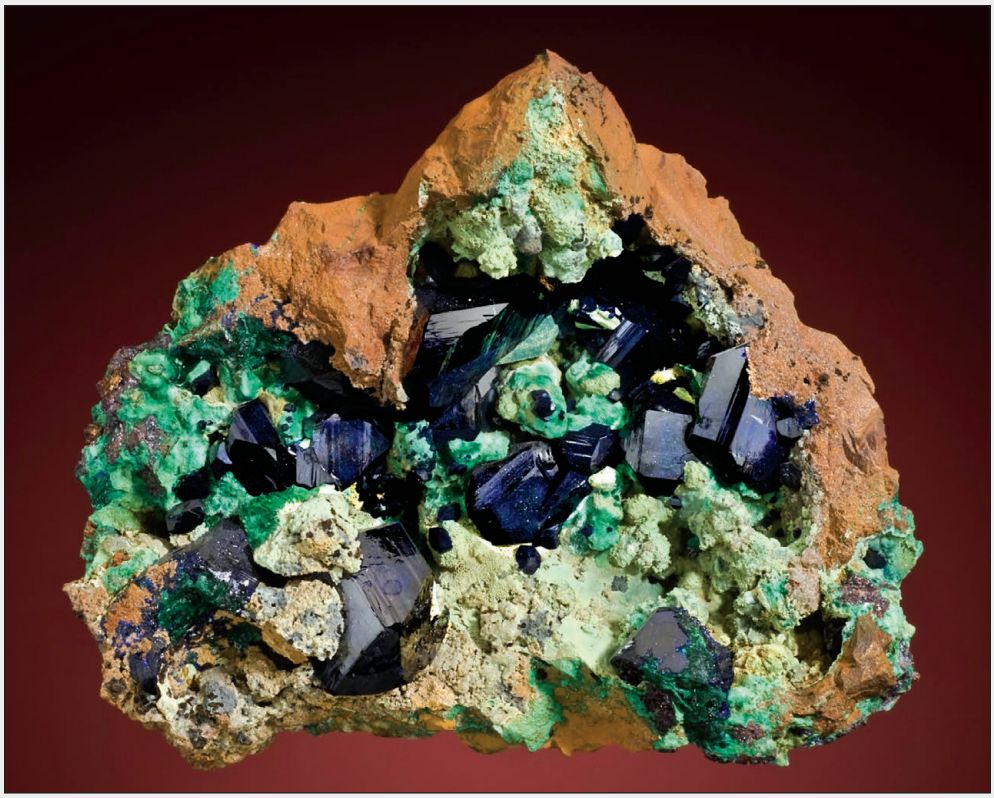


Figure 46. **Azurite and malachite, 9.5 cm, from the Crystal Zone, 4600 Bench, Dispatch Hill, in the Copper Mountain area of the old Morenci pit, collected by Southwest Mineral Associates in 1995. Les Presmyk collection; Jeff Scovil photo.**

Figure 47. **Brilliantly lustrous azurite crystals with malachite pseudomorphs after azurite on limonite, 3.7 cm, from the Morenci mine. Tony Peterson collection and photo.**

Figure 48. **Azurite, 4.2 cm, from the Northwest Extension, Morenci mine. Collected circa 1990 by Southwest Mineral Associates. Mark Hay collection; Jeff Scovil photo.**

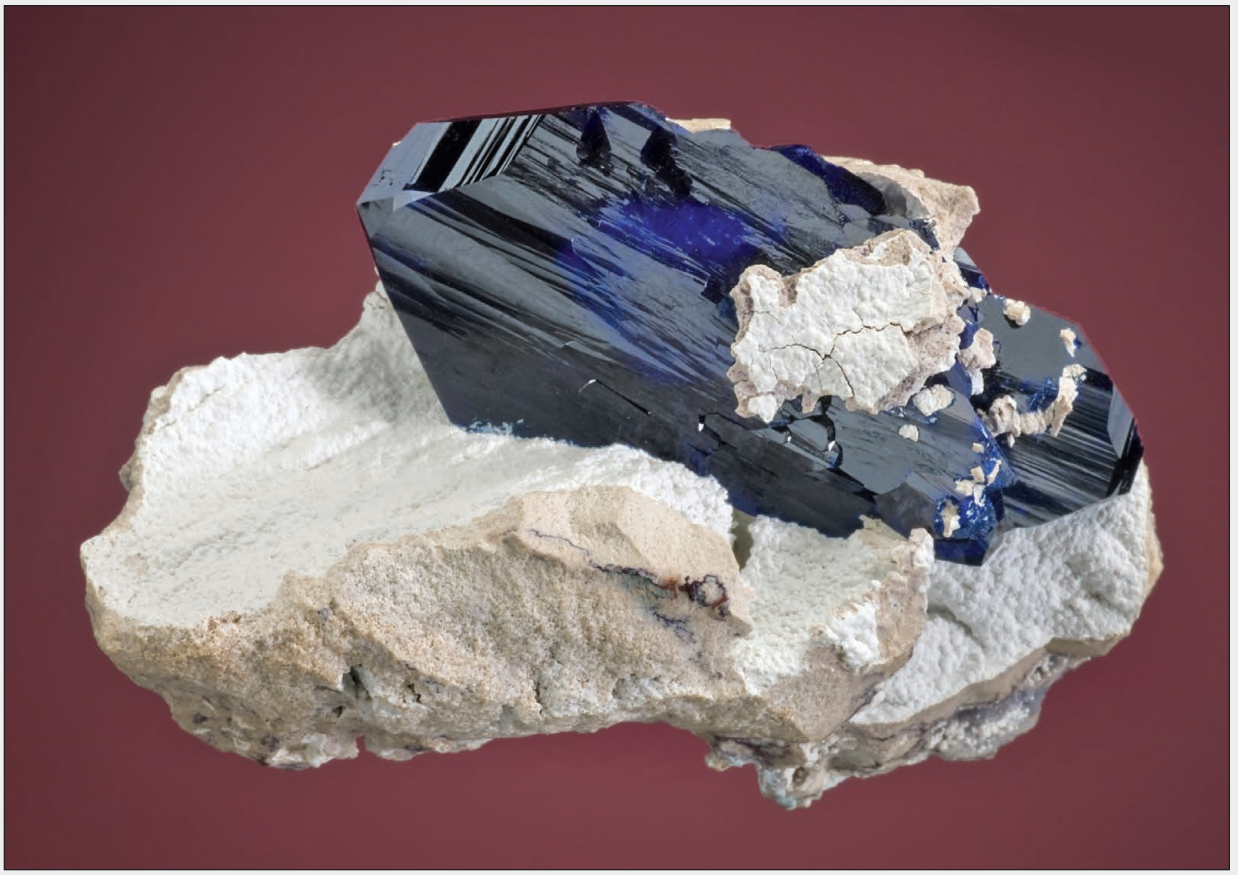


Figure 49. **Azurite, 4.9 cm, from the Crystal Zone on the 4750 bench, Dispatch Hill, Copper Mountain area of the old Morenci pit. Collected in 1984 by Southwest Mineral Associates. Dick Morris collection; Jeff Scovil photo.**

Figure 50. **Malachite pseudomorph after azurite with azurite overgrowth, 4 cm, from the Crystal Zone on the 4650 bench, Dispatch Hill, Copper Mountain area of the old Morenci pit. Collected in 1995 by Southwest Mineral Associates. Dick Morris collection; Jeff Scovil photo.**

MINERAL COLLECTING AT THE MAGMA MINE

SUPERIOR, ARIZONA

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Though the famous Magma mine is now closed and inaccessible, during its working life it provided geologists, mining engineers and miners with opportunities for collecting some of Arizona's finest calcite and barite specimens. Here is a memoir by two collectors who took part in some of those adventures.

Introduction

The authors had the good fortune to spend several years working in the Magma mine in Superior, Arizona, in the late 1970s and early 1980s. Magma was one of the last great underground copper mines in the United States, a true throw-back to the glory days of Western mining. It was a deep, high-grade, hardrock mine with people, methods and orebodies reminiscent of the great underground mines at Bisbee, Butte, Leadville and Kellogg. In this article we reminisce about what it was like to work there, recounting some of our experiences with the mine, the people and the minerals.

In relating our stories, we have used some mining terms that may be unfamiliar to some, so we have included a brief list of terms with definitions at the end of the article.

BRIEF HISTORY

The original claim, staked in 1874 and named the Silver Queen, was discovered by prospectors searching for a rich silver lode they believed to be in the area. They were trying to track down the source of some high-grade silver specimens that had been picked up by a soldier working nearby. They realized that the Silver Queen was not the lode they were seeking but it was a strong vein nonetheless, and they claimed it. A year later and a few miles north, they located their primary target—the fabulously rich silver lode which they named the Silver King. As a silver mine, the Silver Queen was marginal and interest soon waned. Its real value lay in copper, which was not exploited until 1910 when the claim was acquired by eastern mining magnate William Boyce Thompson. Thompson renamed it the Magma mine.

