ICO MINERAL SYMPOSIU WAN

# **Program and Abstracts** November 10 – 12, 2023

History of collecting at the Mineralogy Museum of l'École des Mines de Paris Dr. Eloïse Gaillou, Featured Speaker

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

# WELCOME

### to the

## 43rd NEW MEXICO MINERAL SYMPOSIUM

## November 10 — 12, 2023

## Macey Center

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

Socorro, New Mexico 2023

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



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



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 encourages intimate discussions among all interested in mineralogy and associated fields.

The cover photo is Smithsonite from the Kelly Mine, Magdalena District, Socorro County, New Mexico. Mineral Museum no. 16315. Photo by Jeff Scovil

<b>PROGRAM &amp; CONTENTS</b>			
Friday	November 10, 2023		
9:00 am to 12:00 pm	Micromineral Aficionados Gathering—Rm. 253 Headen Center (Bureau Bld.)		
1:00 to 4:00 pm	Photomicrography Workshop— Patrick Rowe, Michael Michayluk, and Scott Braley, Rm. 253 Headen Center		
5:00 to 7:00 pm	Friends of the Mineral Museum reception—Headen Center atrium, appetizers and cash bar.		
7:00 pm –	Informal motel tailgating and social hour—Individual rooms, Comfort Inn & Suites and other venues, FREE.		
Saturday	November 11, 2023		
8:00 am	Check-in and continental breakfast—Macey Center		
8:00 am to 3:00 pm	Silent auction to benefit the New Mexico Mineral Symposium—Macey Center		
8:45 am	Opening remarks—Main auditorium		
9:00 am	Minerals of the Red Cloud Mine (New Mexico) revisited—Fred J. Parker (pg. 6)		
9:30 am	Notable microminerals from New Mexico—Ramon Demark, Michael Michayluk, Thomas Katonak (pg. 7)		
10:00 am	Coffee break		
11:00 am	The mines and minerals of the Copper Mountain Mining District, Morenci, Greenlee County, Arizona—Les Presmyk (pg. 9)		
11:30 am	Gemstones from the French Crown Jewels at l'École des Mines de Paris— Eloïse Gaillou (pg. 12)		
12:00 pm	Lunch		
1:30 pm	Fissure veins of Keweenaw County, Michigan—Christopher J. Stefano, Phillip Persson (pg. 13)		
2:00 pm	A major new fluorite find at the Blanchard Mine, Hansonburg Mining District, New Mexico— Michael Sanders, Bradley Culebro, Michael Eggleton, Ramon Demark (pg. 14)		

2:30 pm	Coffee break		
3:00 pm	A tale of two specimens, part I-Ron Gibbs (pg. 17)		
3:30 pm	A tale of two specimens, part II-Ron Gibbs (pg. 17)		
4:00 pm	History of collecting at the Mineralogy Museum of l'École des Mines de Paris—Eloïse Gaillou (pg. 19)		
5:30 pm	Sarsaparilla and suds: Cocktail hour, cash bar—Fidel Center ballrooms		
6:30 pm	Banquet followed by a live auction to benefit the New Mexico Mineral Symposium—Fidel Center ballrooms		
Sunday	November 12, 2023		
8:00 am	Morning social, coffee, and donuts-Macey Center		
8:50 am	Welcome to the second day of the symposium and follow-up remarks		
9:00 am to 1:00 pm	Silent auction sponsored by the Albuquerque Gem and Mineral Club for the benefit of the Mineral Museum (free and open to the public)		
9:00 am	Tourmalines from Erzgebirge, Germany: Schorl and fluor-schorl from the type localities and oxy-schorl from diamond bearing rocks—Andreas Ertl (pg. 21)		
9:30 am	After 23 years of Mindat.org: What's new and what's yet to come—Jolyon Ralph (pg. 24)		
10:00 am	Coffee break		
10:30 am	<i>What's new in minerals and personal photo favorites</i> —Jeffrey A. Scovil (pg. 25)		
11:00 am	Paramelaconite from Bisbee, Arizona—Evan Jones (pg. 27)		
11:30 am	Samarskite-(Y) and associated minerals, Platt Pegmatite (Uranium King Claim), Encampment, Carbon County, Wyoming—Markus Raschke, Mark Ivan Jaconson (pg. 34)		

### Symposium Keynote Speakers 1979–2023

Year	#	Keynote speakers and titles		
1979– 1982	1–3			
1983	4	Robert W. Eveleth, "Of Bridal Chambers, jewelry shops, and crystal caverns—a glimpse at New Mexico's mining camps, characters, and their mineral treasures"		
1984	5	Laurence H. Lattman, President, New Mexico Institute of Mining & Technology; "High-tech materials for modern society"		
1985	6	Peter Bancroft, "Gem and crystal treasures"		
1986	7	Vandall T. King. "Pegmatite petrology through phosphate mineralogy"		
1987	8	Robert W. Jones, "Copper throughout history"		
1988	9	Peter Bancroft, "Gem and mineral treasures II"		
1989	10	Philip C. Goodell and Kathryn Evans Goodell, "Adventures in the Sierra Madre, Batopilas, Chihuahua"		
1990	11	Peter K.M. Megaw, "Mineralogy of the rhodochrosite-bearing "silicate" ore-bodies of the Potosi mine, Santa Eulalia mining district, Chihuahua, Mexico"		
1991	12	Gilbert Gauthier, "Mineral classics of Shaba, Zaire"		
1992	13	Stanley J. Dyl, II, "Mining history and specimen mineralogy of the Lake Superior copper district"		
1993	14	Bernard Kozykowski, "Franklin-its mines and minerals;" and, "The Sterling mine-a precious hillside preserve"		
1994	15	Fred Ward, "The 'precious' gems: where they occur, how they are mined;" and, "Jade"		
1995	16	Dr. Miguel Romero Sanchez, "The Romero Mineral Museum"		
1996	17	Robert W. Jones, "Gemstones of Russia"		
1997	18	Carl A. Francis, "New Mexico minerals in the Harvard collection"		
1998	19	Terry Huizing, "Collectible minerals of the Midwestern United States", and, "Colorful calcites"		
1999	20	Rodney Ewing, "Mineralogy, applications to nuclear waste"		
2000	21	Richard Houck, "Sterling Hill: Yesterday, Today and Tomorrow"		
2001	22	Jeff Scovil, "Sampling the Finest"		
2002	23	Robert Barron, "Recovery of A 17 Ton Copper Boulder from Lake Superior"		
2003	24	John Rakovan, "The Cause of Color in Fluorite with special reference to the Hansonburg District, NM"		
2004	25	Harrison H. Schmidt, "Lunar Geology and Mineralogy"		
2005	26	Terry Wallace, "Silver of the American West"		
2006	27	Ed Raines, "The Leadville Silver Deposits"		
2007	28	John Rakovan, "Mineralogical Meanderings in Japan"		
2008	29	John Medici, "Some highlights of 45 years of Medici Family field collecting"		
2009	30	Ray DeMark, "Thirty Years of symposium presentations: a retrospective"		
2010	31	R. Peter Richards "Geology and Mineralogy of Mont Saint-Hilaire, Quebec, Canada"		
2011	32	Dr. Anthony Kampf, "Solving Mineral Mysteries"		
2012	33	Jean DeMouthe, "Ancient and modern uses of gems & minerals: talismans, tools & medicine"		
2013	34	Allan Young, "Collecting Thumbnail Minerals"		
2014	35	Virgil W. Lueth, "The Past, Present, and Future of the New Mexico Bureau of Geology & Mineral Resources—Mineral Museum"		
2015	36	Robert Cook, "An Overview of five great American Gold Specimen Locations"		
2016	37	John Cornish, "Upside down and in the future, mining Tasmania's Adelaide Mine"		
2017	38	Bob Jones, "The History of the Bristol Connecticut Copper Mine"		
2018	39	Peter K.M. Megaw, "The Santa Eulalia Mining District, Chihuahua, Mexico"		
2019	40	Brad Cross, "An overview of the agates of northern Mexico and southern New Mexico"		
2020		Cancelled due to Covid-19		
2021	41	Jeffrey Post, "The Smithsonian Gem Collection—Unearthed: Surprising Stories Behind the Jewels"		

