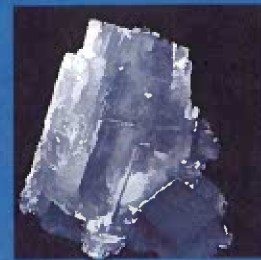
ANNUAL NEW MEXICO MINERAL SYMPOSIUM

34th Annual New Mexico Mineral Symposium

November 9 & 10, 2013



PROGRAM & ABSTRACTS

34th Annual New Mexico Mineral Symposium

November 9 & 10, 2013

New Mexico Bureau of Geology and Mineral Resources
A Division of New Mexico Institute of Mining and Technology

Socorro 2013

Welcome to

The Thirty-Fourth Annual New Mexico Mineral Symposium

and

Fifth Mining Artifact Collectors Association Symposium

November 9 and 10, 2013

Macey Center Auditorium
New Mexico Institute of Mining and Technology
Socorro, New Mexico

The Mineral Symposium is sponsored each year by the Mineral Museum at the New Mexico Bureau of Geology and Mineral Resources.

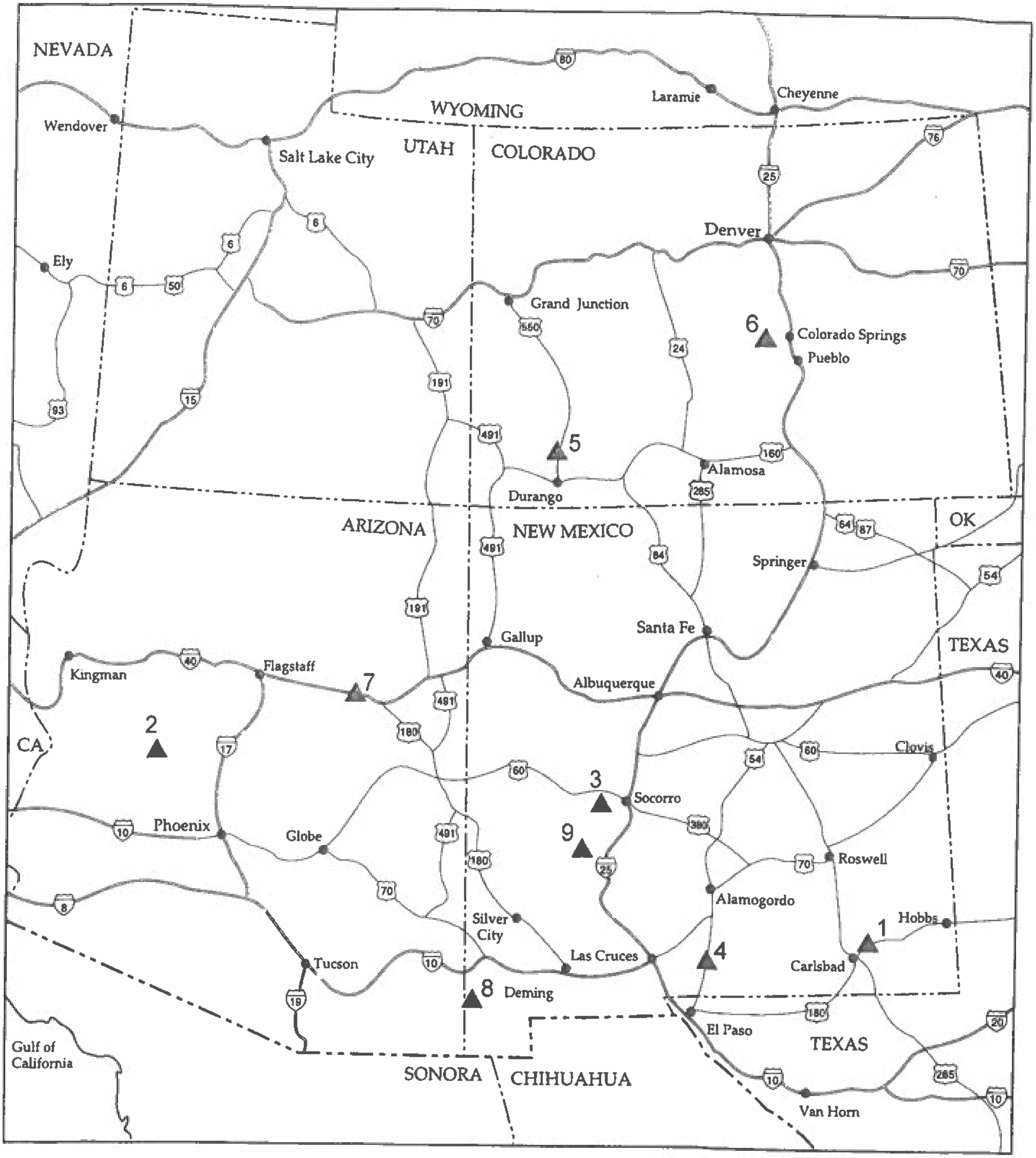
Additional sponsors this year include:

Albuquerque Gem and Mineral Club
Chaparral Rockhounds
Los Alamos Geological Society
New Mexico Geological Society Foundation
Grant County Rolling Stones
Friends of Mineralogy
City of Socorro

CITY OF SOCORRO

The New Mexico Mineral Symposium provides a forum for both professionals and amateurs interested in mineralogy. The meeting allows all to share their cumulative knowledge of mineral occurrences and provides stimulus for mineralogical studies and new mineral discoveries. In addition, the informal atmosphere allows for intimate discussions among all interested in mineralogy and associated fields.

New Mexico minerals on the cover: top left – pyrolusite, top right – halite, bottom left – malachite pseudomorph of linarite, and bottom right – magnetite.



Geographic Index Map

34th New Mexico Mineral Symposium

34th Annual New Mexico Mineral Symposium 2013
&
5th Annual Mining Artifact Collector's Symposium

SCHEDULE

Friday, November 9

6:00 pm	Informal tailgating and social hour, individual rooms, Comfort Inn & Suites (# 1 on map) and other venues—FREE

Saturday, November 10

8:00 am	Registration, Macey Center; continental breakfast
8:50	Opening remarks, main auditorium
9:00	*Blue Ice to Frozen Blue: Two Finds of a Lifetime* – Phil Simmons **(1)**
9:30	*The History and Minerals of the Bagdad Mine, Yavapai County, Arizona* – Barbara Muntyan **(2)**
10:00	*New Mexico Spangolite* – Ray DeMark
10:30	Coffee break and burrito break
11:00	*Arizona's Fabulous Sulfates* – Les Presmyk
11:30	*Collecting New Mexico in the 1950's—Kelly and Juanita Mines* – Sherman Marsh **(3)**
12:00 pm	Lunch and museum tour
1:30*	*The Brunton Pocket Transit* – Jack Purson
2:00*	*The Amazing "Kit" by James Bray—The Ultimate Mining Collectable?!*– Anthony Moon
2:30*	*Postcard mysteries: Orogrande and Captain Ellen Jack* – Jane Bardal **(4)**
3:00	Coffee break
3:30	*A San Juan Anatase Odyssey* – Tom Rosemeyer **(5)**
4:00	*Collecting Thumbnail Minerals* – Allan Young **(featured speaker)**
5:30	Sarsaparilla and suds: cocktail hour, cash bar—Fidel Center Ballrooms
6:30	Silent auction and dinner followed by a voice auction to benefit the New Mexico Mineral Symposium—Fidel Center Ballrooms