For many years, Magma's principal orebody was the Magma vein, which trended roughly east-west and dipped nearly vertically. It was very rich. Production continued without interruption until the 1960s, reaching a depth of over 4,000 feet. In the 1950s, rich limestone replacement orebodies were discovered farther east and at shallower depths. Though the Magma vein never quit, to reduce costs the company began shifting their mining efforts to the limestone replacement deposits instead. When asked about the character of the vein when they left it, a former Magma mine geologist that had worked there in the 1960s remarked "the ore didn't stop, when we walked away it was 13 feet rib to rib of chalcocite and bornite." To put this into context, chalcocite (Cu_2S) runs about 80% copper and bornite (CuFeS) about 63% copper so each ton of rock mined would have produced over a thousand pounds of copper metal! Though he may have been exaggerating to impress young geologists with

Figure 15. **Rounded, composite calcite crystals, some double terminated, on specular hematite matrix, 5.3 cm, from the 3440-6C stope, 3460 level of the Magma mine, collected by Les Presmyk in July 1980. Mark Hay collection; Jeff Scovil photo.**

to know about was the exact location and what else he had found. He said the mining had advanced to the point where the footwall of the ore bed, where the ore contacted the underlying limestone, had been exposed and there was the pocket. I did go down to look at it but the miners were actively drilling the face and no collecting could take place. I knew that time was short and that the geologists would learn about it fairly quickly, for this was the kind of news that never stayed secret for long. Luckily it was the beginning of the weekend and they would not be back for a couple of days.

Over the next night or two both the shift foreman and the level supervisor were able to continue collecting, ultimately each finding average to notable specimens. While I could not collect the pocket, I did buy everything the two of them collected. All in all, I was able to obtain about 25 barite specimens from them, mostly thumbnails and miniatures with one cabinet piece that is just over 4 inches. There were a few gypsum clusters as well.

As expected, the geologists found out about the pocket on Monday and were able to dig the pocket that week. They collected a number of nice specimens and were able to obtain some from the miners as well. When a parallel panel was driven 50 feet to the north, additional barites were encountered. Unfortunately, the mineralized area in between was determined to be lower grade and no additional mining took place.

In another week or so, mining in this panel was completed and Thanksgiving was coming. No further collecting had taken place because all of the accessible material was mined out and getting to additional specimens would require blasting. However, I was in luck.

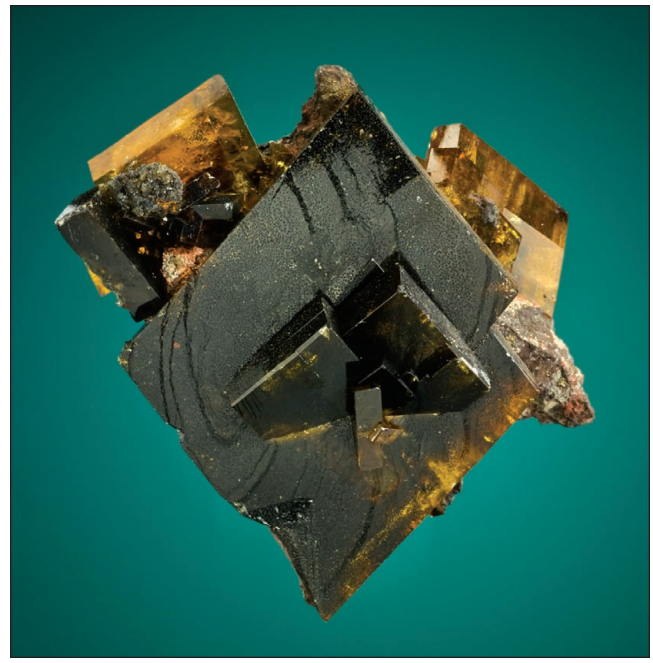

Figure 16. **Barite crystal group, 3.7 cm, from the 3600-4D stope, 3620 level of the Magma mine, collected by shift foreman Ted Miller in November 1980. Les and Paula Presmyk collection; Jeff Scovil photo.**

Figure 17. **Gypsum crystals on matrix, 6.6 cm, from the 3600-4D stope, 3620 level of the Magma mine, collected by shift foreman Ted Miller in November 1980. Evan and Melissa Jones collection; Jeff Scovil photo.**

Treasures of the Magma Mine

The Magma mine has much in common with many of Arizona's other famous copper mines: Its discovery coincided with the country's westward expansion in the latter half of the 19th century. The copper mined there provided longevity and profits. Geologically its orebodies were contained in high-grade veins and limestone replacement beds. And it produced a suite of wonderful crystallized minerals that put smiles on the faces of mineral collectors for years to come.

However, the Magma mine minerals that made it famous among collectors could not be more different from those produced in the other Arizona mines. The alteration of the sulfide ores had not occurred, and consequently the usual suite of secondary copper carbonates and oxides was absent. Azurite, malachite, cuprite and other secondary minerals that made the mines at Bisbee, Globe and Morenci so famous were not found at Magma. Not until the last 30 years of over a century of mining did its value to mineral collectors become apparent. Starting with the exploitation of limestone replacement beds in the 1950s and continuing through the early 1980s, mining encountered pockets of beautiful barite, pyrite and calcite. These remain arguably the finest examples of their species ever found in Arizona and, at the time, were among the finest for the entire country. This album of photos highlights some of the best specimens recovered from the Magma mine during that period.

Mark Hay

Figure 1. **Barite crystal group without matrix, 5.2 cm, from the A-bed replacement horizon, Magma mine. Mark Hay collection, ex Gene Tribbey collection; Jeff Scovil photo.**

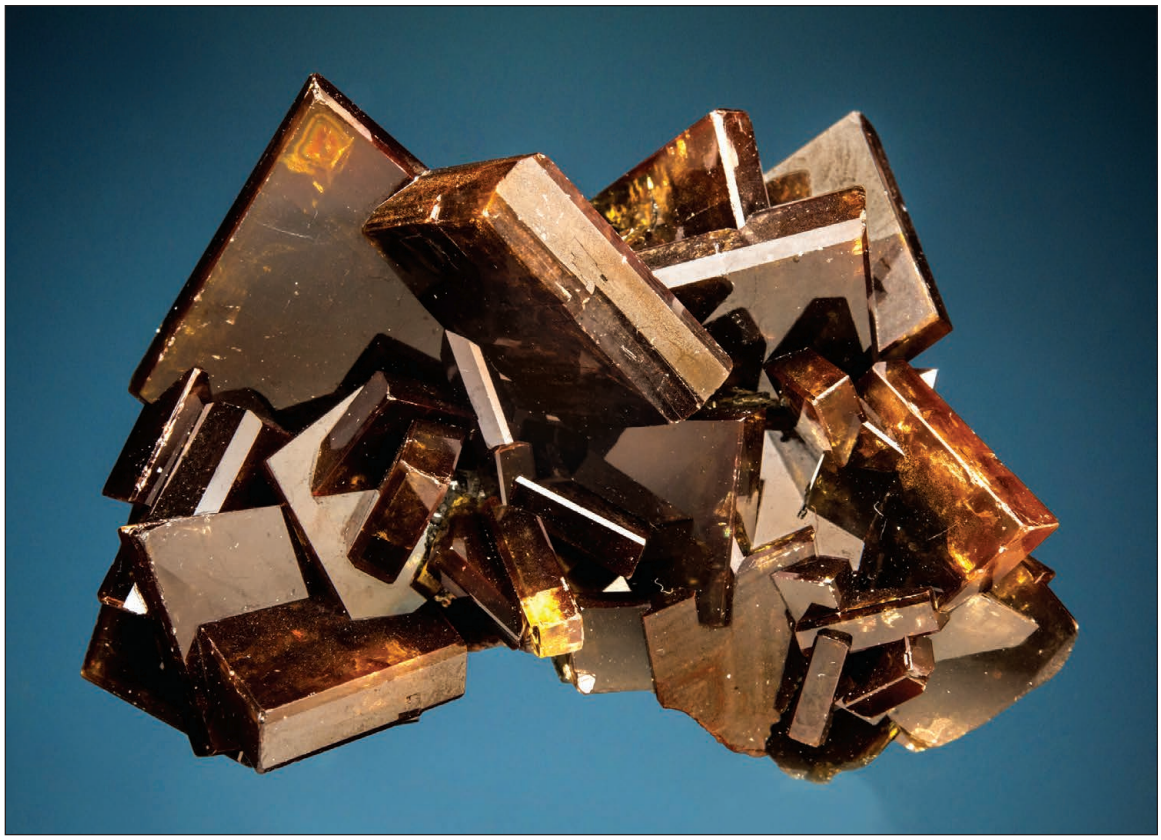

Figure 4. **Barite crystal group without matrix, 5.6 cm, from the A-bed replacement horizon, Magma mine. Tony Potucek collection; Jesse La Plante photo.**

Figure 5. **Barite crystal group without matrix, 6.6 cm, from the A-bed replacement horizon, Magma mine. Dick Morris collection, ex Tom McKee collection; Jeff Scovil photo.**

Figure 19. **Calcite twin on limestone matrix, 11.8 cm, collected in March of 1977 from 97 Fan Drift North, 3700 level of the Magma mine. Les and Paula Presmyk collection; Jeff Scovil photo.**

Figure 20. **Calcite twin on limestone matrix, 8 cm, collected in March of 1977 from 97 Fan Drift North, 3700 level of the Magma mine. Mark Hay collection, ex Dick Bideaux collection; Jeff Scovil photo.**

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50 YEARS OF FIELD COLLECTING IN ARIZONA

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Soft-spoken and unassuming, George Godas has become one of Arizona's most successful underground field collectors. His consummate collecting skill, hard work, uncanny knack for finding pockets, and willingness to face the risks inherent in abandoned mines have yielded an extensive array of beautiful Arizona minerals that today enhance private collections and mineral museums across the country.

