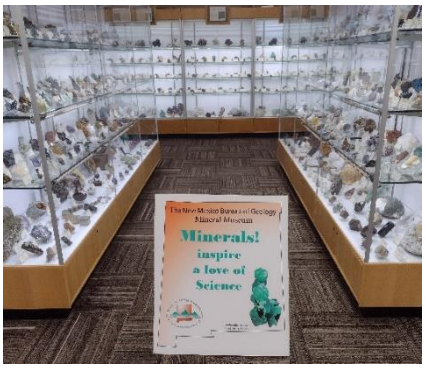
# *The Mineralogical Cabinet**




***The Newsletter for the Friends of the New Mexico Bureau of Geology & Mineral Resources - Mineral Museum***

Volume 8, No. 1, June. 2023

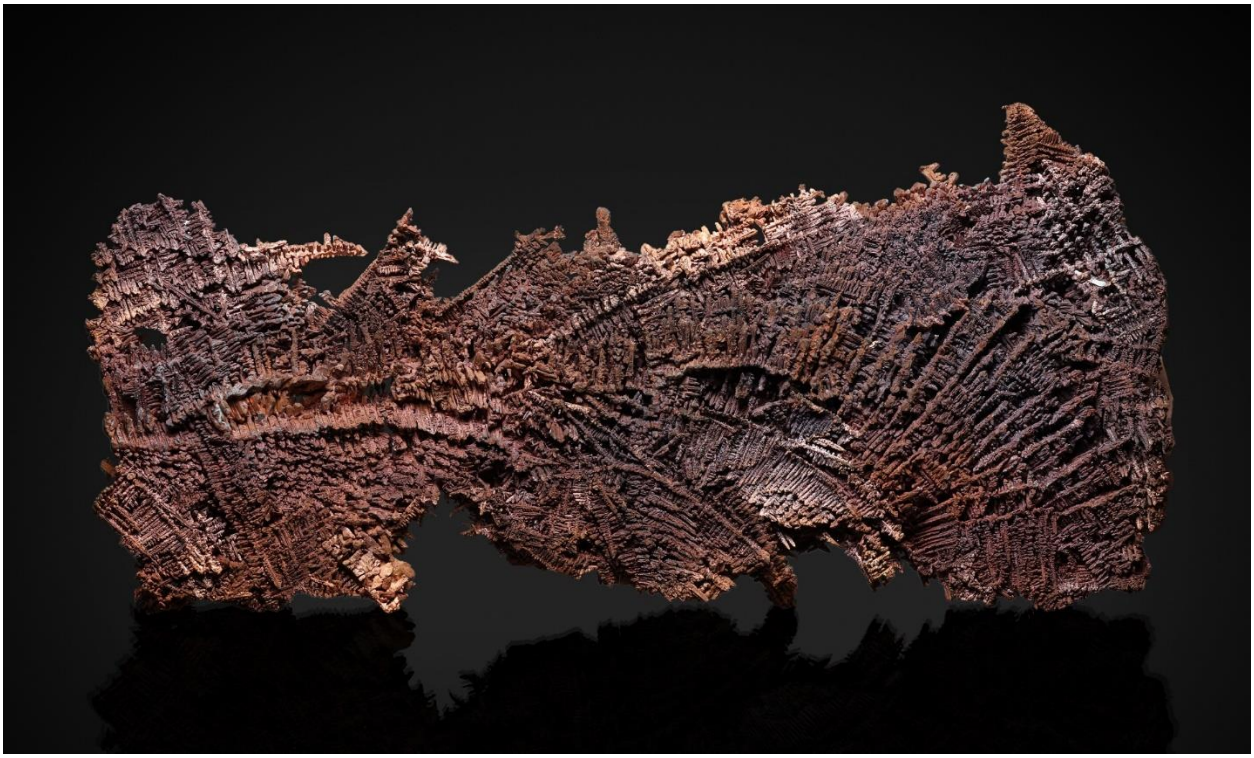
## *From the Director's Desk*

Dear Friends,

As I write this, my second *From the Director's Desk* column, it is nine months since my wife Monica and I arrived in Socorro. One of the most noticeable changes for me is not being tethered to an academic (semester) schedule. This is the first six-month period in the last 25 years that I have not been teaching in a classroom. Although I do love to teach, and I anticipate doing so again in the future, my new schedule has allowed me to focus on the museum and I am happy to report that it has been a very busy nine months. One of my main goals this year has been to meet, and get to know, many of our museum supporters (many who are *Friends of the Museum*). As part of this outreach I have given talks to clubs and other groups in Denver, Phoenix, Tucson, Santa Fe, and Albuquerque (to both the Albuquerque Gem & Mineral Club and the Gold Prospectors Association of New Mexico). I have also visited many collector's homes, to see their collections, while traveling. In addition, I met many museum supporters here in Socorro, when they visit the museum, or attending functions at the Bureau of Geology or the University. Most recently, the Bureau cohosted the Mining History Association 33rd Annual Conference, and the Museum provided the conference's opening.

One of the most surprising things to me, in my short tenure, has been how active and generous our benefactors are in their donations and museum support. This has kept Kelsey and me more than busy and we have added many wonderful new specimens to the museum collection. Many of these are on display. For a review of some of our new acquisitions see Kelsey's *Curator's Corner* below. One acquisition I would like to highlight here because of its significance as a New Mexico specimen. It is a native copper from the Chino Mine, Santa Rita Mining District, Grant County, and is exceptional for its size and perfection of crystallization. The specimen is 35 cm across, was discovered in 2013, and was acquired in December 2022. This is one of the finest copper specimens ever found (and preserved) from New Mexico and we are grateful to our benefactors for helping us acquire it for the museum.