Sunday, November 11

8:00 am	Morning social, coffee and donuts
8:50	Welcome to the second day of the symposium and follow-up remarks
9:00	*A Cripple Creek Update: New Developments at the "World's Greatest Gold Camp"*– Steve Veatch **(6)**
9:30	*Mineralogy along northern Arizona's Route 66* – Anna Domitrovic **(7)**
10:00	Coffee break
10:30	*The origin of chalcedony nodules from southwest New Mexico and southeast Arizona* – Peter Modreski **(8)**
11:00	*Microminerals near San Juan Peak in the San Mateo Mountains Socorro County, New Mexico* – Ron Gibbs **(9)**
11:30	*New Mexico's Lost Localities* – Chris Cowan
12:00 pm	Lunch
1:15-3:00	Silent auction, upper lobby, Macey Center, sponsored by the Albuquerque Gem and Mineral Club for the benefit of the Mineral Museum (FREE)

*denotes Mining Artifact Collectors Association (MACA) talk.

Blue Ice to Frozen Blue: Two Finds of a Lifetime

Philip C. Simmons, Intrepid Potash-New Mexico, Carlsbad, New Mexico

The Carlsbad potash district has long been known among New Mexico collectors for being the source of superbly colored blue and purple halite cleavage pieces, but until recently the knowledge of this occurrence was restricted to mostly local collectors. With the discovery of the "Blue Ice" seam in December of 2009, and the subsequent presentation at the 2010 New Mexico Mineral Symposium, the potash district started to gain acclaim among the collecting community outside of New Mexico as being a promising source of outstanding crystallized evaporite minerals. This distinction culminated in the discovery of the "Frozen Blue" seam in July of 2011 and the ultimate respect paid to the up-and-coming locality, the publication of a major article (37 pages) in the January/February 2013 issue of one of the leading mineral collecting journals in the world, the *Mineralogical Record*.

Since the original presentation in 2010, two more very significant discoveries have been made, and the need for an update on the new finds has been recognized. The most significant new halite find was locating the "Frozen Blue" seam at the Intrepid Potash East mine. Ultimately this seam has produced by far the largest quantity and many of the finest quality halite specimens to ever come from the potash district. Important dates and specimens collected spanning from the original discovery of the "Blue Ice" seam to the present date will be covered, with emphasis on the most recent work (July 2011 to present date). Many knowledgeable collectors and dealers have articulated that the halite from this discovery could very well be the world's finest.

The title references the two major crystallized halite specimen producing seams at the Intrepid Potash East mine, but this reference spans only one of the significant finds. The other find of a lifetime was during July of 2011 at the Intrepid Potash West mine, but in this particular instance halite was not the object of appeal. Instead, aphthitalite, a sulfate mineral that was reported from the district (but only as microcrystals encountered in the milling process) was discovered in two open cavities within the 5th ore zone. Details of the find will be covered in the presentation, but needless to say several dozen specimens were collected that rank as the world's finest examples of the species.

A few more related topics will be presented such as field collecting strategies and observations, halite coloration theories, specimen preparation, and evaporite mineral curation. For a much more thorough exposé on the Carlsbad potash district and the discoveries made, please refer to the article in the January/February 2013 issue of the *Mineralogical Record*.

References

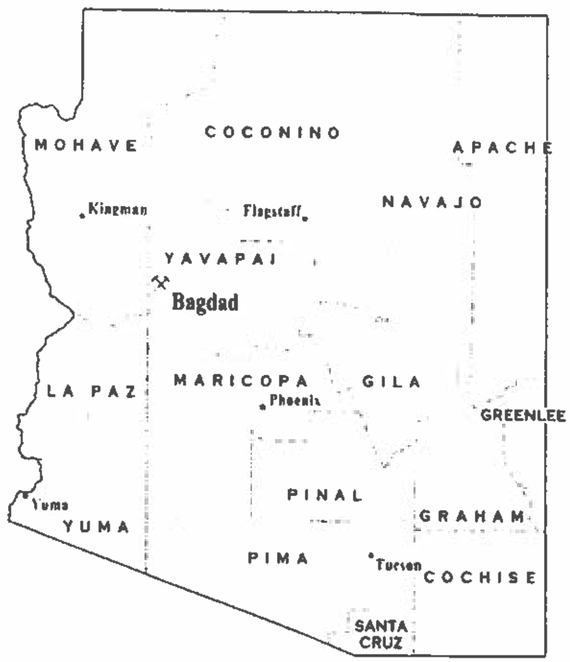
Simmons, P. C., 2010, Blue Ice—Collecting halite and associated minerals from the Carlsbad Potash mines, 31st Annual New Mexico Mineral Symposium, Socorro, New Mexico.

Simmons, P. C., 2013, The Carlsbad Potash Basin, Carlsbad, New Mexico, Mineralogical Record v. 44, no.1, pp. 13–49.

MINERALS OF THE BAGDAD COPPER MINE

Barbara L. Muntyan

The Bagdad copper mine, located in the Eureka mining district, is the last major porphyry copper deposit in Arizona, which has been developed largely without the support of a major mining company. The mine is located in west-central Yavapai County, approximately 100 miles from Phoenix.



Map by William W. Besse

The first claims were staked between 1878 and 1882. John Lawler staked many of the early claims in the district, and is the name most closely associated with the development of the mine. The Bagdad Copper Company was formed in 1911. Originally operated as an underground mine, using block-caving methods, it became an open pit operation in 1945. The first mill was constructed in 1928, and the state's first SXEW plant was constructed at Bagdad in 1970. Cyprus Mining acquired the mine in 1973, later merging with Phelps-Dodge, which operated the mine until 2007; in that year Bagdad was acquired, along with all other Phelps-Dodge assets, by Freeport MacMoRan, the present owner. The mine currently produces about 25 million pounds of copper annually.

Because of its remote location (the highway literally ends at the company town), Bagdad is not as well known as Morenci or Ray, but this mine has produced its share of exceptional mineral specimens, in particular beautiful, gemmy calcite clusters and fishtail twins, sprays of malachite pseudomorphs after azurite, deep blue chrysocolla covered with druzy quartz and surrounded by banded malachite, fine groups of quartz crystals, chalcopyrite crystals, chalcotrichite, and several other species of interest to the mineral collector. The lapidary material from Bagdad is truly noteworthy.

References

Anderson, C. A., Scholz, E. A., and Strobel, Jr., J. D., 1955, Geology and Ore Deposits of the Bagdad Area, Yavapai County, Arizona, U.S.G.S. Professional Paper 278.
Arizona Bureau of Mines, 1938, Some Arizona Ore Deposits, Bulletin 145.
Arizona Bureau of Mines, 1950, Arizona Zinc and Lead deposits, Bulletin 156.
Bogart, R. C., 1990, Some Talk About a Copper Mine: A History of Bagdad, Arizona, Ralph Turner Associates, Prescott, Arizona.
Parsons, A. R., The Porphyry Coppers in 1956, 1957, AIME.
Titley, S., and Hicks, C., 1966, Geology of the Porphyry Copper Deposits, University of Arizona Press.