INTRODUCTION

Arizona's many mines and mineral occurrences are a smorgasbord for the field collector, and no one knows that better than George Godas. Known by nearly everyone in the Arizona collecting community, George is quiet and modest in his speech, and unassuming in his appearance. Chatting with him, you would never know what a determined force he becomes when digging underground, and what an extensive array of specimens he has come up with over the years. Sometimes preferring to collect alone (a dangerous practice that concerns his friends), he taps the wall rock with his chisel, listening for hollow sounds, and seems to have a nose for sniffing out hidden crystal pockets. He is more collector than dealer, but he eventually sells the specimens privately, without fanfare, without a show booth or shop and often without supplying his own labels. For these reasons, George has been largely an unseen force in the mineral world. But the Godas provenance is something that deserves to be preserved with his specimens, and all collectors who have acquired items he found should be sure to record that fact with their documentation.

The background recounted below should provide some historical context and interesting details—factors which always give collectors a richer appreciation for the minerals they own. The authors are grateful to George for his phenomenal memory and for his willingness to share some of his experiences with us. The following is largely an adaptation of various memoir-like stories that George has supplied to us in recent months for this article, augmented here and there by our own experiences with him.

BIOGRAPHICAL NOTES

George John Godas (Giorgio Giovanni Godas) was born in Trieste, Italy, on Christmas Day, 1940, the son of Anna and Giovanni Godas, an auto mechanic and carpenter. At the age of 12 he moved with his family to Manhattan, where he attended Rice High School in Harlem. After graduating he went on to college, first at Iona (a private Catholic college in New York), then City College of New York, then moving on to Columbia University (B.S. Degree in Chemistry, 1965), and finally the University of Arizona in Tucson (M.A. Degree in Philosophy, 1967, and ABD—All But Dissertation—PhD).

In his professional life George has taught Philosophy (that is, after working variously as a bartender, waiter, truck driver and mosaic artist while in school) at the University of Arizona, Pima Community College, California State University in Fresno, Central Arizona College, Glendale Community College and other institutions. He lived in Tucson for 20 years, and as of 2018 has lived in the Phoenix area for 33 years.

During George's junior year in college, while taking organic chemistry, he used to ask questions that were more of a philosophical

Figure 5. **Wulfenite covered by a thin layer of drusy milky quartz, 5.7 cm, from the Finch mine, Gila County, Arizona. Collected by George Godas. Arizona-Sonora Desert Museum collection (no. 11081); Christi Cramer photo.**

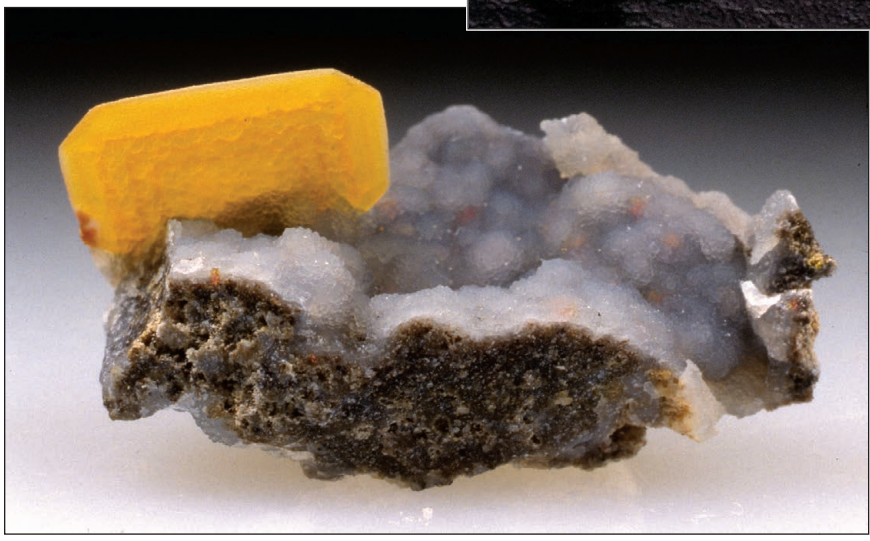


Figure 6. **Wulfenite crystal on drusy quartz-coated matrix, 3 cm, from the Finch mine, Gila County, Arizona. Collected by George Godas; Wendell Wilson photo.**

taste is a wonderful thumbnail he and Howard Hyman collected: a single, small smoky quartz crystal with two perfect, tabular, yellow stolzite crystals attached to its tip. It is a little jewel and a photograph of it appeared in the third edition of *Mineralogy of Arizona*. Some of his better specimens have made their ways into the collections of Mark Hay, Les Presmyk, Mike Marino and several others.

Finch Mine

At the Finch mine in the Banner District of Gila County, about a mile southeast of the 79 mine, George uncovered a small breccia zone of drusy quartz-coated wulfenite in the late 1990s that was completely embedded in solid calcite. Drusy-coated wulfenite crystals have always been the distinctive signature product of the Finch mine. George would break the breccia into chunks and take them home for treatment with hydrochloric acid, not knowing what would be revealed. Several interesting wulfenite specimens emerged. In some cases, the matrix is an almost pure white silica with orange and yellow wulfenite crystals sprinkled on it. Perhaps the best of these went to Paul Harter.

Another memorable pocket contained a single matrix miniature with five wulfenite crystals to about 1 cm. What makes this specimen interesting and aesthetically very appealing is that the wulfenite crystals show four colors: black, yellow, orange, and colorless.

He found his most memorable pocket at the Finch in January 1999 in the floor at the intersection of the east adit with the tunnel. This spot was where Graham Sutton, a few years earlier, had parked his slusher in order to rake the muck away from the northern wall of the tunnel (as a rule, the best wulfenites occurred in the first meter of limestone, right above the contact, on the northern face of the tunnel). George had been wanting to dig underneath where Graham had parked his slusher for some time, because there was a large island of prime limestone still untouched there. The opportunity to do so came when a collector from Washington State, John Lindell, came down for a visit and expressed an interest in the Finch. When they got there, John decided to dig on the western side, near the western adit, while George settled down at last above the "forgotten" slab of limestone and rolled up his sleeves (silicified Finch limestone is *extremely hard)*. After about an hour of pounding, sections of limestone with traces of wulfenite began to appear, and soon the wulfenites started coming out. It was clear that a fairly large pocket was coming next, so in order to minimize damage George cracked the limestone all around and took the pocket apart in large chunks.

Figure 11. **Vanadinite, 5 cm, from the North Geronimo mine, La Paz County, Arizona. Collected by George Godas in 1996. Evan Jones collection; Jeff Scovil photo.**

Figure 12. **Wulfenite, 3.7 cm, from the North Geronimo mine, La Paz County, Arizona. Collected by George Godas in 1996. Evan Jones collection; Jeff Scovil photo.**

Figure 13. **Wulfenite with mimetite, 4.5 cm, from the North Geronimo mine, La Paz County, Arizona. Collected by George Godas. Scott Adams collection; Jeff Scovil photo.**

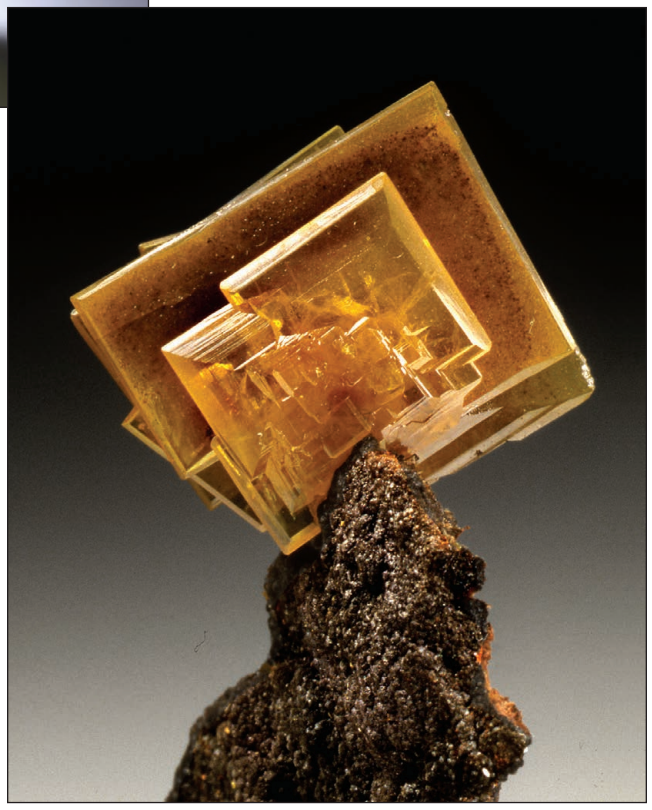
George also collected a small number of choice wulfenite crystals from the North Geronimo mine. The crystals, up to 2.5 cm across, have an incredible red color that is widely considered to be better than that of even the finest crystals from the Red Cloud mine. Examples of these are in the collections of Wendell Wilson, Evan Jones, Dick Morris and Mark Hay.