### Symposium Keynote Speakers 1979–2023

Year	#	Keynote speakers and titles
2022	42	John Jaszczak, "120 Years of the A.E. Seaman Mineral Museum of Michigan Tech"
2023	43	EloïseGaillou, "History of collecting at the Mineralogy Museum of l'École des Mines de Paris"

#### Minerals of the Red Cloud Mines...Revisited

#### FRED J. PARKER

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The adjacent Red Cloud Copper and Fluorite mines are located in the Gallinas Mountains of Lincoln County, New Mexico near the small town of Corona. The Copper mine dates from 1881 and produced lead, copper, and silver. The Fluorite mine operated from 1943 to 1955 for Rare Earth Element (Ce, La, Y) bearing minerals. Today, only a few concrete foundations, trenches, cuts and shafts mark the mine sites, along with small dumps of the Copper mine. For decades, the mines provided predominantly average quality micro minerals to collectors. However, recently diligent dump digging by energetic collectors uncovered excellent micro, thumbnail and larger specimens of red vanadinite with black mottramite, and wulfenite in a variety of colors and crystal morphologies. As a result, this study was initiated to ascertain what other minerals were being uncovered on the dumps. Analytical tools including X-ray diffraction and energy dispersive spectrometry were used for identifications. The outcome resulted in a compilation of 32 minerals for the Red Cloud mines. Previously unreported minerals of interest to the collector include arsentsumebite, brochantite, fornacite, hemimorphite, linarite, and zalesiite (First occurrence in New Mexico!). Photography by Scott Braley illustrates the aesthetic quality of the micro minerals collected from the dumps. From this study comes a new and greater appreciation of the mineralogy of this small frontier mining effort, and motivation to examine Red Cloud specimens for additional mineral species.

#### References

Parker, F.J., (2023) Minerals of the Red Cloud Mines. Rocks and Minerals, V.98, #4, 355-362.



Figure 1. agardite-(La) on fluorite, field of view 1.5 mm, Fred Parker specimen. Scott Braley photo.



Figure 2. Vanadinite with mottramite. Fred Parker specimen. Scott Braley photo.

#### Notable New Mexico Microminerals

#### RAMON S. DEMARK<sup>1</sup>, MICHAEL MICHAYLUK<sup>2</sup>, THOMAS KATONAK<sup>3</sup> <sup>1</sup>Albuquerque, NM <u>raydemark@msn.com</u>, <sup>2</sup> Las Cruces, NM, <sup>3</sup> Corrales, NM https://doi.org/10.58799/NMMS-2023.634

New Mexico has an abundance of localities that produce a wide variety of mineral species best viewed as microminerals. This is a result of the diverse geological environments occurring in the state. Igneous intrusives and volcanics that generated hydrothermal fluids are widespread. Contact metamorphic rocks (e.g. tactites) and regional metamorphic rocks (quartzites, shists, etc.) are also numerous. The Rio Grande rift has mineralization similar to the Mississippi Valley type deposits. Sedimentary environments have also produced superb microminerals. The uranium/vanadium minerals in the Grants uranium district in western New Mexico are particularly noteworthy. Oxidation of hydrothermally deposited primary minerals (sulphides) produced a plethora of colorful secondary minerals which delight the micromineral collector.

The extensive geologic activity created ample ore bodies which have been mined in New Mexico for over two hundred years. Numerous mining districts cover the state. Commercial mining activity has ceased with the exception of large open-pit copper mines in the southwest (Silver City area). This long history of mining has resulted in numerous abandoned mines, prospects, and mine dumps. This program will document some of the notable microminerals recovered and the locations that produced them.

#### References

Northrop, S.A. and La Bruzza, F.A. (1996) Minerals of New Mexico (revised), Univ. of New Mexico Press, Albuquerque, New Mexico, 346 p.



Figure 1. Brochantite, Brochantite, Mex Tex Mine, 6mm Fov. Michael Michayluk photo.



*Figure 2. Gold, San Pedro Mine, 9mm Fov. Michael Michayluk photo.* 



Figure 3. Libethenite, Chino Mine, 8mm Fov. Michael Michayluk photo.



Figure 4 Raydemarkite, Cookes Peak, Summit Group, 2mm Fov. Michael Michayluk photo.

#### The Mines and Minerals of the Copper Mountain Mining District, Morenci, Greenlee County, Arizona, USA

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The Copper Mountain Mining District, also known as the Clifton-Morenci Mining District, is located in Greenlee County along the Arizona-New Mexico border near the center of this border. This district was in Graham County until 1911, when Greenlee became a separate county.

The earliest prospectors accessed this area from Silver City, New Mexico Territory, first panning for gold along the various streams and dry river beds. The green and blue stained rocks attracted the interest of prospectors, as well as that of soldiers who were sent to the area to subdue the indigent tribes, mainly the Apaches, for which this was their long-time home (Canty, Greeley and Conger, 1987).

As with all of the early mines and mining districts in the Arizona Territory, the high transportation costs determined whether a mine was profitable or not. This was especially true with the copper districts like Bisbee and Morenci. The early mine owners in Morenci were dependent on ores that had to average 20% copper or better to even consider making a profit.

Morenci's mineral deposits were unique because they were located near the top of the mountains along Chase Creek. The ores were hoisted to the top of the mountain and then moved down to creek bed by way steep railways installed down the sides of these mountains. The ore was trammed downhill about six miles to the smelters at Clifton, where there was a reliable water source at the San Francisco River. In later years several of these mines used a common haulage drift at the base of the mountain and transferred their ores down winzes to the waiting trains. These ores were stockpiled at Clifton (Eric Melchiorre, personal communication). Any specimens labeled as Clifton came from this stockpile because there were no mines in Clifton. Can you imagine walking across these stockpiles and picking up azurite and malachite specimens?

The collecting culture so prominent in Bisbee did not develop in the Morenci mines. Certainly, there was no general manager like Ben Willians at the Copper Queen who realized a ten-pound azurite specimen was worth far more as a specimen than the copper it contained. Plus, the mineralogy of the Morenci deposits is nowhere near as diverse as those of Bisbee. The major species of interest to the collector are azurite, malachite, cuprite, native copper, dioptase, sphalerite, and pyrite, although a total of 90 species have been identified from this area (Hay and Wilson, 2019).

Old Morenci specimens are found more frequently in eastern collections. The same dealers from the East Coast frequenting Bisbee and Tombstone also traveled to Morenci, especially once the railroads were completed around 1890. These high-grade orebodies were depleted by the early 1900s and specimen production dwindled significantly. Then in the late 1920s and early 1930s, the Coronado Mine was turned over to lessors (Dick Graeme, personal communication). One batch of azurite and malachite specimens was sold to a dealer in Oregon where the boxes were rediscovered in about 2015. The specimens were easily dated because they were wrapped in early 1930s newspapers (Mark Hay, personal communication).

Many Morenci specimens are mislabeled as Bisbee. The Arizona collector has to take on the role of the sleuth to correctly identify Morenci specimens from Bisbee and other localities. Differences in the matrix and a few associated minerals are used to verify the proper localities. For example, the aforementioned Coronado Mine specimens have minor chrysocolla which is a tell-tale sign for Morenci and an association that does not occur in Bisbee (personal communication, Dick Graeme).