New Mexico Spangolite

Ramon S. DeMark, 8240 Eddy Ave. NE, Albuquerque, New Mexico 87109

New Mexico has been known for a number of years as one of the world's premier locations for spangolite. This rare and beautiful, hydrated, copper aluminum sulfate, is known primarily as microcrystals. Highly acclaimed are noteworthy specimens from the Blanchard and Mex-Tex mines in the Hansonburg mining district near Bingham in Socorro County.

A single specimen recovered in 1930 from the Magdalena district and subsequently identified as spangolite by W.T. Schaller in 1937 (Northrop 1959) cannot be located and its identity remains questionable, as no further accounts have been recorded from the district. It was positively identified in New Mexico in 1953 by Arthur Montgomery in specimens provided by W.H. Wright of Santa Fe (Northrop 1959).

A paper by L.W. Talbot in the 1974 New Mexico Geological Society's 25th field conference guidebook reported an occurrence of spangolite at the Nacimiento copper mine near Cuba, New Mexico. A paper describing this occurrence (Hauff and Talbot 1974) was to be published but apparently never made it to press. No further reports of spangolite from this location were noted until a discovery by Rex Nelson in March 2012 (Nelson, pers. comm. 2013). Small crystals were found in a fossil log, partially replaced by chalcocite in the Triassic Agua Zarca sandstone in the Nacimiento pit. The crystals are up to .2 mm with a dominant pedion and minor pyramidal and prism faces. They were found in association with cyanotrichite.

Spangolite was reported from the Buckhorn mine in the Red Cloud district near Corona, in Lincoln County in November 1993 (DeMark and Hlava 1993). Crystals up to 2.2 mm, dominated by prism and pyramidal faces were found associated with cyanotrichite and brochantite. The crystals were found in situ at the bottom of a 45' deep shaft. A comprehensive report on the Buckhorn mine (Schreiner 1993) describes the mineralogy and layout of the shafts and adits constituting the Buckhorn mine. The site has since been reclaimed, and the shaft is no longer accessible.

A site near the portal on the south side of the Sunshine # 6 adit at the Blanchard mine was, for many years, the only are known area for spangolite at the Blanchard mine. This adit was buried and closed in 1979, and the spangolite area is now totally inaccessible. In May 2003 while investigating a boulder for brochantite in the debris field below the Sunshine #6 adit, a piece of rock popped out with a single spangolite crystal over 6 mm long! This is the largest known crystal from the Blanchard mine. Several other large crystals were also found. Spangolite has also been found in the Sunshine #4 adit. These crystals are quite small (less than .2 mm) and associated with cyanotrichite. The Sunshine #1 adit has produced very few spangolite specimens. The crystals are less than .3 mm and typically composed of pyramidal and prism faces. More recently, a short, open adit between the Sunshine #3 and Sunshine #4 adit (dubbed the Sunshine #3 ½ by Rex Nelson) was found by Rex in November 2008 (Nelson, pers. comm., 2013) to have spangolite in association with cyanotrichite, brochantite, and linarite. Very attractive specimens have been recently collected from this area featuring these three species.

In June 1995, an exceptional find of spangolite was uncovered during a mechanized dig at the Mex-Tex mine. An area at the base of the wall on the south side of the main portal was opened that contained very rich specimens of dark, lustrous spangolite crystals and aggregates up to 3 mm across. Some of these specimens have overgrowths of creedite (rare in the district) and are intergrown with lustrous, bright green brochantite. A few specimens exhibiting an unusual vermicular habit were also unearthed. Overall, these specimens are undoubtedly among the finest New Mexico spangolites, and they now grace private and public collections around the world.

This is the current story of spangolite in New Mexico. The next chapter, however, remains unwritten. Perhaps some sharp-eyed, diligent collector will add an additional page to the story.

References

De Mark, R. S., Hlava, P. F., 1993, Spangolite and other secondary minerals from the Buckhorn mine, New Mexico Geology, pp 15, 19.

Hauff, P. L., Talbot, L. W., Morse, A., 1974, Spangolite—an occurrence at Cuba, New Mexico: Mining Society of America, winter meeting, Tucson, Arizona, paper in progress.

Northrop, S. A., 1959, Minerals of New Mexico, revised: University of New Mexico Press, Albuquerque, 665 pp.

Schreiner, R. A., 1993, Mineral investigations of the rare-earth-element-bearing deposits, Red Cloud mining district, Gallinas Mountains, Lincoln County, New Mexico: U.S. Bureau of Mines, Open -file report 99–93, 189 pp.

Talbot, L. W., 1974, Nacimiento pit, a Triassic strata-bound copper deposit: New Mexico Geological Society Guidebook 25th field conference, pp. 301–303.

Arizona's Fabulous Sulfates

Les Presmyk

Most every Arizona collector has encountered gypsum near St. David (roses) or the Camp Verde area (pseudomorphs after glauberite). If you are a bit more adventurous, or just plain crazy, you may have seen white, fur-lined walls in an underground drift composed of epsomite or halotrichite. Maybe you have even gotten lucky and found a recognizable barite crystal. Arizona also has a number of localities for which the conditions and the subsequent sulfates are unique or certainly one of a handful of such localities across the world. There are two distinct and widely varied groups of sulfate minerals gracing the cabinets of collections throughout the world. The first, of course, are those minerals occurring before the influence of man. Minerals like world-class spangolites from Bisbee or linarites from the Mammoth-St. Anthony and Grand Reef mines, a Magma mine barite or leadhillite from Tiger. The other group occurs as the result of the intervention of man. These are the post-mining minerals, some of which are quite astounding in their own right.

Thirteen new sulfate minerals were first described from Arizona, seven of which resulted from the burning of the orebody in the United Verde mine at Jerome. The pyrite and copper sulfides caught fire in 1894 and remained sealed until 1928. During that period numerous attempts were made to quench the fires, including the use of pressurized air, water, carbon dioxide, and steam. It was the multiple surges of water and carbon dioxide that helped provide the environments in which seven new minerals formed, including native selenium, and over a dozen minerals were described. Access to these areas resulted when the United Verde open pit began intersecting cracks, thus allowing hot gases to escape. Three minerals are still unique to the United Verde, and they are guildite, yavapaiite, and lausenite. The other species are butlerite, ransomite, jeromite, and selenium, along with alunogen, copiapite, coquimbite, voltaite, and claudetite.

The Mammoth-St. Anthony mine hosts a significant group of rare and spectacular mineral species. The mine really came into its own as one of Arizona's premier localities during its last mining period from 1934 to 1953. Mine management recognized the value of its minerals and had one or more of their personnel collecting specimens for the company. There are two periods in which sulfate minerals formed, the first, referred by Dick Bideaux as the normal sequence, produced anglesite and devilline. The second, called the anomalous sequence, resulted in beaverite, brochantite, connellite, linarite and bobmeyerite. There are also sulfate/carbonate species in this second sequence which include leadhillite, susannite, plumbonacrite, caledonite and wherryite.