Old Yuma Mine

The Old Yuma mine near Tucson, discovered around 1872, had been one of Arizona's most iconic sources of good wulfenite and vanadinite specimens since 1909. George did very well at finding both wulfenite and vanadinite there. The inclined orebody carries wulfenite going down one side and vanadinite going down the other. He opened a pocket of wulfenite on the west side, in a room near the top and just west, of the incline. There were several excellent specimens in the pocket, some of which were illustrated in the 1983 *Mineralogical Record* article by Dick Jones. He also found several pockets of vanadinite, one of them containing numerous small specimens accompanied by a single, superb vanadinite crystal, measuring about 2.5 cm, that could pass for a crystal from

Figure 24. **Smithsonite, 11.5 cm, from the 79 mine, Gila County, Arizona. From an unprecedented pocket of over 20 fine specimens collected by George Godas in May 2009. Mark Hay collection; Jeff Scovil photo.**

Figure 25. **Wulfenite on mottramite, 2.8 cm, from the 79 mine, Gila County, Arizona. Collected by George Godas; Wendell Wilson photo.**



when first opening the pocket, but after a quick glance his excitement faded. However, a second pocket, roughly 15 to 20 feet from the floor of the tunnel, produced some excellent teardrop-shaped green smithsonite with hemimorphite and aurichalcite. This pocket also had some very appealing brown hemimorphite balls with good luster.

Then one day, as he was poking around in an area close to the floor of the tunnel, he noticed a large chunk of prime matrix: it had the right color, the right composition, and was in the right place. George slowly removed some of the surrounding ground with a thin gad and a small opening appeared. He looked in and could see a large creamy ball and part of another. And after some quick but careful surgery, five balls of cream-colored smithsonite appeared. John Callahan, who had been watching, took off one of his gloves and gently held onto the piece as George excavated from behind it and then pried the specimen out. This piece was acquired by Evan Jones and definitely ranks as one of the finest smithsonite specimens ever to come from the 79 mine or anywhere else in Arizona.

The Aurichalcite Stope was where, over 25 years earlier, one of us (WW) found what are still the world's finest specimens of aurichalcite. (The choicest piece from that find is now in the Arizona-Sonora Desert Museum.) At the time of that early discovery, the Aurichalcite Stope was barely large enough to hold two people, and one had to sit on a pile of rubble while digging specimens out of the ceiling. Now after decades of follow-up work by other collectors, the stope has been enlarged to about 20 feet tall and 20 × 40 feet across. It turned out that it was at the edge of a very large and rich zone that no one knew about. Later mining by George and John discovered the hidden zone and they excavated a separate, attached stope large enough (about 9 feet tall and 7 × 15 feet across) to merit its own name, so they called it the Aurichalcite Stope #2. The zone produced some excellent smithsonite, both green and blue (and occasionally one would also encounter a small pocket of white smithsonite). Some of these were associated with aurichalcite and/or hemimorphite and/or calcite. Many flats of good to excellent hemimorphite, botryoidal as well as prismatic, were also recovered. And George collected many excellent aurichalcite specimens; these made their way into various collections, but a very large cabinet specimen, with sprays of aurichalcite sprinkled in a very appealing way all over a black matrix, went to the Arizona-Sonora Desert Museum. A plate sprinkled with similar sprays of aurichalcite is in the collection of Evan Jones.

The wulfenite from this zone, though rather scarce, was very colorful (red, orange and yellow). Three unusual specimens George found had wulfenite crystals to 2.5 cm that are golden yellow,

The Ford Mine

Mammoth District, Pinal County, Arizona

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Among Arizona's many wulfenite occurrences, the Ford mine rarely rates a mention. But it has produced attractive wulfenite and vanadinite specimens since the 1960s, including some very fine specimens in 2002, and sits tantalizingly close to what is volumetrically the greatest wulfenite producer in the country, if not the world: the Mammoth–St. Anthony mine at Tiger.

INTRODUCTION

Arizona is famous for its wulfenite occurrences (wulfenite was recently designated as the official Arizona "State Mineral"), and most mineral collectors are familiar with the wonderful specimens that have come from the Red Cloud, Rowley, Old Yuma, Mammoth (Tiger), Defiance, Glove, Tombstone, Total Wreck and other mines. Few people, however, have heard of the Ford mine, an occurrence near the Mammoth mine that has yielded specimens beautiful enough to be considered remarkable and noteworthy in any other state.

The Ford mine is an underground copper-lead-gold-silver-molybdenum-vanadium mine located in the southeast quarter of section 27, T8S, R16E, on the north side of Tucson Wash, about 2 miles west-southwest of the town of Mammoth. The mine is on private land. Like the famous Mammoth and San Manuel mines close by, it is considered to be in the Mammoth District (also called the Oracle District and the Old Hat District).

HISTORY

Prospecting in the Mammoth area began as early as the 1850s, but it was not until 1879 that Charles Dyke and Theodore Catlin Weed filed the Hackney claim on the Collins vein (Howell, 1991). This was the beginning of mining at the famous locality mineral collectors know as "Tiger," or more specifically the Mammoth–St. Anthony mine. Vast amounts of wulfenite, vanadinite and other highly collectible species emerged over the following decades. Although a number of other claims were filed nearby, no other mine produced such spectacular quantities of beautiful and rare minerals. And yet, a few minor occurrences on the periphery have yielded attractive specimens long after closing. The little Ford mine is one of those, probably a disappointment to its hardworking namesake, who never found a significant ore shoot on the vein he discovered, but it became a sparkling footnote to the history of wulfenite collecting in Arizona.

The Ford Mine

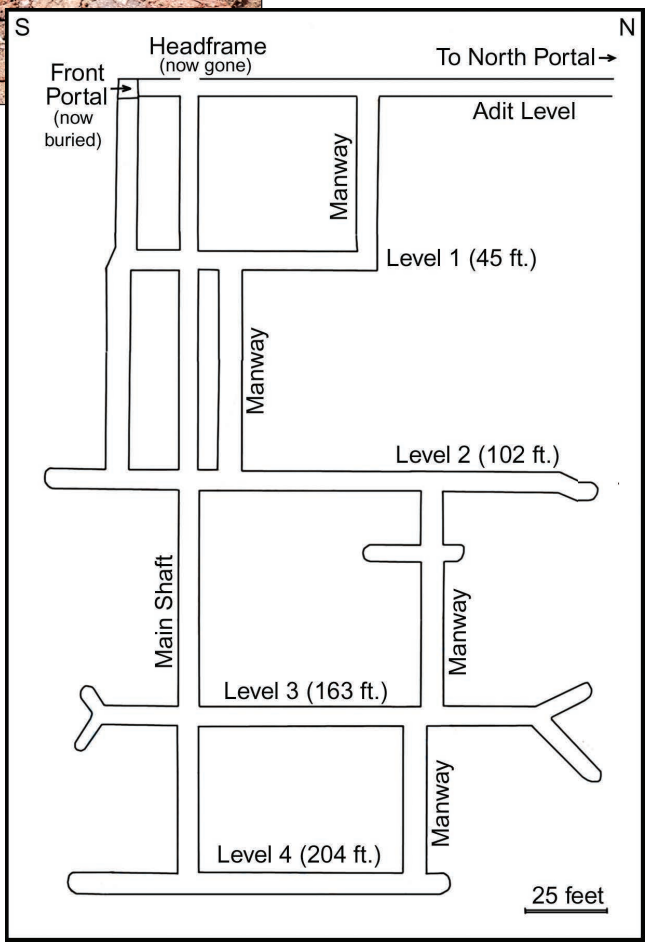
The Ford vein, though located not far from the Mammoth, Collins, Mohawk and New Year workings, was an outlier discovered (or at least first worked) by H. S. Ford around 1902 (Colvocoresses, 1943; Baird, 1938). It is covered by the Ford and the adjacent Ford Fraction claim, both patented. Ford shipped his first ore by wagon to Tucson for smelting in 1902.