Specimen recovery took a huge step forward in 1974 when Wayne Thompson formed Southwest Mineral Associates and acquired the collecting contract at Phelps-Dodge and Company's Southwest Division (Bisbee, Morenci and Ajo). Starting with the Metcalf pit and then various areas of the Morenci Mine, specimens were recovered that otherwise would have gone to the leach dumps. The famous azurite stalactite pocket of 1985 and all of the azurites and malachites from the Northwest Extension are in collections today because of this contract.

Morenci is the largest and most productive copper mine in North America, moving around 900,000 tons per day of rock. The opportunities to collect occur rarely. If an employee or contractor is fortunate enough to be in the right spot at the right time then the occasional specimen is preserved although this is against company policy.

#### References

Canty, J.M., and Greeley, M.N. (1987). History of Mining in Arizona. *History of the Clifton-Morenci District,* Conger, W.C., 129-153. Mining Club of the Southwest Foundation, Tucson, Arizona.

Hay, M. and Wilson, W.E. (2020). *The Morenci District, Greenlee County, Arizona.* Mineralogical Record, 51, 71-118. Tucson, Arizona. The Mines and Minerals of the Copper Mountain Mining District, Morenci, Arizona



Figure 1. Azurite and Malachite after azurite – Detroit Mine, Morenci, Arizona. Collected in the 1880s or 1890s. 11cm wide. Les and Paula Presmyk collection. Jeff Scovil photo.



Figure 2. Azurite – Coronado Mine, Morenci, Arizona. Collected in the late 1920s to early 1930s. 21cm long. Les and Paula Presmyk collection. Les Presmyk photo.



Figure 3. Azurite and malachite stalactites. Morenci Mine, Morenci, Arizona. Collected in 1985 and 1992. The center stalactite is 11.5cm tall. Les and Paula Presmyk collection. Jeff Scovil photo.



Figure 4. Malachite after azurite and Azurite – Detroit/Manganese Blue Mine areas, Morenci Mine, Morenci, Arizona. Collected in 1998 and probably out of the same area as the specimen in Figure 1. 13cm wide. Les and Paula Presmyk collection. Jeff Scovil photo.

#### Emeralds from the Coronation Crown of Napoleon III

#### ÉLOÏSE GAILLOU

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The Paris School of Mines discreetly detains a few of the most valuable – in a heritage sense – gems of France: gemstones that used to belong to the French Crown Jewels. The loose gemstones were saved from the 1887 auction voted by the French Third Republic to sell this national treasure, aiming to demonstrate that the monarchy would never return. Among the 77,486 gems, a few hundred were put aside and given mostly to three French Institutions: Le Louvre Museum, the National Museum of Natural History, and the Paris School of Mines. The School of Mines was awarded a series of emeralds, "Brazilian rubies" (pink topazes), and amethysts.

This presentation will focus on the series of emeralds that used to adorn Napoleon III's coronation crown. Created by Alexandre-Gabriel Lemonnier, the Emperor's jeweler, the crown along with that of the Empress, was presented and awarded at the Universal Exhibition of 1855 (Morel, 1988). The golden imperial eagles and palms were set with diamonds and emeralds. Only the fifty small emeralds were spared and awarded to the Paris School of Mines, forty-five of which are still in the collection. Figure 1 shows the eight largest of the suite. The forty-five stones were examined recently by the French Gemological Lab (LFG), and their examination will be described during this lecture. For the first time, the emeralds are exhibited at the museum along with an interpretation of the crown (Figure 2) on the occasion of the temporary exhibit "Collectible Minerals", running until March 9, 2024.

#### References

Morel B. (1988) The French Crown Jewels. Fonds Mercator, Antwerp, 417 pages.



Figure 1. Eight of the 45 emeralds from the Coronation Crown of Napoleon III in the Mineralogy Museum's collection. These emeralds were adorning the feet of the golden eagles.



Figure 2. Drawing of the interpretation of Napoleon III Coronation Crown, designed by Lemonnier in 1855. The crown is mostly made of yellow gold (crosshatched and lines), with diamonds (in white) and emeralds (in green).

#### The Fissure Veins of Keweenaw County, Michigan

#### CHRISTOPHER J. STEFANO<sup>1</sup>, PHILLIP PERSSON<sup>2</sup>

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Michigan's Keweenaw Peninsula is well known to mineral collectors for producing the world's finest specimens of native copper, along with world-class specimens of native silver, calcite, analcime, and many other species. The district has a rich history dating back to prehistoric times, and its development has contributed significantly to the course of US and therefore world history. Despite this, specimen mineralogical literature on the region has been largely confined to discussions of recent discoveries in a series of articles in Rocks & Minerals by Tom Rosemeyer. The only really indepth historical dive was done by Marc Wilson and Stan Dyl in their 1992 Mineralogical Record special issue (Wilson and Dyl 1992). While outstanding as far as it goes, this coverage only scratches the surface of the deep and rich history and mineralogy of the region.

The present authors have begun the process of digging deeper with the recently released Michigan Copper Country II issue of the Mineralogical Record, which covers the socalled fissure mines of Keweenaw County, Michigan (Vol.54, No.1, 2023). Additional special issues are planned to cover the rest of the district with the same level of detail. We chose to start with the fissure veins because these were among the very first mines opened in the district. Conveniently, those early mines were among the most prolific producers of fine specimens for the collector, and most are familiar with the likes of the Phoenix, Central, Copper Falls, and Cliff mines. This talk will briefly summarize the history and mineralogy of these mines as laid out in our recent Mineralogical Record special issue.

#### References

Wilson, M.L. and Dyl, S.J. II (1992) The Michigan Copper Country. *Mineralogical Record*, V.23(#2), 1-76.



Figure 1. Copper, adularia, epidote, 6.8 cm. Dana Mine, Central, Keweenaw Co., MI. Scott Rudolf specimen. Jeff Scovil photo

#### A Major New Find of Fluorite at the Blanchard Mine, Socorro County, New Mexico

#### MICHAEL SANDERS<sup>1</sup>, BRADLEY CULEBRO<sup>2</sup>, MICHAEL EGGLETON<sup>3</sup>, RAMON DEMARK<sup>4</sup>

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In March 2023, a major new fluorite discovery was made at the Blanchard mine. Culebro and Eggleton were granted access for surface collecting at the Blanchard mine by claim owner Demark. As a result, Culebro and Eggleton conducted surface and near-surface exploration at the property and discovered a major new fluorite pocket. This pocket has produced a large number of superb large to very large primarily fluorite and quartz museum specimens, some with associated galena.

After the initial discovery of what is now known as the new Ice Cream Igloo pocket, Culebro and Eggleton showed Sanders (also a Blanchard mine claim owner) and Demark an excellent, very large, botryoidal green fluorite and galena specimen that they had recovered. Funding for extraction of the Beast was provided by the generous support of Mel Huffman and Nancy Parsons, owners of The Crystalary in Cincinnati, Ohio. It was immediately apparent that they had found a significant new fluorite occurrence at the mine! Several weeks later, Sanders and Demark inspected the Ice Cream Igloo pocket, and it was obvious that it had the potential for significant specimen production.

Because this was a pocket accessible from the surface, Sanders and Demark recognized that it needed to be exploited immediately. It was also clear that it was going to be a major physical effort to work the pocket, and one that neither of us had the ability to take on. As a result, we contacted Culebro and Eggleton, the discoverers of this pocket, to partner with us in developing the find as soon as possible. Culebro and Eggleton also recognized the urgency of working the pocket and made immediate plans to head back to New Mexico from their homes in Virginia and Connecticut, respectively. Mining work commenced on April 23, 2023 and continued more or less continuously by Culebro, Eggleton, and Sanders until June 6 (Figs. 1, 2). Multiple superb medium to very large fluorite specimens were painstakingly recovered during this period.