The mines of Bisbee comprise one of Arizona's great copper mining districts and is also its premier specimen producing locality. Two new sulfates were first described from Bisbee, chalcoalumite and spangolite, and although the type specimen is labeled Tombstone, it is almost certainly from Bisbee. Additional and noteworthy sulfates include antlerite, anglesite, brochantite, connellite, cyanotrichite, leadhillite, and gypsum. The antlerite and connellite crystals from here are some of the world's finest. Leadhillite is overshadowed by the Mammoth-St. Anthony mine but is nicely crystallized with distinctive white bladed crystals.

Bisbee's other group of sulfate minerals are the ones forming in the mines. It is not uncommon to find chalcanthite and halotrichite growing in a number of old mines throughout the state. What is unique to Bisbee is the suite of species occurring there. Dick Graeme and his two sons, Richard and Douglas, are responsible for this information. As they explored the mines, not only did they extract numerous specimens, but they also preserved information about the depositional environments. Post-mining gypsum crystals adorn a number of collections. Miners would find these lining drainage ditches and iron pipes. The other species include melanterite, boothite, ransomite, halotrichite, coquimbite, copiapite, kornellite, voltaite, chalcanthite, hydrobasalumnite, and goslarite. Due to the humid conditions these minerals form in, most remain where they were encountered and phtotographed.

One other notable locality for its sulfate minerals is the Grand Reef mine. Most famous for its large linarite crystals, up to two inches long, it is also the type locality for two sulfates, grandreefite and pseudograndreefite. Caledonite, anglesite and creedite also occur here in crystallized specimens.

A number of other localities throughout the state have produced fine specimens. The barites from the Magma mine at Superior are Arizona's best and range in color from white to golden to black and in crystals up to two inches across. Other barite localities include the Cerbat Mountains, the Rowley mine with mimetite and wulfenite, the Old Reliable mine, near Mammoth, and from the Puzzler mine in the Castle Dome district. Gypsum crystals up to two inches occur on siderite from the Antler mine, with azurite at the Castle Dome mine near Miami, as crystal groups and with colorful copper inclusions from the Mission mine, and associated with both azurite and dioptase from the Morenci mine.

Cyanotrichite has been produced from the Maid of Sunshine mine, near Courtland, and the Grandview mine in the Grand Canyon. Brochantite in association with azurite is known from the Silver Hill mine, north of Tucson, and the Castle Dome mine near Miami.

Collecting New Mexico in the 1950s—Kelly and Juanita Mines

Sherman P. Marsh, GAEA Minerals, 8384 West Iliff Avenue,
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The Magdalena mining district was discovered in 1866 by a California miner who found a rich piece of silver ore in the Magdalena Mountains. Subsequently, numerous mines and prospects were opened and worked until by 1910 total production from the district was over $50,000. The district continued to produce into the 1940s.

Kelly Mine

My first recollection of the mining town of Kelly was in 1947 when I traveled there with my grandfather, a traveling salesman. The Kelly mine was still working, and the town was laid out along one main street with houses and boardwalks on both sides. My most vivid memory is seeing an old time sheriff coming down the boardwalk complete with hat, vest, badge, and six-guns at his waist. Impressed the bejeepers out of a twelve year old!

My next experience with the Kelly mine was in the early 1950s when Bill Adkinson and I spent a week exploring the district. We occupied one of the abandoned houses and spent our days exploring and collecting at the many old mines in the area. We had noticed that there was a family living several houses up from us, and one evening we went up and introduced ourselves. The man who lived there was Fito Tafoya, and he had been a miner at the Kelly mine. In the course of our conversation he asked us if we would like to go into the mine and see where the blue smithsonite came from. Both Bill and I leaped at this opportunity and after dinner the next evening Mr. Tafoya led us down into the mine. The main entrance adit was mostly caved, but we managed to squeeze around some timbering and get into the main adit. From there we shortly turned left down a small ladder and into another tunnel. We went down through some stopes and, at one point, slithered through a fissure tilted at a 45-degree angle with some very dubious timbering. The rest of the journey was convoluted, and I couldn't possibly repeat it today. We finally got to a stope that had the blue smithsonite and were able to collect a number of nice specimens, making our first trip a successful one.

Over the next few years as Bill and I pursued our educations in geology we managed to return to the Kelly mine a number of times adding to our collections. On one visit we brought along our soon-to-be wives, Carol and Colleen, thinking they might like to see the smithsonite stope. They took one look at the entrance and told us they would wait for us outside. We then got the brilliant idea that, since they were staying outside, they could help us bring specimens out of the mine. We had found a shaft somewhat near the smithsonite stope, and we dropped a rope down so the girls could then pull our specimens up and out, saving us the trouble of carrying our packs out through the mine. The girls agreed, and the plan went well until we got the packs tied to the rope. The girls started to pull the packs up, and they got up about 30 feet when they stopped and then started to slowly slide back down. On the surface, the plan started well, but the weight was too much, and the girls started sliding toward the shaft. From below we yelled, "The packs are coming back down!!!!" The packs came crashing down. We repacked everything into several, much smaller and lighter loads that could be managed.

Juanita Mine

I had noticed on some of the maps in the USGS report on the Magdalena district (USGS Professional Paper 200) that the Juanita mine was closely related to the Kelly mine, running along the southerly continuation of the Kelly ore zone. Most of the ore in the Juanita mine was oxidized, and there was much quartz-barite. At the time there was a persistent rumor that the Juanita and Kelly mines were connected underground. I decided to see if I could enter the mine and do some exploring with a good friend, Ray Coudray. The main adit was open and we had no problem getting back to where much of the stoping had been done. The main adit ended in a "T" intersection, and to the left it opened into a large stope that plunged downward into darkness.

Even as a teenager I realized that that way could get me into big trouble, as I didn't have any idea how I was going to traverse all the way to the Kelly mine and then out. We prudently decided to explore the tunnels and stopes to the right and were able to find some outstanding quartz-barite specimens. Many of these were barite crystal aggregates lightly coated with quartz. We were able to open a small vug that had light brown single blades of barite on a druzy quartz background. The barite specimens from the Juanita mine were some of the best I'd ever seen, and there may be a potential for more to be found.

The 1950s were a magical time for collecting in New Mexico. Even as teenagers we were able to go just about everywhere and access never seemed to be a problem. We were able to collect very nice specimens from the various mines and prospects we visited, and the specimens seemed to be abundant. In all our collecting trips I don't recall seeing any other collectors, although there must have been some. It was a great time to be a collector and have a collection. It also inspired many of us to go on and become geologists, mining engineers, and enter other mineral-related professions.

The Brunton Pocket Transit

Jack Purson, Mining Artifact Collectors Association

A Canadian-born Colorado geologist named David W. Brunton patented an innovative tool for mineral exploration in 1894. Brunton's compass, officially designed as the "Brunton Pocket Transit," is an instrument that is legendary in the United States. The William Ainsworth Company in Denver, Colorado, manufactured it for over 75 years with the Brunton name engraved on the cover. Because of that long association between the Brunton® name and the pocket transit, most field geologists simply refer to it as a "Brunton." His compact design, which combined several existing tools into one, has proven to be innovative, extremely rugged, and versatile, unequalled in its portability and workmanship.