Hampford "Hamp" Scott Ford was born in Knowlton, Pennsylvania, on January 27, 1852, the son of John Ford, a farmer. He grew up in Chester County, and at the age of 20 he enlisted in the U.S. Army. He first came to Arizona in 1872, as a member of Troop F, United States Cavalry. During the next four years he served under General Crook in almost continuous warfare with the Apaches. Later he went to Kansas, and in 1876 took the field against the Sioux Indians. He returned to Arizona in 1880, taking up residence briefly in Tucson and then more permanently in Tombstone in 1881 (*Arizona Republican*, 13 April 1921). There in 1882 he worked

Figure 5. **North adit of Ford mine, still partially open in 2019. Christi Cramer photo.**

Figure 4. **Wulfenite crystal, 1.4 cm, on matrix, from the so-called "Thunderbird" (= Ford) mine. Remi Bornet specimen and photo.**

Figure 6. **Schematic cross section of the Ford mine workings, looking west (after Colvocoresses, 1943).**



The "Thunderbird mine" name was found painted on the adit door in the 1960s, and probably came from a fairly recent and transitory effort to re-claim the mine. Specimens collected during the 1960s and 1970s were consistently labeled "Thunderbird mine" as a result of this.

Fordville

There was a small outpost called Fordville at the junction of the Gila and San Pedro Rivers (near present-day Winkleman). The ranch of William C. Cunningham was there; he set up the Fordville Station for a while to serve all the prospectors and travelers coming into the new district, and it had its own post office for a few months in 1880. Cunnigham stocked "hay, grain, and all accommodations for the traveling public." To confuse matters, however, Will C. Barnes (1960), in his *Arizona Place Names,* says that there is a "possibility" that Fordville and its post office was named after the Ford mine, but the Winkelman-area Fordville predates the Ford mine by quite a few years and is in the wrong district. Barnes was apparently referring to the USGS *Mammoth* 7.5-minute quadrangle map that shows a "Fordville" at exactly the same location as the Ford mine shown on the USGS 1:250,000 *Winkelman* topographic map. Clearly Barnes had conflated the two; the Fordville near Winkelman was probably named after a convenient fording location in the river, whereas the Fordville in Tucson Wash west of Mammoth was probably a tiny mining camp associated with the Ford mine—but it never had a post office.

Figure 10. **Wulfenite, 5.5 cm, one of the best specimens recovered from the 2002 pocket. Evan Jones collection; Jeff Scovil photo.**

Figure 11. **Wulfenite, 3.5 cm, from the Ford no. 2 (Ben Hur) mine. Evan Jones collection; Jeff Scovil photo.**

Figure 14. **Vanadinite, 4.4 cm, from the so-called "Thunderbird" (= Ford) mine. Collected by Dick Jones, ca. 1965. Mark Hay collection, ex Tom McKee collection; Jeff Scovil photo.**

Figure 15. **Vanadinite crystals on sparkling black descloizite, 4 cm, from the Ford no. 2 (Ben Hur) mine. Collected by Jesse and Frank Valenzuela, in the mid-1960s. Mark Hay collection; Jeff Scovil photo.**

Figure 16. **Vanadinite, 7.8 cm, from the Ford no 2 (Ben Hur) mine. Dick Morris collection; Jeff Scovil photo.**

The Rowley Mine

Painted Rock Mountains

Maricopa County, Arizona

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The Rowley deposit, probably discovered around 1902, is one of Arizona's eight most famous wulfenite occurrences, and the only one in which deep yellow to orange wulfenite occurs with bright red mimetite. In 1917, wulfenite was mined there as an ore of molybdenum, but in recent decades the most valuable product of the mine has been specimen-quality wulfenite. The deposit has also produced a variety of rare microminerals including parkinsonite, mammothite and antipinite, and is the type locality for rowleyite and phoxite, minerals formed by the reaction of copper minerals with bat guano.

INTRODUCTION

The Rowley mine is one of Arizona's most famous wulfenite localities, a well-known source of many different microminerals, and the type locality for several new mineral species. Although the deposit was first claimed in 1906, it may have been discovered as early as 1894. It miraculously escaped the notice of collectors until the late 1940s.

In January 1974, Wilson and Miller published their article on "Minerals of the Rowley mine" in the *Mineralogical Record*. In the 45 years since then, much has happened at the Rowley mine, and many great specimens have been found. Today the locality is off-limits to collecting, even by the owners, except for scientific research purposes. Consequently now is a good time to revisit that early article and bring it up to date, with much new information, new species, newly uncovered history and recent collecting activities to report, along with many new specimen photos.

LOCATION

The Rowley mine is located about 60 miles southwest of Phoenix, Arizona, on the western slope of the Painted Rock Mountains, about 2 miles south of the Gila River, overlooking the Dendora Valley. Access is via Painted Rock Road, which branches off U.S. Highway 80, about 4 miles west of the old Theba railroad depot, and continues northward about 12.6 miles to a turnoff on the right for the short mine road. The precise location is the western half of section 25, R8W, T4S, at an elevation of about 250 meters.

Some confusion persists regarding the name of the mine. It is misspelled "Rawley" on the quadrangle map, was known as the Reliance mine for a short time in the 1920s, and has also been referred to as the Theba mine and the Rainbow mine in the 1959 edition of *Minerals of Arizona* by Galbraith and Brennan. Some people still believe the Rainbow or Theba mines are distinct from the Rowley mine, or even from each other, and are "lost" in the hills

Figure 12. **The most famous of all Rowley mine wulfenite-mimetite specimens: from the collection of Tucson mineral dealer Susie Davis (1909–1982). This 6.2-cm specimen, with the wet-looking, deep red mimetite balls that are most highly valued, was probably collected by Monnie Speck. It was sold to the Smithsonian Institution along with the rest of Susie's collection in 1972 (no. 125251). Rock Currier photo, taken in 1973.**

Figure 13. **Wulfenite and wet-looking mimetite on barite, 7.2 cm, another specimen from Monnie Speck's famous pocket at the Rowley mine. It was in Wayne Thompson's collection in 1973 when it was photographed by Rock Currier; current owner unknown.**

MORE ROWLEY WULFENITE!

Figure 32. **Wulfenite pocket in barite, 15.3 cm, from the Rowley mine. Evan Jones collection; Jeff Scovil photo.**

Figure 33. **Wulfenite with yellow mimetite, 4 cm, from the Rowley mine. Ian Whitlock collection and photo.**

Figure 42. **Wulfenite on barite with mimetite, 2.5 cm, from the Rowley mine. Alex Schauss collection; Rob Lavinsky (*The Arkenstone*) specimen and photo.**

Figure 43. **Wulfenite on barite with mimetite (this was the cover specimen for the *Mineralogical Record*'s "Mineral Collections in Arizona" supplement in 2013), 5.1 cm, from the Jobes stope, Rowley mine. Dick Morris collection; Jeff Scovil photo.**

Figure 44. **Wulfenite with red mimetite, 2.5 cm, from the Rowley mine. Alex Schauss collection; Jeff Scovil photo.**

MORE ROWLEY MIMETITE!

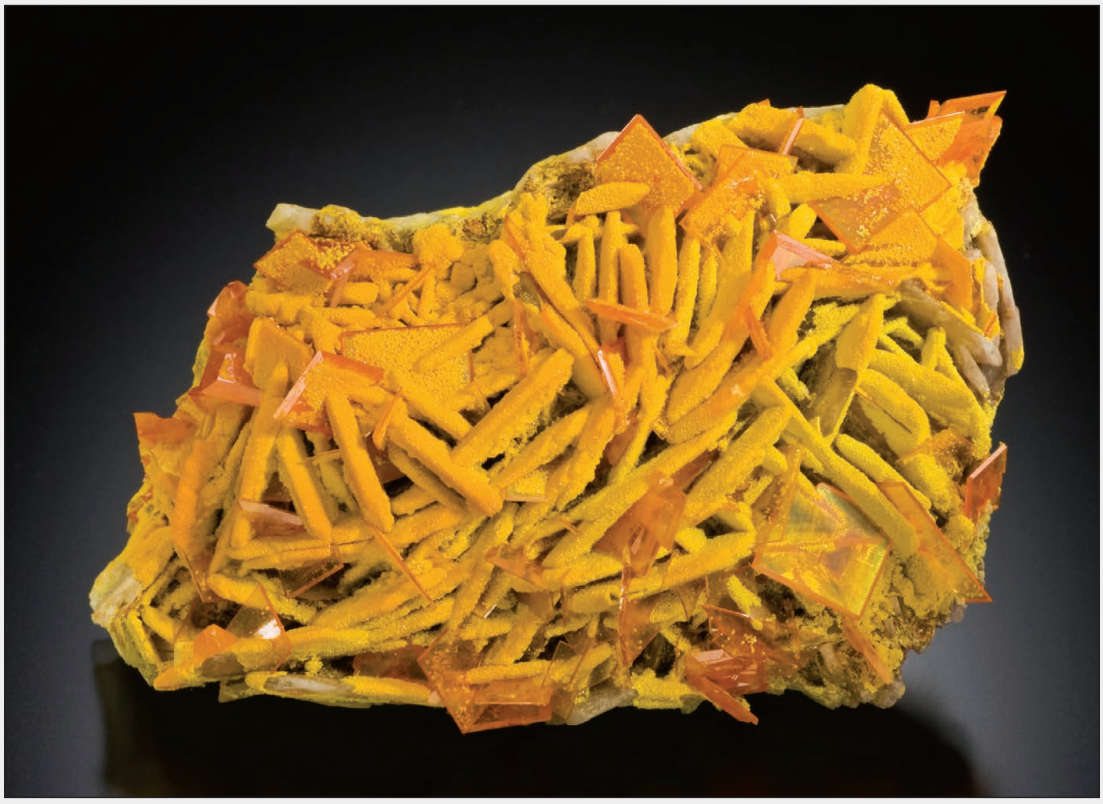

Figure 67. **Yellow powdery mimetite on barite crystals with wulfenite, 6 cm, from the Rowley mine. Phil DeVries collection; Jeff Scovil photo.**