Figure 1: Michael Eggleton (left) and Bradley Culebro extracting a large fluorite specimen from the Ice Cream Igloo pocket. May, 2023. Mike Sanders photo.



Figure 2: Bradley Culebro drilling feather and wedge holes with an electric hammer drill to split a large slab in the Ice Cream Scoop pocket. May 13, 2023. Mike Sanders photo.

However, there was still one giant fluorite specimen that remained in the pocket, which became known as the "Blanchard Beast". It was determined that the only way to recover this approximately 1100 lb. specimen safely was to get a track hoe to the location. With this the Beast could be removed from the pocket and transferred to a vehicle for transport offsite.

In accordance with requirements specified by Sanders and Demark, arrangements and funding to recover the Beast were completed by Culebro and Eggleton. Fred Ortega, a Northern New Mexico mineral collector and expert Taos Ski Valley equipment operator was hired to operate the track hoe for extraction of the Beast. Recovery was completed successfully and safely on June 22, 2023 (Figs 3, 4).



Figure 3: Recovering the "Blanchard Beast" fluorite specimen from the Ice Cream Igloo pocket with a track hoe operated by Fred Ortega. July 22, 2023. Mike Sanders photo.

Specimens from the Ice Cream Igloo pocket were displayed by the New Mexico Mineral Museum at the Denver Hard Rock Summit show in September 2023 (Fig. 5). This presentation at the New Mexico Mineral Symposium in Socorro, New Mexico in November 2023 about this find will describe the various aspects of discovery, collecting, cleaning and preparation of material that was removed from this remarkable pocket (Fig 6).



Figure 4. "Blanchard Beast" fluorite specimen examined by (left to right) John Rakovan, Bradley Culebro, Maxwell Novetzke, Fred Ortega, Michael Eggleton (legs). June 22, 2023. Mike Sanders photo.



Figure 6: The "360" fluorite, and quartz on galena specimen. 15 cm. across. Collected by Bradley Culebro and Michael Eggleton from the Ice Cream Igloo pocket in early May 2023. Mike Sanders specimen and photo.



Figure 5. NMBGMR Mineral Museum display of the new find of fluorite at the Blanchard Mine. Denver Hard Rock Summit, September 2023. John Rakovan photo.

#### A Tale of Two Specimens

#### RON GIBBS

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Ray DeMark had some specimens of molybdite and sidwillite available at the 2016 New Mexico Mineral Symposium. They had been collected by Ray from the Summit Claim at Cookes Peak in Luna County, New Mexico. The Cookes Peak district had been a producer of lead, zinc, and silver for many years and more recently has produced some exceptional fluorite specimens (Simmons, 2019).

The specimens were nice additions to anyone's New Mexico collection and something not before seen from the district. I obtained two specimens and showed them to Bob Jenkins, who wanted to analyze a bluish mineral associated with the molybdite using Raman spectroscopy at the University of Arizona in Tucson. He gave the specimen to Dr. Hexiong Yang who set it aside after finding out that the bluish mineral might be some kind of phosphate. Five years passed before this molybdite specimen was "rediscovered" and reanalyzed.

Surprisingly, a careful analysis of the specimen labeled molybdite using Raman spectroscopy, SEM/EDS, and single-crystal X-ray diffraction revealed that the presumed molybdite was not, MoO<sub>3</sub>. Instead, it is a new mineral species, a hydrated molybdenum trioxide, MoO<sub>3</sub>·H<sub>2</sub>O, and triclinic in symmetry. The new mineral was named raydemarkite in honor of its collector, which was approved by the IMA-CNMNC in 2022 (Yang et al., 2022).

The discovery of raydemarkite aroused Dr. Yang's curiosity about molybdenum trioxides and he learned more than he ever expected to know. Subsequent investigation revealed that several species had been synthesized in the lab as far back as 1903 (Rosenheim and Davidsohn, 1903). Their  $\alpha$ -MoO<sub>3</sub>·H<sub>2</sub>O phase created in the lab has now been found in nature as raydemarkite.



Figure 1. Raydemarkite, Summit Claim, Cookes Peak, Luna County, New Mexico, University of Arizona RRUFF photo.

The other specimen I acquired was labeled sidwillite, which it strongly resembles. However, analysis showed that it is also a new mineral. Instead of sidwillite,  $MoO_3 H_2O$ , it has the same chemistry as raydemarkite,  $MoO_3 H_2O$ , but with a different structure symmetry, monoclinic. This new mineral is dimorphous with raydemarkite and identical to the  $\beta$ - $MoO_3 H_2O$  phase synthesized by Rosenheim and Davidsohn in 1903. This new mineral was given the name virgilluethite in honor of Dr. Virgil Lueth, which was approved by the IMA-CNMNC in 2023 (Yang et al, 2023).

Subsequent work by several researchers on specimens from Cookes Peak and the Freedom No.2 mine in Utah have established a series of hydrated molybdenum trioxides with varying amounts of water, from two to none. These are not members of a dehydration series, one forming by the dehydration of another. Instead, they represent species that form under particular circumstances, However, it has been shown that sidwillite can dehydrate easily to virgilluethite when heated to between 60 and 80 degrees Celsius. Both raydemarkite and virgilluethite will dehydrate to become molybdite upon heating between 110 and 160 degrees Celsius.



Fifure 2. Virgilluethite, Summit Claim, Cookes Peak, Luna County, New Mexico, University of Arizona RRUFF photo.

Raydemarkite and virgilluethite were named to honor two outstanding individuals who have done much to further our interest in New Mexico mineralogy. Ray DeMark is a wellknown and respected mineral collector, writer, presenter, and museum donor. He is rightly considered to be an authority on New Mexico minerals.

Prior to his retirement in 2021, Dr. Lueth held the position of Sr. Mineralogist /Economic Geologist and Director of the Mineral Museum at NMBGMG, where he has worked since 1994. Virgil has overseen its dramatic growth to the new facility and has encouraged generous gifts to enlarge the collection. He has been instrumental in the continued growth and success of the annual New Mexico Mineral Symposium held each November at New Mexico Tech in Socorro.

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Name	Chemistry	Symmetry	Unit cell vol.
molybdite	MoO <sub>3</sub>	Orthorhombic	202 Å <sup>3</sup>
raydemarkite	MoO <sub>3</sub> ·H <sub>2</sub> O	triclinic	158 Å <sup>3</sup>
sidwillite	MoO <sub>3</sub> ·2H <sub>2</sub> O	monoclinic	1,538 Å <sup>3</sup>
virgilluethite	MoO <sub>3</sub> ·H <sub>2</sub> O	monoclinic	538 Å <sup>3</sup>

Name	Chemistry	System	Type Locality
sidwillite	MoO <sub>3</sub> <sup>·</sup> 2H <sub>2</sub> O	monoclinic	Lake Como, CO
<u>raydemarkite</u>	MoO <sub>3</sub> ·H <sub>2</sub> O	triclinic	<u>Cookes</u> Peak, NM
<u>virgilluethite</u>	MoO <sub>3</sub> ·H <sub>2</sub> O	monoclinic	<u>Cookes</u> Peak, NM
zhenruite	MoO <sub>3</sub> ·0.5H <sub>2</sub> O	monoclinic	Freedom #2, UT
tianhiuxinite	MoO <sub>3</sub> ·0.33H <sub>2</sub> O	hexagonal	<u>Cookes</u> Peak, NM
molybdite	MoO <sub>3</sub>	orthorhombic	Czech Republic

#### 230 years of history of collecting at the Mineralogy Museum of L'Ecole des Mines de Paris

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Created in 1794, the "Cabinet des Mines", today the Mineralogy Museum of the École des Mines de Paris (Paris School of Mines), is one of the world's leading mineral collections. Its showcases, drawers, and cupboards preserve a multitude of stories of the people involved in their collection. At the occasion of the temporary exhibit "COLLECTIBLE MINERALS" (Figure 1), the museum reveals some of these stories with the associated rocks and archive documents. This lecture will trace back a few adventures: from the confiscation of the Chinese art object collections of Henri Bertin, minister under King Louis XV, to the journey of Prince Napoleon in the northern seas in 1856, from the purchase of Dolomieu's mineral collection to the donation of Emile Bertrand and Adam's systematic collections (Figures 2 and 3), and a few more, we will travel to French History and foundation of mineralogy.