The Brunton continues to be an essential tool for many types of fieldwork today. Collecting vintage Bruntons is a pleasing way to connect with our geological roots, early science innovators, and the mineral industry. It appeals to those who appreciate fine precision instruments of science and also to those who grasp the human connection to the person who once made their living in part by using it. Because the Brunton has always been difficult to obtain and pricey in any era, they have often been cautiously used and cared for by people like us. This discussion will probe the history of David W. Brunton, the evolution of his transit, and the marvelous high-quality examples that are still available to collectors. Like most precious and rare items, there exist inevitable fakes and rip-offs to be avoided.

The Amazing "kit" by James Bray—The Ultimate Mining Collectible?!

Anthony Moon, 13000 Desert Moon Place, N.E., Albuquerque, New Mexico 87111

An article from the Aspen Democrat-Times newspaper of August 1909 described the kit as follows: "There were big and tiny hammers, all kinds of candlesticks, some to shut up and carry in the pocket, prospector's picks, etc., and all handwork and made of polished steel."

Mr. Bray had been foreman of blacksmiths at the Mollie Gibson mine in Aspen, Colorado, and was on his way to Ely, Nevada, at the time of the newspaper article. In 2009 the kit surfaced to the collecting community, and the presentation provides detailed photographs of the kit and the somewhat meager information known about Mr. Bray. The workmanship shown in the items is nothing short of superb and way beyond typical blacksmith work. For those of us that collect miner's candlesticks this kit could well be the ultimate mining collectible!

Postcard Mysteries: Orogrande and Captain Ellen Jack

Jane Bardal, jbardal@q.com, Albuquerque, New Mexico

Obtaining postcards can make a collector wonder about the stories behind the images. The Orogrande Commercial Club published a set of postcards to promote their mines and community. Postcards featured the mines, the smelter, the growing community, groups of investors and miners, and a scene of a parlor in one of the nicely furnished homes. In the early 1900s it was quite common for merchants in many towns to publish postcards to promote their towns and industries, but this organized set of postcards from Orogrande is unusual. The Orogrande Commercial Club first met in 1906, and they were full of enthusiasm for their new town, hoping that it would one-day rival El Paso. Postcards played a role in the boosterism seen in Orogrande.

Captain Ellen Jack proclaimed herself the "mining queen of the Rockies" in her set of postcards that she sold to tourists at her business on the High Drive outside of Colorado Springs. Her autobiography *Fate of a Fairy* contains many wild tales of her exploits. She owned a mine near Gunnison, Colorado, and then moved to Colorado Springs. Postcards were part of her efforts at self-promotion. She is one of the women immortalized as a Colorado Pioneer on the Women's Gold Tapestry that hangs in the Colorado State Capitol.

References

Colorado Springs Gazette, 1904–1921, Foote, A., 1950, The Fabulous Valley: A & T Company, Inc., New York.

Hunt, I., & Draper, W. W., 1960, To Colorado's restless ghosts: Sage Books, Denver.

Jack, E. E., 1910, The fate of a fairy: M. A. Donohue & Co., Chicago.

North, R. M., 1982, Geology and Ore Deposits of the Orogrande Mining District, Otero County, New Mexico, from http://geoinfo.nmt.edu/publications/openfile/downloads/OFR300-399/351-375/370/ofr_370.pdf

Not Just a Housewife: The Changing Roles of Women in the West, 2013, September 7, from National Cowboy and Western Heritage Museum: http://www.nationalcowboymuseum.org/research/exhibits/housewife/bios.aspx#jack

Schmidt, P. G., 1964, The Geology of the Jarilla Mountains, Otero County, New Mexico: New Mexico Bureau of Mines and Mineral Resources, New Mexico Institute of Mining and Technology, Socorro.

The Mining Fraud Question, 1907: Engineering and Mining Journal , p. 341.

The Orogrande Times, 1906–1907.

Vandenbusche, D., 1980, The Gunnison Country: B & B Printers, Gunnison, Colorado.

Vanderwilt, J. W., 1937, Geology and mineral deposits of the Snowmass Mountain area, Gunnison County, Colorado: U. S. Geological Survey, Bulletin #884.

Wolle, M. S., 1974, Stampede to Timberline: The Swallow Press: Chicago.

Women's Gold Tapestry, accessed July 2013, from Colorado State Capitol Virtual Tour (online) http://www.colorado.gov/dpa/doit/archives/cap/tapest.htm

A San Juan Anatase Odyssey

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Anatase has been reported from several localities in Colorado, but it wasn't until July 1984 that microcrystals of the mineral were discovered in the San Juan Mountains of southwestern Colorado. Robert Stoufer and the author made the first discovery high above the scenic town of Ouray in the abandoned workings of the Ores and Metals mine located in Squaw Gulch. The crystals, which vary in color from brilliant blue-black to translucent zoned crystals of light yellow or blue to blue black, range up to 0.5 mm and are perched on small transparent quartz crystals.

The next discovery of micro anatase crystals was in the underground workings of the Mountain Monarch mine, Ouray County, in 1985 by Richard Dayvalut. The 1-mm crystals, which are semitransparent and bluish-gray in color, show a prominent basal pinacoid and are associated with crystallized quartz, chalcopyrite, rhodochrosite, barite, and hubnerite.

In summer 1991, the author discovered anatase along with brookite and rutile on the dumps of the Silver Link mine in Ouray County. The crystals range up to 0.7 mm in size and exhibit two crystal forms. The dipyramidal crystals show a subtransparency and are color zoned from dark yellowish-green to dark greenish-blue, whereas crystals with a dominant basal pinacoid are typically dark bluish-black. The anatase occurred on quartz associated with crystallized brookite, bornite, chalcopyrite, and rutile.

Collecting on the dumps of the Grizzly Bear mine in Ouray County by Dorothy Atlle and Dee Rickey in summer 1994 produced a few tiny (0.1-mm) smoky-gray crystals of anatase associated with pale brown crystals of brookite.

In fall 1994, while collecting on the dumps of the Silver Mountain (concave tunnel), Indiana, Topeka, and Kentucky Giant mines, the author noted the widespread presence of anatase and brookite on all of the mine dumps. Anatase collected from the various mine dumps occurred in a variety of colors, ranging from honey-yellow to dark brown and from pale blue to very dark blue. The most common crystal habit is the steep dipyramids. Brookite occurred as honey-yellow to medium brown tabular crystals that range up to 0.5-mm in size. Rutile occurred as lathlike, pale-brown crystals up to 0.1 mm that crystallized on either brookite or quartz crystals.

In summer 1998 Robert Stoufer collected dark-blue to black anatase partially embedded on the faces of quartz crystals that occurred in the Leadville limestone in the amphitheater in Ouray. The crystals are unusual in that they occur in quartz veins in a sedimentary formation rather than a poly-metallic fissure vein enclosed in San Juan Tuff.

The last occurrence noted in the San Juan Mountains was a single anatase crystal found by Dee Rickey and Ron Gibbs at the Bandora mine in San Juan County. Recently in a restudy of the base-metal replacement ores of the Camp Bird mine, a single greenish crystal of anatase was noted associated with crystallized quartz, epidote, and pyrite.