Figure 68. **Orange grading to red mimetite, 4.4 cm, from the Rowley mine. *Spirifer* (Tomaz Praszkier) specimen; Jeff Scovil photo.**

Figure 69. **Orange balls of mimetite on barite with wulfenite, 8-mm view, from the Rowley mine. Keith Wentz collection; Jeff Scovil photo.**

Lost Arizona Mineral Collections

1863-1912

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Mineral collecting was rampant in the Arizona Territory, before statehood was achieved in 1912. The excitement was fed by specimens emerging from bonanza mines in every county. Early newspapers tell of those richly historic specimen cabinets exhibited not only in private homes but in saloons, hotels, assay offices newspaper offices, schools and even barber shops, drug stores and cigar stores, nearly all of which are now lost to history.

INTRODUCTION

Since the 1860s, people in Arizona have been collecting minerals. This early interest in collecting was fostered largely by the early heyday of prospecting and mining that flourished in every county, from the establishment of Arizona Territory in 1863 to statehood in 1912. Assayers received specimens to test and saved their favorites, while miners gave fine specimens to newspaper editors in hopes of getting some free publicity. Hotels, saloons, barber shops and drug stores put in collection cabinets to attract patrons and promote local discoveries. Soon mineralogists and mineral dealers from the East (locals referred to them as "mineral fiends") were descending on Arizona in a quest for minerals, awakening people to specimen values and spreading knowledge of Arizona's mineral wealth far and wide. People took great pride in the mineral resources of their local area, and enjoyed forming collections of local minerals they could show off to visitors. Many a house around the turn of the century counted a mineral cabinet among its furnishings.

Unfortunately, the majority of those early Arizona mineral collections are long gone and no one today knows what happened to them. The usual fate of "lost collections" is that they were ultimately sent to the smelter to recover their silver and gold values, or thrown away in the trash after their builders passed away. Or they may have been given away to friends, donated to institutions somewhere, or sold to another collector or dealer.

And considering the high intrinsic value of silver and gold specimens, it should come as no surprise that many of them were stolen and smelted into bullion. A note in the *Arizona Republican* (29 January 1897) reported just such a robbery:

> Sheriff Ruffner, of Yavapai County, came in from the south yesterday morning with a man named Canary [Charles Canaris], wanted in Prescott for burglary. He had raided a mineral cabinet [owned by Thomas Brown] and carried away a lot of valuable specimens, some of which he sold and had assayed.

Although the value of specimens did catch on fairly early in Arizona's mining history, it was by no means universally known; the notion of collecting natural specimens for their own sake was hardly recognized at all in some mining camps, and consequently

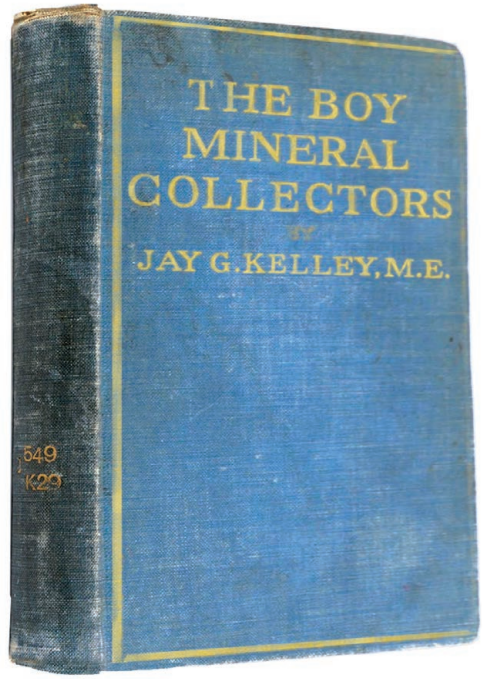

Figure 12. **Prescott assayer Jay G. Kelley was such an enthusiastic and well-read mineral collector that he wrote a fictionalized but educational book for the youth market, *The Boy Mineral Collectors* (1898), designed to inspire an interest in mineral collecting among young boys.**

Philadelphia mineral dealer A. E. Foote. The only other possible source where Kelley might have purchased it would have been in Europe. In any case, it was quite an assemblage to have on the frontier, but Kelley lived an adventurous life:

Jay George Kelley was born in Boston in 1838. As a boy he ran away from home and rode a clipper ship around Cape Horn to California. In 1859 he joined a company of volunteer Indian fighters and proceeded into Nevada to engage the Piutes, who were on the warpath at that time. Following a decisive battle at Pyramid Lakes he left the group and traveled to Carson City, Nevada, where he joined the Pony Express in 1860, riding through dangerous Indian territory. When the Pony Express shut down a year later he worked as a miner in the Carson City area, until he once again volunteered to fight Indians and was made Captain of a company by Governor Nye; he was put in command of Fort Churchill, while other men went off to fight in the Civil War (*Atlanta Constitution*, 5 December 1896).

Ultimately Kelley did serve in the Civil War in 1864, and was discharged in 1865. He then returned to San Francisco, California, where he appears to have studied assaying and smelting. It may be there that he began collecting minerals. He moved on to Virginia City, Nevada, where he worked as an editor for the *Chronicle* and also as an assayer before heading for Prescott, Arizona and opening his own assay office there in 1876.

In 1877 Kelley announced his intention to publish a book on "Mining Resources of Arizona," and solicited information from all of the mining men in all parts of the Territory, but apparently nothing came of it. In July 1877 he was hired as superintendent of the Zalida mine, but left Arizona to prospect in Colorado, opening an assay office in Leadville in 1879. By June 1882 he was working as an assayer in Bellevue, Idaho Territory. He then spent a few years in El Paso where he worked as a railroad detective and assisted with the Texas mining and mineral exhibit at the 1885 New Orleans World's Fair.

Kelley always carried gold nuggets in his pockets, and could launch off on many entertaining stories about his life in gold mining. The editor of the *Salt Lake Herald* (1 February 1894) described him thusly:

> Capt. Jay G. Kelley, mining engineer and expert, is the man, and [I spent] one day looking at some of his peculiar and valuable specimens and listening to his fascinating explanation. [He is] a fine looking gentleman, with ruddy face as though well used to open weather, making a lively contrast with his gray hair and mustache. He will interest a listener more in two minutes than ordinary men can in a whole hour. Just let him pull one of those gold nuggets from his capacious pockets, or those chunks of gold embedded in quartz, and then listen to him tell of the various ways of finding gold . . . and you will look and look, and listen and listen in utter captivation.

Clearly Kelley had kept his collection with him all those years, was capable of spinning a good tale, and was eager to inspire interest in minerals. In 1898, the J. B. Lippincott Company published a book by Jay G. Kelley entitled *The Boy Mineral Collectors*, in which he recommends the "endless fund of entertainment and information open to the boy who chooses to pursue the study of mineralogy," by field-collecting specimens locally, supplemented by "purchases from time to time without creating too much of a drain on his pocket money" (*The Times*, Philadelphia, 13 November 1898). He at last settled in Denver sometime in the 1890s and died there in 1899.