The historic collections of the Paris School of Mines continue to be the mirror of our society. It tells stories of great explorations, discoveries, inventions and conflicts. Indeed, aside from the historical and scientific aspects. these collections also present, since their creation, strategic issues: they help identify and map the territories' resources and to organize their exploitation. In this sense, the museum showcases the first geological map ever constituted – the map of France, built by engineers from the School, in parallel with French lithium ores, as France is considering reopening some mines after closing them all (or almost), to regain some sovereignty over its natural resources. The collections constitute a precious instrument for materializing and talking about the strategic, economic and environmental

issues that govern our present and shape our future.



Figure 1. "Collectible Minerals", an exhibition running until March 9, 2024, and tracing back 230 years of collecting at Paris School of Mines.



Figure 2. Some of Dolomieu and Marquis de Drée's specimens, purchased by the School of Mines in 1845.



Figure 3. A few minerals from the extensive collection of over 1,500 specimens of M. Adam, donated to the Paris School of Mines in 1881.

## Tourmalines from Erzgebirge, Germany: schorl and fluor-schorl from the type localities and oxy-schorl from diamond-bearing rocks

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The early history of the mineral schorl shows that this name was in use prior to the year 1400 AD because a village known today as Zschorlau (in Saxony, Germany) was then named "Schorl" (or minor variants of this name). This village had a nearby tin mine where, in addition to cassiterite, a lot of black tourmaline was found (Ertl, 2006). There are historical mining dumps where schorl can still be found (Fig. 1). Around 200 years later the first relatively detailed description of schorl and its occurrence (various alluvial tin deposits and tin mines in the Erzgebirge) was published by Johannes Mathesius in 1562 (Ertl, 2006). He described schorl originally as "schürl", with the properties black, a lighter weight than cassiterite ("zynstein") and that it breaks easily.



Figure 1. Historical mining dumps near the village Zschorlau, Saxony, Germany. Type locality for schorl and fluor-schorl. Photo was taken in 2006.

Today the generalized formula of tourmaline-supergroup minerals can be written  $XY_{3}Z_{6}(T_{6}O_{18})(BO_{3})_{3}V_{3}W$ , as proposed by Henry et al. (2011). Usually the X site is occupied by Na and Ca, the Y and Z sites by Al, Fe, Mn, and Mg. The T site is usually occupied by Si (sometimes also by Al and B) and the V and W sites are OH sites. The schorl endmember has the formula <sup>X</sup>Na <sup>Y</sup>Fe<sup>2+</sup><sub>3</sub> <sup>Z</sup>Al<sub>6</sub> <sup>T</sup>Si<sub>6</sub>O<sub>18</sub> (BO<sub>3</sub>)<sub>3</sub> <sup>V</sup>(OH)<sub>3</sub><sup>W</sup>(OH). A reinvestigation of black tourmalines from the Erzgebirge localities has shown that most of these tourmalines have a distinctly F-dominant W site (Ertl et al., 2009 DMG). Thus, surprisingly, many of the examined tourmalines from the area of the schorl type locality can be assigned to a fluorine-dominant tourmaline, which was given the name fluor-schorl (see following paragraph). However, the presence of a significant proportion of fluorine in the samples is not that surprising given the occurrence of fluorite and "pyknite" (stem-like variety of topaz) in many tin deposits in Saxony, where the pyknite is known to have formed from the reaction of potassium feldspar with pneumatolytic fluids (mainly HF). An investigation of the water and fluorine content in melt inclusions of highly differentiated granite from the Erzgebirge revealed very high fluorine values in some cases.

Fluor-schorl, <sup>x</sup>Na <sup>Y</sup>Fe<sup>2+</sup><sub>3</sub> <sup>Z</sup>Al<sub>6</sub> <sup>T</sup>Si<sub>6</sub>O<sub>18</sub> (BO<sub>3</sub>)<sub>3</sub> <sup>V</sup>(OH)<sub>3</sub> <sup>W</sup>F, is a mineral species of the tournaline supergroup (Ertl et al., 2016), from which the German type locality has been described as alluvial tin deposits at Steinberg, Zschorlau, Erzgebirge (Saxonian Ore Mountains), Saxony, Germany (Fig. 2). Indeed the structural formulae of these black tournalines ranges from <sup>X</sup>(Na<sub>0.5</sub> $\Box_{0.5}$ )  $\label{eq:2.1} \begin{array}{l} {}^{Y}(Fe^{2+}{}_{1.8}Al_{0.9}Mg_{0.2}\square_{0.1}) \, {}^{Z}(Al_{5.8}Fe^{3+}{}_{0.1}Ti^{4+}{}_{0.1}) \\ {}^{T}(Si_{5.7}Al_{0.3}O_{18}) \, (BO_3)_3 \, {}^{V}(OH)_3 \, {}^{W}[(OH)_{0.9}F_{0.1}] \ to \\ {}^{X}(Na_{0.8}\square_{0.2}) \, {}^{Y}(Fe^{2+}{}_{2.3}Al_{0.4}Mg_{0.3}) \\ {}^{Z}(Al_{5.8}Fe^{3+}{}_{0.1}Ti^{4+}{}_{0.1}) \, {}^{T}(Si_{5.8}Al_{0.2}O_{18}) \, (BO_3)_3 \\ {}^{V}(OH)_3 \, {}^{W}[F_{0.7}(OH)_{0.3}]. \ The \ investigated \\ tourmalines \ from \ the \ Erzgebirge \ show \ that \ there \\ exists \ a \ complete \ fluor-schorl - \ schorl \ solid \\ solution \ series. \ Correlations \ indicate \ that \ Fe^{2+} \\ rich \ tourmalines \ clearly \ tend \ to \ have \ a \ F-rich \ or \\ F-dominant \ composition \ (Ertl \ et \ al., \ 2016). \end{array}$ 



Figure 2. Sprays of schorl crystals intergrown with fluor-schorl from the type locality Zschorlau (formerly known as a village named Schorl), Saxony, Germany. 10 × 6 cm.

A tourmaline-bearing gneiss from an ultrahigh-pressure unit in the Erzgebirge at the northwestern margin of the Bohemian Massif, is exposed in Saxony and the northern Czech Republic. This is part of the Devonian-Carboniferous metamorphic basement of the Mid-European Variscides. A stack of different tectono-metamorphic units, each with distinct pressure-temperature histories, characterizes the region. The investigated sample is from the diamond- and coesite-bearing gneiss-eclogite unit. The occurrence of diamond in the felsic gneisses requires pressures in excess of 4 GPa (Fig. 3). Peak metamorphic conditions may have been even higher (8 GPa at >1050 °C; Massonne, 2003). The sample was collected as a loose decimeter-sized block from a small creek near Forchheim, Pockau, Erzgebirge, Saxony, Germany. It is a felsic, medium-grained, granulite-facies mylonite displaying strongly

elongated quartz and feldspar with black tournaline porphyroclasts and minor garnet.