Collecting Thumbnail Minerals

Allan Young

A thumbnail mineral is, as every collector knows, one category in a series of somewhat loosely defined specimen size classifications that range from micro to so-called museum pieces and, at the extreme, decorator specimens that require a forklift to move. Limiting oneself to collecting thumbnail-sized minerals is both challenging and in a way, liberating. Challenging because of the limitations it places on aesthetics, and liberating in that, while you can certainly enjoy and appreciate larger specimens for what they are, for most of us the strong urge to acquire them is simply not there. What a thumbnail mineral is depends upon whom you ask. If it is someone who competes in this category at mineral shows, they will tell you that it must fit within a one-inch cube as displayed. For others, it is simply a small mineral specimen, perhaps fitting snuggly into a perky box (or perhaps not) that is somewhat smaller than what is referred to as a miniature. Why the one-inch size? At one inch by one inch, it represents the lower limit of what can still be viewed and appreciated with the naked eye, while anything much smaller requires magnification.

A brief history of thumbnail collecting will be presented in this talk, together with a review of some of the most prominent early thumbnail collectors and dealers. The advantages and disadvantages of collecting specimens in this size as compared with larger sizes will be discussed. Many of the aspects of what makes a good thumbnail specimen, or any specimen for that matter, will be illustrated, as well as the various practices employed for curating and displaying thumbnail minerals. The author uses many photos of specimens from his own collection to illustrate various points presented in this talk, including his techniques for photographing small mineral specimens.

A Cripple Creek Update: New Developments at the World's Greatest Gold Camp

Steven W. Veatch, Emporia State University
Timothy R. Brown, Exploration Manager, Cripple Creek & Victor Gold Mining Company
Carl R. Carnein, Lock Haven University of Pennsylvania
John M. Rakowski, Lake George Gem and Mineral Club
Zachary J. Sepulveda, Colorado Scientific Society
Ian M. Miller, Denver Museum of Nature and Science
Jenna M. Salvat, Colorado Springs Mineralogical Society
Luke Sattler, Colorado Scientific Society
Theodore S. Reeves, Western Interior Paleontological Society
Caleb Bickel, Lake George Gem and Mineral Club
Hunter Bickel, Lake George Gem and Mineral Club
Blake L. Reher, Colorado Scientific Society

The Cresson Mine

Gold has been produced from the Cripple Creek mining district since its discovery in 1891. Historic production from underground mines and small, shallow surface mines is approximately 20 million ounces (622 tonnes) of gold. Recent gold production, since 1995, by Cripple Creek and Victor Gold Mining Company (a wholly-owned subsidiary of AngloGold Ashanti, Ltd.) is nearly 4.5 million ounces (140 tonnes). Current reserves include 5.9 million contained ounces (184 tonnes) of gold while the exclusive resources include an additional 7.0 million ounces (218 tonnes). This puts the total district endowment at nearly 37 million ounces (1,164 tonnes) of gold. This endowment makes Cripple Creek one of the most important gold districts in the world.

All ore tons are currently processed on the Valley leach facility where a dilute solution of sodium cyanide is percolated through the crushed rock. The gold goes into solution, and this pregnant solution is collected and pumped to the recovery facility. The leach pad currently holds over 300 million tons of rock. It will be filled with ore tons in late 2015 when it reaches its capacity of 400 million tons. Annual gold production from the operation is approximately 260,000 ounces.

Exploration activities have successfully replaced depletion for several years, and sufficient reserves exist to justify the construction of a second Valley leach facility. The construction of the second leach pad, with a capacity of 218 million tons, is currently underway, and the first gold will be poured from the new pad in 2016. In addition to this project, a new mill is also under construction to process higher-grade material and to increase gold recoveries with a gravity circuit, flotation, and CIP. This mill will process nearly 2.0 million tpa (tons per annum) of higher grade/lower recovery material that is intersected in the open-pit mining operations.

Mining activities are currently permitted to 2024 as this will allow the construction of both the second leach pad and the mill. Opportunities exist to add additional years to the mine life if exploration is successful. These opportunities include the re-introduction of underground mining in the district.

Carbonized Wood in the Cripple Creek Volcanic Complex

During historic underground mining operations in the late 1890s, pieces of carbonized wood, logs, and trunks were encountered. Discoveries continued through the early 20th century when additional carbonized wood specimens were found in several underground mines in the district. In 2003, the deep directional drill program beneath the main Cresson surface mine, yielded a core sample of diatremal breccia from a depth (beneath the surface) of 938 m that hosted a fossil wood fragment. Since then, much larger specimens (up to 15 cm long) of carbonized wood were found in the same general mine area at a shallower depth (152.4 m below the surface). This recent discovery was on the north side of the Cresson pipe, a late-stage, lamprophyre breccia near the center of the largest open-pit mine.

The occurrence of these carbonized wood specimens, and other pieces of petrified wood found in various locations on the surface, suggest that trees were growing during periodic lulls in the volcanic activity. Succeeding explosive volcanic events and the subsequent subsidence likely incorporated trunks, branches, and other organic debris into the resulting diatremal breccia. Further studies are being planned on the carbonized wood to determine the metamorphic temperatures to which they reached, including Raman spectra analysis.

Historic Preservation

Cripple Creek and Victor Gold Mining Company (CC&V) supports historic preservation in the district. They put the Independence Headframe and Mill on the National Register of Historic Places, relocated the Cresson headframe and ore sorting house, relocated and preserved the Hull City headframe and ore sorting house, moved the Gold Sovereign headframe to the Cripple Creek district museum, and they maintain a display of historic mining equipment at the Victor Lowell Thomas museum. Through their partnership with the Southern Teller County focus group, CC&V preserves historical sites throughout the mining district and provides public access to some of those areas. Five trails have been developed by the focus group on CC&V property.

The Cripple Creek district museum houses a fantastic collection of photographs and other ephemera, as well as tools, costumes, house wares, and Victoriana relating to the district's rich late-19th- and 20th-century mining history. Included is a large (not yet fully inventoried) collection of mineral and rock samples from the district and elsewhere. The collection contains excellent examples of the district's ores and other minerals, as well as the original rock specimens collected by Whitman Cross and R.A.F. Penrose, Jr. when compiling their historic work on the district's geology.

In 2012, three semi-retired geologists, Carl Carnein, John Rakowski, and Steven Veatch, began the task of developing an inventory and computer database that documents this collection. Once or twice a month, they meet with a museum docent and fully describe, measure, photograph, and number specimens. This work requires careful examination of each specimen, which often involves discussions of identities among the participants. Many of the district's telluride minerals cannot be identified by eye, and we consider this to be a preliminary inventory. Thus far, we have inventoried about 300 specimens, and we estimate that the work will take several more years.

Thanks to financial help from CC&V and support from the staff of the Cripple Creek district museum, we hope to help the museum to make its geologic collections accessible and available to future generations of scientists, historians, and the interested public.

Mineralogy Along Northern Arizona's Route 66

Anna M. Domitrovic, Arizona–Sonora Desert Museum, Tucson, Arizona

The first road to traverse the continental United States from the east coast to the west coast was the Lincoln Highway. Conceived in 1911 and dedicated in 1913, it stretched across 13 states from Times Square in New York City to Lincoln Park in San Francisco. But the first paved road was Route 66, also known by such colorful names as the Will Rogers Highway, the Mother Road, and Main Street America. Route 66's eastern end was in downtown Chicago, with its western terminus in Los Angeles. Completed in 1938, Route 66 not only provided a relatively smooth ride for motorized vehicles, it was also a means for migrant workers of the 1930s Dust Bowl era to safely travel west in search of better lives.