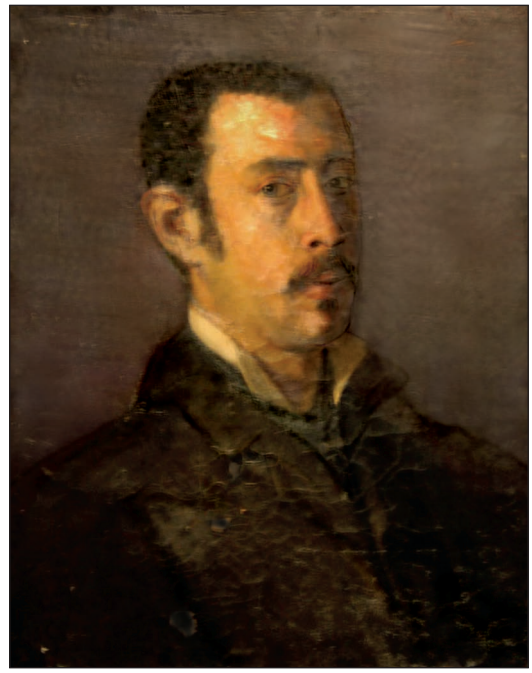

Figure 13. **Charles Wores; oil painting (undated, ca. 1884) by Theodore Wores. Society of California Pioneers collection, gift of Carrie B. Wores.**

Charles Wores

One early assayer who made the most of his collecting opportunities was Charles R. Wores. His story is known in some detail:

Charles Roth Wores was born in San Francisco in February 1859, the son of a hat maker from Hungary. As a young man Charles worked in his father's hat-making business, while attending school and studying chemistry and assaying. In 1880 he moved to Arizona to seek his fortune, and began prospecting, filing his first claim, the Olympic, in the Arivaca District, on November 21, 1880. At

Figure 20. **The Big Bug gold nugget was found in 1890, at Galena Gulch in the Big Bug district, Yavapai County, by a Mexican placer miner; it weighed 37 ounces, and measured 13 cm across. It was purchased for about $600 by the Bank of Arizona in Prescott, and displayed in their window for two years, along with a smaller gold nugget and a silver nugget. The bank also exhibited the nugget at the 1893 World's Fair at Chicago, and later sold it to dry goods merchant Ed Block, who showed it around for several years, the last time in 1901. Thereafter it was presumably melted down. Sharlot Hall Museum photo, Prescott; colorized by the author.**

> R. J. Duncan has secured the waiting room of the S. P. Hotel and passenger depot, in which he will place a full and complete exhibit of all of the productions of Yuma County, including all kinds of fruit, grains, grasses, flowers, vegetables, minerals, building stone, specimens of ores, clays and curiosities. The room will be fitted up with safe cases, built especially for each class. Every exhibit will be plainly labeled . . . Valuable specimens of minerals will be returned to their owners whenever wanted.

Bisbee

In Bisbee, George Roberts (see below) built a fine collection of Bisbee minerals beginning around 1900, and moved it into the lobby of the Copper Queen Hotel in 1907. The White House Cafe in Douglas (formerly known as Jim's Place, Charles Reifer proprietor) also had a valuable and beautiful mineral cabinet, which was moved into (or sold to?) the Waldorf Restaurant in June 1911—where it joined another mineral cabinet already on display there. Otto W. Geisenhofer was the proprietor of the Waldorf, so the existing collection must have been his. (He also operated the "gentlemen-only" Edelweiss Cafe.) Geisenhofer had come to Arizona from Bavaria in 1875 and settled first in Tombstone for a few years, then moved to Bisbee where he opened a restaurant in Brewery Gulch and later on Main Street; by 1900 he had a rooming house and restaurant on School Hill in Bisbee, with his nephew (also named Otto) as cook, and also the Anheuser Saloon on Main Street. He sold some of his Bisbee properties in 1904 and retired to San Leandro, California, near Oakland—no word on the disposition of his mineral collection.

BANK COLLECTIONS

The most famous mineral collection exhibited by a bank was that of Michael Cunningham, the vice president of the Bank of Bisbee—but, of course, that collection (750 specimens) was never "lost." The minerals survive to this day. However, *The Oasis* in Arizola (31 August 1895) reported that "The International Bank has put in a fine, new case for its mineral collection."

Arizona Bank, Prescott

Up in Prescott, the Arizona Bank kept their collection of gold nuggets on display from at least 1890 to 1901, including the then-famous "Big Bug nugget," a 37-ounce, 9 × 13-cm gold nugget found by an itinerant Mexican placer miner in Galena Gulch, Big Bug District, Yavapai County, about 15 miles southeast of Prescott (*Weekly Journal-Miner*, Prescott, 28 and 30 May 1890). He sold the nugget to the bank for $670 (*Mohave County Miner*, Kingman, 31 May 1890)**.** Although higher offers were later received, the bank elected to keep the nugget for display in its quarters in Prescott and also to show at the 1893 World's Fair in Chicago (*Weekly Journal-Miner*, Prescott, 1 July 1891).

In 1901 the Arizona Bank sold the Big Bug nugget to Edward Block, a Prescott dry goods merchant who had a collection of other gold specimens as well. Block enjoyed displaying the nugget at various venues (Leadville, Denver, New York), but how long he may have kept it is unknown, and there is no evidence that the Big Bug nugget survived past 1901 (*Mohave County Miner*, Kingman, 2 March 1901).

Figure 27. **Charles Owen Brown (1829–1908), founder of Tucson's Congress Hall Saloon in 1868, was one of early Arizona's most prominent mineral collectors. This photo may have been taken around 1849 when he left Arizona for the California Gold Rush—perhaps the inspiration for his mineral collecting passion. Arizona Historical Society photo no. 51524.**

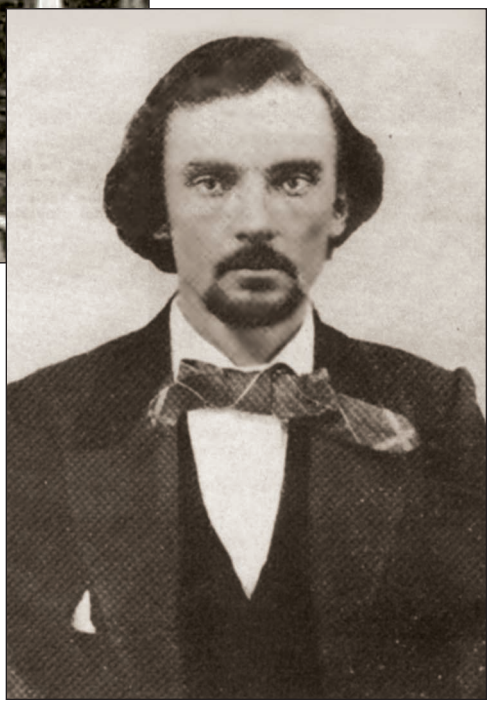

Figure 28. **The Congress Hall Saloon in Tucson, shown here ca. 1900, was the most famous gambling hall in the Southwest. Owner Charles O. Brown displayed his "splendid cabinet of minerals," all carefully labeled as to mine, shaft and depth. Started around 1870, it contained mineral specimens from mines throughout Arizona, including wulfenite from Tiger, malachite from Bisbee, cerussite crystals, gold and silver. It was all sold off in 1903. Arizona Historical Society photo no. 20858.** ***Inset:*** **Detail showing Brown and his son standing in front of the mineral cabinets.**

THE UNIVERSITY OF ARIZONA MINERAL MUSEUM

EMINENT PAST, BRIGHT FUTURE

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The Mineral Museum at the University of Arizona in Tucson, founded in 1892, is among the most active University-associated mineral collections in the country. It has absorbed numerous fine private collections and donations, and has big plans for a major expansion in 2020.

HISTORY

The University of Arizona's Mineral Museum houses one of the finest mineral collections of its kind in an academic department. It began with an act of the Arizona State Legislature establishing a School of Mines in Tucson, Arizona Territory, in 1885; the main building opened for classes in 1891, and Arizona became a state 21 years later, in 1912. The original building, known today as "Old Main," still stands at the center of the sprawling University of Arizona campus.

Mineralogy was one of the original subjects taught at the University, and a proper collection of minerals was deemed essential for teaching purposes. Future mining engineers needed to know what good ore looked like and how to identify a whole host of mineral species without access to modern analytical equipment. The 1892 *University of Arizona Register* states: "In addition to collections made by Prof. Blandy, formerly Territorial Geologist, the private collections of the Director of the School of Mines (Dr. Theo Comstock) are on deposit in the Museum." This is the first reference to the Mineral Museum, and suggests that it had been established as soon as the school opened its doors.

In 1893 the Territorial Museum was established on campus, incorporating not just the growing mineral collection started by the School of Mines but also ethnographic artifacts and historical documents.

FOUNDERS OF THE COLLECTION

In 1883, Arizona Territorial Governor Frederick A. Tritle expressed his desire to establish a Geological Survey for Arizona Territory. The U.S. Congress responded in 1888 by creating the post of Territorial Geologist of Arizona. The unpaid position went first to mining engineer John Frederic Blandy (1833–1903), an American graduate of the Freiberg Mining Academy, who served from 1889 to 1890. During that time he traveled throughout Arizona Territory, visiting various mining districts, collecting specimens, and preparing three reports for the Governor. His personal mineral collection became the start of the University of Arizona collection.

The office of Territorial Geologist lapsed in 1890, and a School of Mines was established at the University of Arizona in 1893. Although the title of Territorial Geologist was not used between 1890 and 1898, the duties were performed by Dr. Theodore Bryant Comstock (1849–1915) in 1891–1894, who was appointed its first Director and held the post until 1895, when it was taken over by William Phipps Blake (1826–1910) until 1897. Comstock's mineral collection was the second to be added to the University's collection. In 1898 the office of Territorial Geologist was reinstated and Blake assumed the position again until 1904, while continuing to serve as Director of the University's School of Mines until 1905. Specimens from Blake's collection can be found in the University's collection as well.