Figure 3. Microdiamond in garnet from Saidenbach reservoir, Forchheim, Erzgebirge, Saxony, Germany. Transmitted light photograph by Franz Bernhard, Graz, Austria.

Short, prismatic tourmaline crystals are up to 3 mm in length. In thin section, the tourmaline crystals show three distinct color zones: a blue core, a brownish mantle, and a greenish-gray rim (Fig. 4). Coesite and kyanite inclusions have been described from the tourmaline mantle zone (Marschall et al., 2009). This tourmaline, which contains almost no F, is a Mg-bearing oxyschorl with the structural formula  $X(Na_{0.9} \square_{0.1})$  $^{Y}(Al_{1.7}Fe^{2+}_{1.2}Ti^{4+}_{0.1}) ^{Z}(Al_{5}Mg) ^{T}Si_{6}O_{18} (BO_{3})_{3}$  $^{V}(OH)_{3} = [O_{0.8}F_{0.1}(OH)_{0.1}]$  (Ertl et al., 2010). This tourmaline most likely formed during exhumation at >3 GPa, 870 °C. It is interesting that this Fe-rich tourmaline contains more Al than Fe<sup>2+</sup> at the Y site. This could be explained by the very high formation temperature.



Figure 4. Zoned ultrahigh-pressure tourmaline

porphyroclast in phengite (Phe)–quartz (Qtz) gneiss from the Erzgebirge, Saxony, Germany (Marschall et al., 2009).

It can be concluded that black tournaline from the Erzgebirge in Germany is not always schorl, but that the composition depends on the host rock composition and the conditions under which it was formed.

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#### After 23 years of mindat.org - what's new and what's yet to come

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Mindat.org is the world's leading online authority on minerals and their localities, deposits, and mines worldwide. Our mission is to advance the world's understanding of minerals.

Mindat.org has been collecting, organizing, and sharing mineral information since October 2000. Today, an international team of 50 expert managers works to ensure the accuracy of posted data. It has become an essential resource used daily throughout education, academia, and industry sectors.

As a 501(c)(3) not-for-profit organization, mindat.org relies on support from both companies and individuals. Mindat.org is the primary outreach project of the Hudson Institute of Mineralogy

This presentation will be a round-up of the latest developments on the site (including the public API and the massive reference library) along with a preview of some of these.



*Figure 1. Screen capture of the mindat.org main webpage.* 

#### What's new in minerals and personal photo favorites

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The Rochester Mineralogical Symposium (RMS) celebrated its 50<sup>th</sup> and last year in 2023. A regular and very popular part of the symposium was "What's New in Minerals". In the early years this was done as a panel discussion (Chamberlain and Dossert 1979). As with many things, this evolved over time and in 1994 I was asked to present a talk for "What's New in Minerals" based on specimens that I professionally photographed during that year. 2023 was my 29th "What's New in Minerals" presentation at the RMS. Later on, additional attendees such as John Betts, Ray McDougall and Mark Jacobson became regular presenters of regional What's New in Minerals (McDougall 2020).

In 2023 I will be moving my "What New in Minerals" presentations to the New Mexico Mineral Symposium with the addition of personal photo favorites of specimens that may not be new to the collecting scene.

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Figure 1. Calcite, cobaltoan. Mashamba West mine, Kolwezi, Katanga, DR Congo. 6cm high. Christophe Gobin specimen. Jeff Scovil photo.



Figure 2 Cuprite.5.3cm high. Christophe Gobin specimen. Jeff Scovil photo.



Figure 3. Actinolite. Konwa Dist., Dodoma Reg., Tanzania. 6.3cm high. CorradoVietti specimen. Jeff Scovil photo.

#### Paramelaconite from Bisbee, Arizona

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#### INTRODUCTION

In 2008, the collection of Jim and Dawn Minette was offered for sale at the Tucson Gem & Mineral Show. As a collector of Arizona minerals with an abiding interest in the mineralogy of Bisbee, I was keen to acquire, if possible, the only fine example of the rare copper oxide, paramelaconite, from Bisbee that was privately owned and therefore potentially available. Bisbee is the type locality for the species and Minette had managed to acquire one in 1978. It was generally acknowledged as one of the most important specimens in his thumbnail suite. A few other good specimens exist but are in the collections of institutions including the National Museum of Natural History (Smithsonian) and the American Museum of Natural History. Upon securing the Minette specimen, I embarked on a quest to learn more about paramelaconite, the discovery and history behind the few specimens known to exist from Bisbee, and the reason for the mystique surrounding this mineral.

#### HISTORY

Paramelaconite was first found at Bisbee in the late 1880's but wasn't identified as a new species until 1891. No subsequent specimens were ever recovered throughout the rest of the 100-year history of the district. Adding to the intrigue, only two specimens of any significance were recovered. As a result, the species has acquired a near-mythical status among collectors. How could just two great specimens have been found at the type locality, both with impressively large euhedral crystals, when no other examples were ever identified throughout years of intense mining and specimen recovery in the district? Subsequent finds of paramelaconite in Michigan (1962), Mexico (2009) and the Democratic Republic of Congo

(2018) have excited the mineralogical world, but none approach the quality of the best specimens from the original find, and many of these are partially to completely altered to tenorite.

#### WHAT IS PARAMELACONITE?

Paramelaconite is an extremely rare tetragonal copper oxide. Paramelaconite crystals are purplish black in color and show typical tetragonal morphology but tend to be heavily striated due to an oscillatory combination of the {100} and {101} faces. The chemical formula for paramelaconite is  $Cu_2^{(1+)}Cu_2^{(2+)}O_3$ . Two much more commonly occurring copper oxides, cuprite, Cu<sub>2</sub>O, and tenorite, CuO, contain only 1+ or 2+ oxidation states of copper respectively. In a sense, paramelaconite represents an intermediate species between the two. While cuprite and tenorite form in more typical secondary copper depositional environments and are generally stable, paramelaconite readily alters to tenorite upon exposure to air, via oxidation, sometimes forming pseudomorphs. It nearly always occurs in vugs in massive cuprite. Massive cuprite seems to serve as a mini laboratory for the deposition of paramelaconite and a host of other rare secondary copper species such as paratacamite, connellite, spangolite, buttgenbachite, gerhardtite, rouaite, likasite, graemite, and teinite. Because of the two different oxidation states of copper in paramelaconite, half of the ions are 1+ and half are 2+, and its crystal structure, which includes square planar coordination, its physical and chemical properties have been the subject of intense research for its potential use as a hightemperature superconductor and solid-state catalyst.

#### 1890 – TWO CO-TYPE SPECIMENS PURCHASED BY A.E. FOOTE.

The legendary mineral dealer A. E. Foote (1846-1895) of Philadelphia traveled west often in the late 19th century and visited most specimenproducing mining districts in search of minerals. It was on a trip to Bisbee in 1890 that he acquired two examples of an unknown black tetragonal mineral similar in appearance to anatase. Local lore has it that the specimens were sitting on a shelf in the assay office when they were shown to Foote, who purchased them on the spot. He could not identify the crystals and suspected a new mineral species. One specimen consisted of goethite-covered cuprite ore with a magnificent 3 cm black tetragonal free-standing crystal in the center of the rock, associated with connellite, called "footeite" at the time, which later was discredited. The other piece was a splendid large crystal plate of intergrown tetragonal crystals about 10 cm across. It was lightly coated with malachite (this specimen is considerably smaller now; fragments were trimmed off over the years). Foote took them back to Philadelphia but before they could be identified or properly studied, he sold them for \$50 apiece - not an insignificant sum for the time - to Clarence S. Bement (1843-1923), a prominent Philadelphia collector. Bement had assembled a significant mineral collection consisting of over 13,000 specimens between 1866-1900. Bement's collection was purchased by financier J. P. Morgan in 1900 who then donated it to the American Museum of Natural History in New York City. At some point later, one of the two co-type specimens (the large crystal plate) was acquired by the Smithsonian Institution where it resides today.