Our mineralogical journey along Route 66 will start at the western end just east of where the Arizona and California state lines meet and end in the east before crossing into New Mexico on Route 40. First to consider are the mines and minerals in the mountains and canyons surrounding Oatman. The Oatman mining district in the Black Mountains is also known as the San Francisco and Union Pass districts. Of note is the Moss mine. In 1863 it was the first located in the district, and also the first and oldest patented claim in Arizona. The Moss was followed shortly thereafter by the Hardy and the Homestake. The district is known for lode gold, which occurs in quartz-monzonite porphyry veins. Mining will resume at the Moss mine through the efforts of current owners, Patriot Gold Corporation of Canada. In February 2013, the company announced a three-phase operation on the property. The open pit, heap leach operation is scheduled to begin commercial production of gold by mid-2014 and continue through 2017.

Mining at the Hardy and Homestake mines began in the mid- to late-1800s and continued to the 1920s. Of late, these mines and other claims in the Oatman district are most notable for occurrences of green fluorite.

Gold Road joins the Moss mine as another lode gold occurrence in the Oatman district. It produced intermittently from 1902 to 1949. Gold and silver with trace beryllium occur in a vein in Tertiary volcanics. Current owners conduct public tours of the mine. Other tourist attractions along the western beginnings of Arizona's Route 66 include historic Oatman. Oatman started as a gold mining camp in 1906. Centrally located in the Oatman mining district on the western flanks of the Black Mountains, the town served as a supply distribution point for mines in the area and residential area for its burgeoning population. At its peak, Oatman had a population of nearly 3,500. Currently, the town's permanent residents number about 150. The town caters to tourists traveling historic Route 66 and those seeking some of the early mining history of northwestern Arizona. Nearby Bullhead City, Arizona, and Laughlin, Nevada, along the Colorado River, are also places of interest for visitors to the area.

The next localities of note are north of Kingman, and a side trip in that direction takes one first to the mines and copper minerals found at Mineral Park. Mineral Park is considered the oldest camp/town in Arizona. The post office operated from 1872 to 1912.

Copper was the first mineral of choice mined at Mineral Park, but silver, gold, molybdenum, and lead were also recovered from the Precambrian crystalline rocks. Mining peaked between 1876 and 1892. Modern open pit mining began with Duval in 1963, followed by Cyprus in 1986, and Equatorial Mining of Australia in 1997. In 2003, Canada's Mercator Minerals, LTD. acquired the property from Equatorial. In 2012, Mercator announced that the ore reserves provided for a 22-year mine life.

Continuing north of Mineral Park and one comes to Chloride, the oldest continuously inhabited town in Arizona. It was originally a silver camp founded in 1863 but mining in the area did not commence until the 1870s, even though mineral resources were first located in the 1840s.

And finally, the northernmost mineral locality to consider is in Gold Basin east of Highway 93. Wulfenite, vanadinite, and mottramite with micro gold crystals occur at several of the mines in the area. Gold Basin is also the site of a meteorite fall and numerous specimens of the nickel/iron meteorite can still be found in scattered localities.

The longest and best-preserved sections of the original Route 66 stretch easterly out of Kingman and at Ash Fork, it lies under Interstate 40. But at Flagstaff, we will take another mineralogical jaunt north to the Grand Canyon. While the Grand Canyon is a bit off the beaten track, trappers, prospectors, and miners were drawn to the canyon area in the mid- to late-1800s. In the late 1880s, John Hance attempted to mine asbestos in the canyon. Louis Boucher, who arrived in northern Arizona and the Grand Canyon about 1889, mined copper until 1912. And in the 1890s to early 1900s, Ralph Cameron opposed the Grand Canyon's national park consideration in an attempt to open a platinum mine near the south rim. Some notable mines on the South Rim include the Cameron, the Grand View, and the (Old) Orphan. A recent contribution to Arizona's type mineral specimens, grandviewite, was discovered at the Grand View mine.

One cannot leave the Grand Canyon without a nod to John Wesley Powell. He was the first to traverse the Grand Canyon by way of the Colorado River in 1869. During his tenure at the Smithsonian in Washington, D.C., he led three river expeditions through the Grand Canyon. Powell served as director of the U.S. Geological Survey from 1881 to 1894.

We pick up Route 66 once again at Flagstaff where it continues to underlie I-40. East of Winslow and south of I-40 is Barringer Crater. Also known as Meteor Crater and Canyon Diablo, it was named after Daniel Barringer, who was the first to recognize it as a meteor impact. About 50 thousand years old, the impact formed in Pleistocene rocks. The crater is 4,000 feet in diameter, 570 feet deep, with a 150-foot rim. In 1903, Standard Iron Company staked claims on 640 acres around the center of the crater, estimating iron reserves up to 100 million tons. While the mining operation did not progress as hoped, remnants of the nickel/iron meteorite have made their way into collections worldwide.

Route 66, still underlying I-40, forms the boundary between the Painted Desert in the north, and Petrified Forest in the south. Petrified Forest is about 146 square miles. It was named a national monument in 1906 and a national park in 1962. The rocks of Petrified Forest, the Chinle Formation, are about 225 million years old. Nine different species of trees, all extinct, have been identified at Petrified Forest, but the most common are of the species *Araucarioxylon arizonacum*, *Woodworthia arizonica*, and *Schilderia adamanica*. Other fossil flora includes ferns, cycads, and gingkoes. *Phytosaurs* (fossil crocodiles), *Buttneria* (fossil amphibians), and early dinosaurs have also been found along with the fossilized flora. Silica, in the form of agates with some crystallized quartz permeated the fallen trees, the result of volcanic eruptions, thus preserving them in the form of petrified wood. Iron, manganese, and copper stained the silica in some instances resulting in the rainbow of colors in the fossilized wood.

Painted Desert lies at the southern end of Monument Valley. It gets its name from early Spanish colonialists who called it *El Desierto Pintado*. The rocks are siltstones, mudstones, and shales of the Triassic age Chinle Formation, the same rocks that occur in Petrified Forest. Iron and manganese stain the rocks various hues that give the Painted Desert its name. This approximately 7,500-square-mile area was named a national landmark in 1906, and later raised to national park status. Mineralization and fossilization in the Painted Desert are similar to that found in Petrified Forest.

As we approach the eastern boundary of northern Arizona at the New Mexico line, the original Route 66 is broken into bits and pieces in the populated areas off I-40. But a few miles remain under the interstate. So our last look at mineralization will be to the north in Monument Valley on the Navajo Indian Reservation. The Navajo call Monument Valley *Tse Bii' Ndzisgaii* or Valley of the Rocks. Buttes, very popular in early western movies out of Hollywood, rise about 1,000 feet off the valley floor. The rocks are shales and sandstones stained with iron oxide. From 1948 to 1967 mining activities in Monument Valley recovered uranium, copper, and vanadium.