**The Mineralogical Cabinet*: New Mexico Tech (originally the New Mexico School of Mines) was established by the territorial legislature in 1889 (23 yrs before statehood) and in its charter is the mission to "provide mineral and geological cabinets [collections] for…."



*Copper, Chino Mine, Santa Rita Mining District, Grant County, New Mexico. 35 cm across. NMBGMR #20551. Gift of Nancy Attaway and Friends of the Museum.*

You may notice a new photograph in the header of this issue of *The Mineralogical Cabinet*. I have been thinking a lot about the significance of mineral museums (and collections) and the roles that they play. At the New Mexico Bureau of Geology and Mineral Resources and New Mexico Tech, some of the roles of the mineral museum are defined in the University's charter which includes "providing apparatus, mineral and geological cabinets [i.e. collections; since 1927 the museum]…with a view of promoting the best interests of the institution"; which would mean, among other possible roles, teaching and research. By the way, this is the origin of our news letter's name, *The Mineralogical Cabinet.* The museum's mission, as put forth in its Manual of Collections Procedures, "is to procure, display, and curate geological, mineralogical, and paleontological materials, primarily from the State of New Mexico, for the purposes of research, education, posterity, and enjoyment for the citizens of the state." After numerous conversations with colleagues, especially John Jaszczak, Virgil Lueth, Carl Francis and Jeff Post I have come to realize that another very significant role that mineral museums play is to inspire. To inspire interests in science and the natural world around us. After observing and listening to visitors of our museum this last year, and from my own personal journey in mineral collecting and science, I am convinced that this is one of our more tangible and significant contributions. To that effect, we have added "We seek to inspire and act as a gateway to a love of science and other STEM fields" to our museum mission, and we have adopted a museum slogan:

"Minerals! Inspire a love of science"