#### 1891 – PARAMELACONITE FIRST DESCRIBED AS NEW SPECIES

In 1891, Bement loaned the two unknown specimens to George A. Koenig (1844-1913), Professor of Mineralogy and Metallurgy at the University of Pennsylvania and, later, at Michigan Tech. His research determined the mineral was unrelated to anatase and was indeed a new copper oxide species unknown to science. He named it Paramelaconite (para = like; melaconite = tenorite). Koenig published his findings in 1891 in the prestigious Proceedings of the Academy of Natural Sciences of Philadelphia. Included in the article is a splendid line drawing of the Bement specimen with the large free-standing crystal on matrix. This specimen is often acknowledged as the finest paramelaconite in existence and is currently on exhibit in the new Mignone Halls of Gems and Minerals at the American Museum of Natural History in New York.



Figure 1. Paramelaconite, 3 cm xl, Czar Mine, Bisbee, Arizona, USA. One of two type specimens purchased by Dr. A. E. Foote in 1890 and sold to Clarence S. Bement. Generally acknowledged as the best specimen for the species. AMNH specimen. Richard Graeme III photo.



Figure 2. Paramelaconite, approx. 8 cm crystal plate, Czar Mine, Bisbee, Arizona, USA. One of two type specimens purchased by Dr. A. E. Foote in 1890 and sold to Clarence S. Bement. NMNH specimen. Richard Graeme III photo.



Figure 3 – Koenig's splendid line drawing of the best paramelaconite crystal, published in 1891 in the Proceeding of the Philadelphia Academy of Sciences.

#### 1941 – FRONDEL'S RESEARCH

Dr. Clifford Frondel of Harvard University performed additional analyses on a sample of paramelaconite and confirmed that Koenig got it right in 1891. Paramelaconite was indeed a valid copper oxide species in the tetragonal crystal system containing both 1+(cuprous) and 2+ (cupric) oxidation states of copper.

#### 1962 – PARAMELACONITE FOUND IN MICHIGAN

In 1962, paramelaconite was identified in copper ore, at the A. E. Seaman Mineral Museum, that had been collected at the Algomah Mine of Upper Michigan. Crystals to 5 cm(!) were found frozen in massive chrysocolla. Somewhat pitted and lacking luster, subsequent analysis determined the crystals are mostly altered to tenorite. This probably makes sense considering chrysocolla itself is a result of the alteration of primary copper ores.



Fig. 4 – Paramelaconite crystal (6.8 mm) from the Algomah mine in Michigan. Paramelaconite was discovered there in 1962 and was studied by Sid Williams. Crystals are mostly altered to tenorite. Tom Buchholz specimen. Dan Behnke photo.

Some of the Algomah specimens were marketed by dealer Scott Williams of Scottsdale, Arizona. In his 1963 catalog he mentions that prior to this discovery, only three specimens of paramelaconite were known, all from Bisbee. What was this third piece from Bisbee? It turns out that mineralogist Sid Williams, who at the time was at Michigan Tech, during his research into the Algomah material, had located a Bisbee paramelaconite in the A. E. Seaman Museum collection. It was described as "a small, superb group of crystals associated with connellite and malachite". Where had this specimen come from? George A. Koenig, who had done the original work on paramelaconite in 1891, had also been a professor at Michigan Tech. Perhaps the paramelaconite had been donated by him. Was it trimmed off the large Bement plate in 1891? Is this the third Bisbee specimen dealer Scott Williams was referring to? These questions may never be answered, as the whereabouts of the Michigan Tech specimen are currently unknown, though a tiny single crystal of Bisbee paramelaconite is still in the A. E. Seaman collection. This crystal may have been trimmed from the "superb group of crystals" that Williams described.

#### 1970's – ROCK CURRIER LOCATES ANOTHER SPECIMEN

While examining the mineral collection at Bryn Mawr College in Pennsylvania in the 1970's, Rock Currier spotted another specimen of Bisbee paramelaconite in a cabinet of drawers. This one was a thumbnail sized cluster of crystals mounted on a wooden stand. Where had it come from? Bryn Mawr College had been the recipient of the George W. Vaux Collection in 1957 and the specimen had been his. Vaux was the nephew of William S. Vaux (vauxite is named for him), and was another prominent Philadelphia area collector. Vaux's beautiful handwritten label notes the specimen was purchased from A. E. Foote in October of 1894. There is also a cost code which is undeciphered, and a notation that says "Bement". Perhaps this means it too was trimmed off the large Bement plate. In any event, Currier was able to secure the specimen in a trade. Now there was a fine Bisbee paramelaconite in private hands!

## 1978 – CURRIER SELLS THE SPECIMEN TO COLLECTOR JIM MINETTE

In 1978 Currier decided to sell the paramelaconite to Jim Minette. There is an anecdotal story that Rock needed cash to purchase a new hi-fi stereo system with the goal of impressing a lady he had been dating at the time. The specimen was sold to Minette to finance the stereo equipment. According to the rest of the story, Rock eventually showed off the new sound system to his date and proceeded to crank it up. Her response was please turn it down. In the end, Rock still had a great stereo system and Minette got an incredible thumbnail for his collection.



Fig. 5 – Paramelaconite, 2.5 cm, Bisbee, Arizona, USA. Ex-George Vaux, ex-Bryn Mawr, ex-Rock Currier and ex-Jim Minette. Now in the collection of Evan & Melissa Jones. Photo Jeff Scovil.

## 2008 – MINETTE COLLECTION FOR SALE AT 2008 TGMS SHOW.

When Jim & Dawn Minette's collection was marketed in Tucson in 2008 there was a long line of collectors waiting to get into the booth to purchase specimens. I was second in line. What interested me most was the paramelaconite, but what was troublesome was the fact that Ralph Clark, perhaps the most serious thumbnail collector at the time, was FIRST in line. However, Ralph reassured me he wasn't interested in the paramelaconite. I was finally able to secure the specimen after fantasizing about owning it for years.

## 2009 - PARAMELACONITE FOUND AT THE OJUELA MINE IN MEXICO

The following year, Paramelaconite was identified in specimens collected from a pod of cuprite ore which had been marketed by Mike New at Top Gem Minerals. It was associated with malachite and claringbullite with paramelaconite crystals up to 1 cm. This was the first significant find of paramelaconite crystals in over 45 years. Like the Michigan material, these were found to be partly to mostly altered to tenorite but was an exciting and important find nonetheless.



Fig. 6 – Paramelaconite, 5 cm, Ojuela Mine, Mapimi, Durango, Mexico. Found 2009. The crystals are partially altered to tenorite. Rolf Leutke specimen and photo, photo courtesy MinDat.

## 2018 – PARAMELACONITE FOUND AT THE TENKE DEPOSIT, D. R. CONGO

In 2018, a large batch of cuprite ore was being marketed by an African dealer at the Saint-Marie-aux-Mines show in France. Several sharpeyed mineral dealers quickly noticed vugs of unusual crystals within the material. Later analysis proved the crystals were extremely large examples of the copper nitrate species Gerhardtite, Rouaite and Buttgenbachite. In addition, Paramelaconite was also identified in the material. The paramelaconite crystals from this find occur as small platy groupings of crystals, as opposed to the more typical euhedral tetragonal forms for the species.