The Origin of Chalcedony Nodules from Southwest New Mexico and Southeast Arizona

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Chalcedony is cryptocrystalline quartz, composed of minute, fibrous microcrystals. Agate is chalcedony with a distinct banded or other pattern. Thus, all agate is chalcedony, but the term chalcedony is generally used for material that is translucent but which has only indistinct or limited banding. Chalcedony and agate most often occur as fillings of gas cavities within volcanic rocks, though they can also form in sedimentary rock and as a replacement of fossil wood. In "thundereggs," agate fills angular, often star-shaped cavities in rhyolite, generally within zones of spherulitic devitrification of the rhyolite.

This talk will describe cryptocrystalline quartz from four localities for chalcedony nodules and "roses":

- Locality "A," an occurrence of chalcedony nodules and geodes in rhyolite near Geronimo Pass in the Peloncillo Mountains, Hidalgo County, New Mexico.
- Locality "B," an occurrence of chalcedony nodules in Luna County, New Mexico.
- Locality "C," of chalcedony "roses" near Apache Creek, Catron County, New Mexico.
- Locality "D," a well-known rockhounding area for chalcedony, agate, and fire agate nodules near Round Mountain and Engine Mountain, in the Peloncillo Mountains south of Duncan, Greenlee County, Arizona.

The mode of formation of the chalcedony at these localities is curious and not well understood. Rather than forming concentric layers coating the entire interior surface of a cavity, the chalcedony has been deposited only on a portion of the cavity, appearing to originate from one or several "feeder" sources where silica-bearing water seems to have seeped into the cavity and immediately deposited the chalcedony. Sometimes just a small amount of chalcedony has formed, which may erode out of the rhyolite to form an individual "button"; or, chalcedony originating from several sites within a cavity may grow and coalesce to fill or almost fill it, leaving a small mouth-like opening and a hollow center.

Nodules from the Hidalgo County locality "A" tend to form cup or bowl shapes resembling partial geodes, while those from the Luna County locality more often form flattened "chalcedony roses". Many of the nodules from all these localities fluoresce green under shortwave ultraviolet light, indicating a trace content of uranium; the fluorescence tends to be quite bright at the Hidalgo County locality, less so and more subdued at the Luna County locality. There is no known explanation for the pink coloration—more common at the Luna County and Catron County localities—though it appears to be more evident in the portions of nodules that were most exposed to sunlight as they rested on the ground after weathering out of the host lava.

We seem to be in a time of extreme rockhound interest in agate and other forms of chalcedony; many books on the topic are being publishing, ranging from "coffee table" picture books of spectacular agates, to those that try to elucidate the origin of agates, nodules, and thundereggs. Recent books by Brzys (2010), Colburn (2008), Lynch and Lynch (2011), Kasper

(2012, 2013), and Woerner (2011) have tried to address the origin of agates; Dunbar and McLemore (2000, 2002) described the agate-bearing spherulites at Rockhound State Park, New Mexico; and the present author discussed the nodules from the Hidalgo County locality in several previous presentations (Modreski, 1995, 2005a,b).

References

Brzys, K. A., 2010, Agates Inside Out: Grand Marais, MI, Gitchee Gumee Agate and History Museum, 246 pp.

Colburn, R., 2008, The formation of thundereggs (lithophysae), (privately published on CD-ROM), Deming, NM; see http://www.zianet.com/GEODEKID/CDInfo.html

Dunbar, N. W., and McLemore, V. T., 2000, The origin of rhyolitic spherulites at Rockhound State Park, New Mexico: 21st Annual New Mexico Mineral Symposium, Socorro, NM, pp. 7–8, and New Mexico Geology, 2001, v. 23, no. 1, p. 22.

Dunbar, N., and McLemore, V., 2002. The origin of rhyolitic spherulites at Rockhound State Park: *in* Gemstone Deposits of Colorado and the Rocky Mountain Region, Abstract Volume, pp. 29–32. See: http://geoinfo.nmt.edu/staff/dunbar/publications/abstracts/Dunbar_gem_and_mineral_symposium_abstract-2002.pdf

Kasper, D., 2012, A Student's Guide to the Genesis of the Lithophysae—Geodes and Amygdules: Kasper Jasper Press, 40 pp.

Kasper, D., 2013, A Southwestern Field Guide to the Agates, Jaspers, and Opals, Volume I, The Geology of their Formation, Inclusions, and Structures (revised edition): Kasper Jasper Press, 469 pp.

Lynch, B., and Lynch, D. R., 2011, Agates of Lake Superior: Stunning Varieties and How They Are Formed: Cambridge, MN, Adventure Publications, 223 pp.

Modreski, P. J., 1995, Origin of chalcedony nodules in rhyolite from the Peloncillo Mountains, Hidalgo County, New Mexico [abs.]: 16th Annual New Mexico Mineral Symposium, 1995, Socorro, NM, pp. 18–19, and New Mexico Geology, 1996, v. 18, no. 1, pp. 18–19.

Modreski, P. J., 2005a, Fluorescence of agate and related minerals from New Mexico and the World [abs.]; 26th Annual New Mexico Mineral Symposium, 2005, Socorro, NM, pp. 7–8.

Modreski, P. J., 2005b, Luminescence of cryptocrystalline quartz and opal: in Symposium on Agate and Cryptocrystalline Quartz, Program and Abstracts, Golden, Colorado, pp. 98–102.

Woerner, Peter, 2011, Geodes and Thundereggs in Rhyolite: Kasper Jasper Press, 420 pp.

Microminerals near San Juan Peak in the San Mateo Mountains Socorro County, New Mexico

Ron Gibbs, Oro Valley, Arizona

The San Juan Peak area of the southern San Mateo Mountains is composed of various volcanic flows related to the Rio Grande rift. Some of these flows contain abundant lithophysae which contain a variety of microminerals. The San Mateo Mountains are west of I-25 in southern Socorro County. The collecting areas are readily reached from exit 115 on I-25, 35 miles south of Socorro. Roads turn from paved to graded to 4-wheel drive recommended, but good collecting is within easy reach. Good specimens can be found by working on boulders on hillsides and in dry washes.

The lithophysae are usually lined with quartz and sanidine, often as excellent crystals. Quartz can be found as its usual self, as tridymite, amethyst, or hyalite. Sanidine occurs as transparent bladed crystals, slightly cloudy, and often exhibiting a brilliant blue sheen. Other minerals found include hematite, pseudobrookite, bixbyite, titanite, fluorite, zircon, and pyroxene.

Another occurrence with similar mineralogy is accessed from Exit 100 on I-25. A roadcut on NM-1 about one mile north of the exit contains numerous lithophysae with similar mineralogy.

The San Mateo Mountains are an uplifted fault block within the Mogollon–Datil volcanic field. The San Juan Peak area is underlain by various rhyolitic flows and tuffs dated at 28 million years ago. Some units are spherolitic and have abundant and conspicuous crystal-lined lithophysae.

Lost Mines and Legends in New Mexico

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All the potential magic of mineral collecting, with respect to lost mines and legends, will be explored with an overview of localities from southern to northern New Mexico. I will examine individual counties and give a short review of the stories that have been responsible for all of the glorified legends. This collection of stories will be treated with some practical perspective illustrating the way they were created and transmitted. An in-house exercise will be performed that will hopefully provide everyone with some insight into how and why stories of lost mines and legends are so glorified. Some perspective about why each of us seeks and searches for legendary deposits, or at least is intrigued by them, will also be discussed. Hopefully this presentation will cause everyone some introspection and provide humor.