SHIFTING QUARTERS

The Territorial Museum, including the ever-growing mineral collection, was moved to new quarters in 1905, in 1915, and again in 1919 when the new Mines and Engineering Building was completed and the Mineral Museum once again became a formal entity

Figure 5. **The historic "Old Courthouse" in downtown Tucson, new home of the University of Arizona Alfie Norville Gem & Mineral Museum.**

the continued growth of the collection. Other donors included P. G. Beckett, Boodle Lane, Martin Schwerin, J. E. Burtin, Susie Davis, Ed Davis, William Pinch, Richard Bideaux, Hubert de Monmonnier, Gene Meieran, Pat Rose, Princeton University, Rock Currier and Wendell Wilson. A portion of the collection of Mexican specimens assembled by the late Miguel Romero, Mexico's leading mineral collector, was donated to the Museum by his family. The collection has also been temporarily enlarged by the loan of specimens from the currently-closed Arizona Mining and Mineral Museum in Phoenix.

Today the mineral museum, under curator Robert T. Downs, houses over 23,000 specimens in the main collection, over 6,000 in the micromount collection, and about 10,000 specimens in the

Figure 6. **Spodumene "hiddenite," 4.9 cm, from the Warren mine, Alexander County, North Carolina. Jeff Scovil photo.**

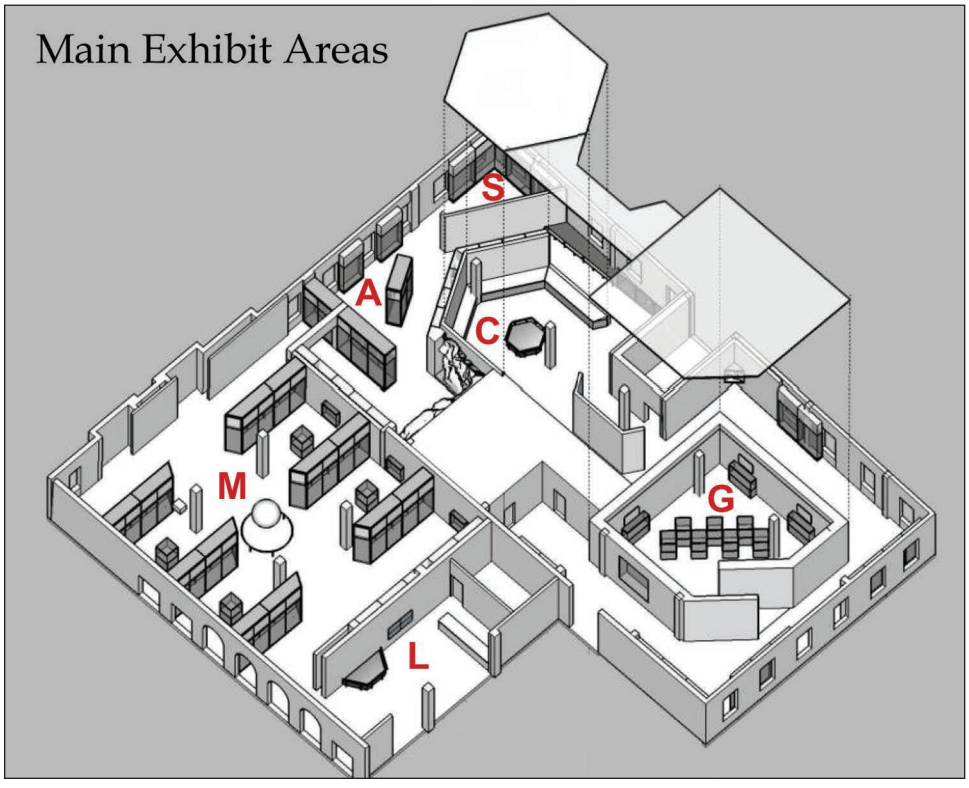

Figure 7. **Floor plan of the new museum: (L) Lobby, (M) Mineral Evolution Gallery, (A) Arizona Gallery, (S) Special Exhibits, (C) Crystal Arcade, (G) Gem Gallery.**

Figure 8. **Architect's rendering the Bisbee-Azurite Vug exhibit.**

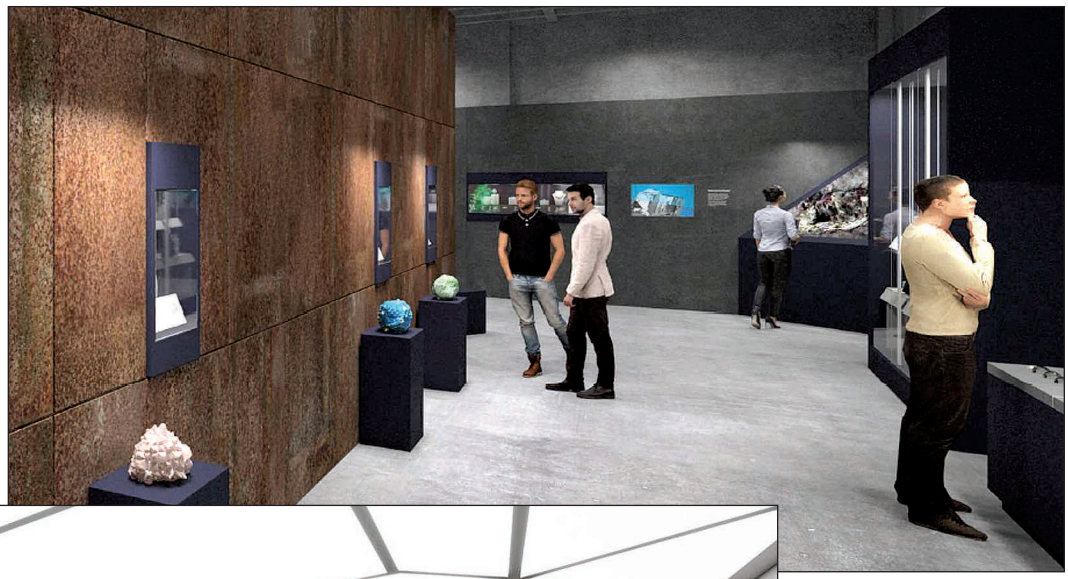

Figure 9. **Architect's rendering "The Treasury" area.**

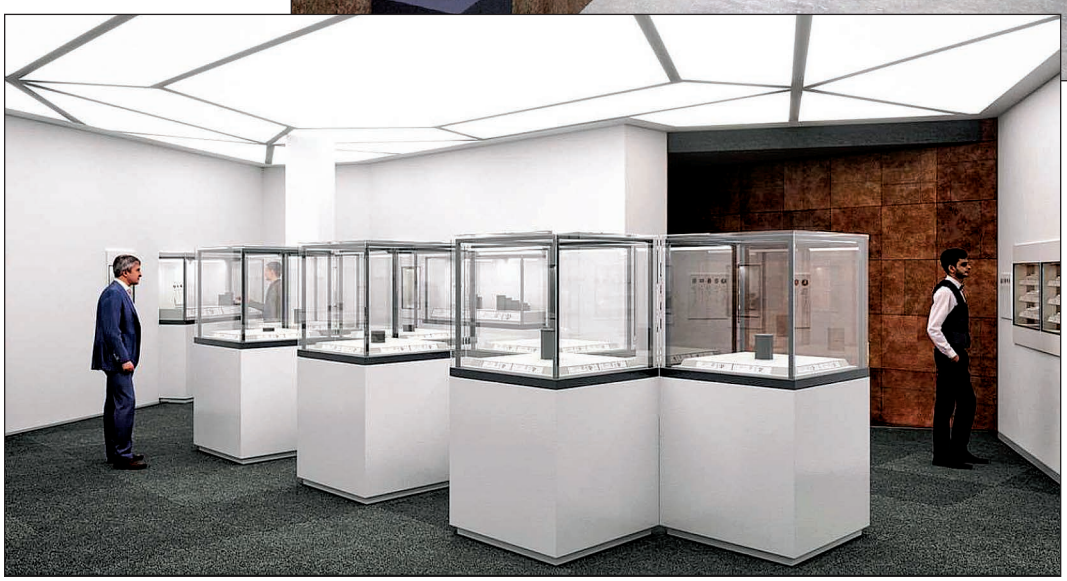

Figure 10. **Architect's rendering the gemstone showcases.**

research collection. The collection currently represents over 3,700 different species with over 2,000 specimens currently on display. The mineral museum also has two displays of meteorites from localities around the world. The collection itself is divided into roughly ten major exhibits, including a new exhibit of the minerals from the Guanajuato mining district in Mexico and an exhibit of recently donated meteorites. Minerals from famous Arizona localities such as Bisbee and Tiger also have special displays. As an attractive and interesting complement to the minerals, a collection of 17 historic oil paintings of Arizona mining scenes from the 1920s, by William Davidson White (1896–1971), donated by Phelps Dodge Corporation, lines the walls.

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