Fig. 7. – Paramelaconite, Tenke Deposit, Democratic Republic of Congo. Found 2018. Joy Desor specimen and photo. Photo courtesy MinDat.

## WHAT MINE PRODUCED THE BISBEE SPECIMENS?

The locality as given by A. E. Foote for specimens of paramelaconite was the Copper Queen Mine. This is not entirely accurate. The Copper Queen Mine, the very first mine in the district, only operated from 1880-1884 and ceased ore production at that time. However, new ore bodies were discovered shortly after by the Copper Queen Mining Company and a new shaft, called the Czar, was sunk starting in 1885 to access the rich new ores. This is undoubtedly where the Paramelaconites were collected. The Czar was a large efficient and specimen-rich mine. The paramelaconites then ended up on a shelf in the Czar Mine assay office where Foote saw them in 1890.

## HOW MANY BISBEE PARAMELACONITES ARE OUT THERE?

It has always been claimed that only two specimens of paramelaconite were saved from the crushers at Bisbee. But we have seen how other specimens have turned up over the years. These have always been assumed to be trimmings off the large crystal plate from the original discovery. After all, the Bement plate is distinctly smaller than originally described (though some material was probably destroyed for analysis). However, it is also possible Foote had acquired other specimens. This speculation is based on Foote's 1891 mineral catalog, the same year paramelaconite was declared a new species. In it, we find the following advertisement: "From Arizona - the new species described by Professor Koenig, Paramelaconite, an oxide of copper, resembling anatase, in fine large crystals". While these specimens, which were available for purchase in 1891, could have been trimmed off the plate he sold to Clarence E. Bement in 1890, another explanation could be that he acquired MORE specimens "in fine, *large crystals*". He obviously had enough material to advertise in a catalog. This begs the question: are there more out there somewhere?

#### FOUND ANOTHER ONE! - ECOLE DES MINES DE PARIS SPECIMEN

During a visit to the Saint-Marie-aux-Mines show in France a couple of years ago I was enjoying the special exhibits and, much to my delight, spotted another Paramelaconite from Bisbee in a case of copper minerals. I had never seen this one before! But who owned it? The label said the fine thumbnail sized grouping of crystals was in the collection of the Paris School of Mines. What was the history of this specimen? Later, Dr. Eloise Gaillou kindly sent me the information she had on the specimen. It was donated to the collection in 1896 by a gentleman named Eckley Coxe. Logic would tell us that the specimen likely came from Dr. A. E. Foote.



Fig. 8 – Paramelaconite, 2.6 cm, Bisbee, Arizona, USA. Donated to the Paris School of Mines by Eckley Coxe in 1896. Likely acquired from A. E. Foote. Ecole des Mines de Paris Specimen. Photo courtesy Eloise Gaillou

Now we have at least four Paramelaconite crystal clusters from Bisbee that definitely, or more than likely, came from Foote in the 1890's (five if one counts the Michigan Tech specimen which is currently MIA). In addition, there are a few small single crystals extant. The moral of the story? There may be more out there in a dusty box or drawer somewhere, overlooked for all these years. The hunt continues!

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## Samarskite-(Y) and associated minerals, Platt Pegmatite (Uranium King claim), Encampment, Carbon County, Wyoming

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The Big Creek Pegmatite area, Carbon County, Wyoming, on the western slope of the Medicine Bow Mountains is known for its niobium-bearing pegmatites hosted in Precambrian gneiss and schist. The local rancher and miner, Ralph Platt, reportedly found, in July 1956, a dense, glassy black, radioactive boulder, about 30 kilograms in weight on the surface of a potassium feldspar-quartz-muscovite pegmatite. After claiming the property as the Uranium King claim. Platt sunk a shaft into the core of the pegmatite and sold the hand-cobbed Nb-U mineral as uranium ore to the U.S. Atomic Energy Commission. Crystals of this mineral from this locality have since been widely sought by collectors and museums worldwide labeled as euxenite, rarely as samarskite, and sometimes also as allanite. Although a qualitative analysis was described by Houston (1961) and referred to the material as euxenite, no further analysis on this or other associated minerals has been documented.

The complex REE-Nb-Ta-Ti oxides represented by the aeschynite, euxenite, and samarskite group minerals are generally rare, yet occur locally abundant in certain NYF (Nb,Y,F) pegmatites. Aeschynite and euxenite group minerals of general formula AB<sub>2</sub>O<sub>8</sub> are orthorhombic with well-understood structure and crystal chemistry. In contrast, samarskite, one of the earliest described REE minerals (over 180 years ago) has an uncertain structure, although it has been intensely investigated in terms of chemical composition. Its crystal structure, because of radiation-induced amorphization (i.e. metamictization), was not confirmed until 2019, when non-metamict crystals from the Laacher See, Eifel volcanic region, Germany, allowed for the crystal structure to be resolved for the first time as monoclinic with P2/c symmetry (Britvin, 2019). That work defined samarskite as the first

example of a cation-ordered niobate with a pseudo-layered framework related to layered double tungstates, of general formula  $AMB_2O_8$  where A = Y, REE, Th, U<sup>4+</sup>,Ca; M = Fe<sup>3+</sup>, Mn<sup>2+</sup>; and B = Nb, Ta, Ti, with an end member formula of samarskite-(Y) of YFe<sup>3+</sup>Nb<sub>2</sub>O<sub>8</sub>.

Within this new framework, provided by this and other recent work on these classes of REE-Nb-Ta-Ti oxides, we reinvestigated the Platt Pegmatite containing large, yet not previously well analyzed, members of these minerals. The dense metamict Nb-U mineral, listed as euxenite, forms from up to decimeterscale irregular masses to well-defined single blocky crystals with a rectangular shape and a pitched roof termination. They occur either isolated as single crystals, as intergrown clusters, or intergrown irregularly with large crystals of monazite and rarely columbite, within a potassium feldspar, quartz, biotite, and muscovite matrix. The monazite forms the typical reddish crystals with its characteristic cleavage. Columbite also occurs in part as euhedral crystals of characteristic habit. Schorl is rare but present in crystals up to a decimeter in length.

We report on our recent reinvestigation of the pegmatite studying the mineral associations and structural relationships both above ground and in the underground workings. Samples were obtained from the dump, stockpiled material from the Platt family, and *in situ* underground.

Most significantly, we performed a combination of whole rock ICP-OES/MS/XRF analysis of bulk crystals and electron microprobe (EMP) analysis of grain mounts of the dense black minerals previously thought to be euxenite. We show that the mineral is Y, Fe, and Nb dominant, i.e., the species-defining elements of samarskite-(Y) occupying the A, M, and B sites, respectively. Stoichiometry calculations and applying the statistical approach of Ercit (2005) confirm this assignment as samarskite. Powder X-ray diffraction shows complete metamictization associated with the high U and Th content.

The monazite and columbite based on chemical analysis and X-ray diffraction is monazite-(Ce) and columbite-(Fe), respectively. The microprobe work confirmed the identity of the allanite. EMP analysis on polished sections of all these species shows considerable granularity and local alteration, with spatial heterogeneity in chemical composition, and inclusions of galena, thorite, xenotime, and secondary U-minerals.

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Figure 1. The three REE/rare-element minerals of the Platt Pegmatite: A) large crystal aggregate of samarskite-(Y). B) samarskite-(Y) with typical roof-shaped crystal habit [FOV 5 cm]. C) Intergrowth of samarskite-(Y) (black, right) with monazite-(Ce) (red, left) [FOV 9 cm]. D) Columbite-(Fe) [FOV 5 cm]. Markus Raschke specimens, Mark Jacobson photographs.