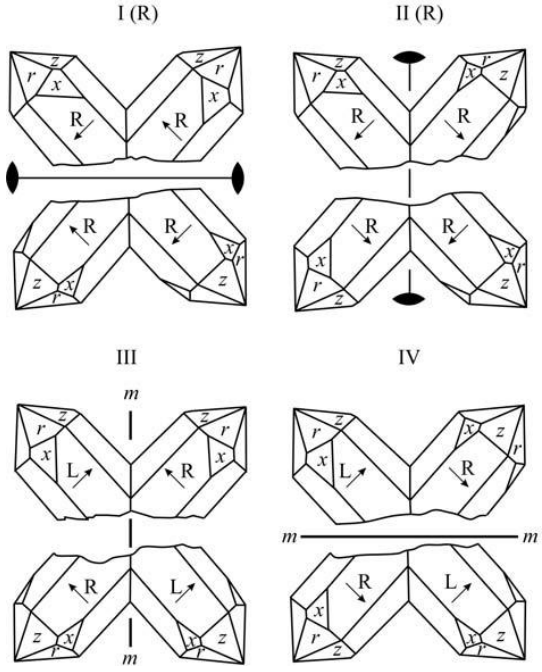
*John Rakovan*

## *Director's Choice*

*Japan Law Twinned Quartz from New Mexico*

A twinned crystal is an aggregate of two or more single crystals that are joined together with a specific symmetric relationship (i.e. according to a specific symmetry operation), for example rotation by $180^{O}$, reflection or inversion. The exact symmetric relationship between the crystals in a twin is known as the twin law. Common types of twins found in the mineral kingdom are often given specific names. In quartz, common twin types include Dauphiné Law, Brazil Law, and Japan Law Twins.

In a Japan Law twinned quartz two crystals are in contact with their *c*-axes inclined at 84º33' and a pair of prism faces from the two individual twin components are coplanar. The composition plane is the $(11\bar{2}2)$. As is common in twins, the component crystals are typically distorted, in this case flattened in the plane of the twin. It appears that the symmetry which relates the two twin components would simply be reflection across the $(11\bar{2}2)$ plane; a mirror plane of symmetry **m**. However, the structural complexities of quartz result in four related but different types of Japan Law twins and only one of these four laws relates the twin components by reflection across $(11\bar{2}2)$. The atomic arrangement of quartz is chiral (i.e. it has a handedness). Some crystals are left handed while others are right handed. The operation of reflection changes the hand of an object. Thus, if reflection is the symmetry of the twin law than the two components must be of opposite hand; one left and one right. In addition to chirality, the *a*-axes of quartz are polar, so the +*a* and –*a* directions are not equivalent by symmetry. The combination of chirality and polarity results in four unique possible structural combinations of the two components in a Japan Law Twin, thus there are four different twin laws. In most specimens it is difficult if not impossible to determine which of the four is at play by simple inspection. For a full explanation of the four Japan Laws see Frondel (1962) The System of Mineralogy 7th edition vol. 3.




*The four variants of Japan Law twins (modified after Frondel, 1962). The symmetry elements that relate the twin components, ⧫ (two-fold axis of rotation) and **m** (plane of mirror symmetry), and their orientations are shown. In most actual twins, either the upper or the lower part of each figure is exhibited. R, L: right-, left-handed quartz. The polarity of the twofold axis (one of the a-axes) parallel to the plane of the drawing is indicated by an arrow. Other sub-variants exist but are not included in the figure.*

New Mexico has several localities that have produced excellent Japan Law twinned quartz crystals. Of particular note are those that yield smoky quartz twins. Probably the most significant locality, in terms of number and quality of specimens is Mina Tiro Estrella, Capitan Mining District, Capitan Mountains, Lincoln County.

*Japan Law twin quartz from Mina Tiro Estrella, Capitan Mining District, Capitan Mountains, Lincoln County, New Mexico. 8 x 7.5 x 3 cm. NMBGMR #13184. Gift of Don Moore. Photo by Jeff Scovil.*

Quartz crystals from this deposit range in color from colorless to dark smoky, with the vast majority being pale to medium smoky (personal communications with Phil Simmons and Tim Hanson). These started appearing in collections after they were found by Dick Jones in 1976 (Hanson, T. Min. Rec 20:51-53).

The NMBGMR Mineral Museum has several very nice examples on display. No.13184, which was donated by Don Moore on behalf of Dick Jones, is a large open twin (well defined reentrant angle between the twin components) that exhibits a color on the darker end of the observed range.

*Two views of a Japan Law twin quartz from Mina Tiro Estrella, Capitan Mining District, Capitan Mountains, Lincoln County, New Mexico. 5.5 x 5.5 x 2.5 cm. NMBGMR #10079. Gift of Mac Canby. Bottom photo by Jeff Scovil.*

A similarly sized specimen, #10079, that has only a slight hint of color but is morphologically very fine was collected and donated by Mac Canby. The twin is almost closed (very little of a reentrant angle between the twin components) and has an untwinned quartz crystal attached to it for good measure.

The rarest, and most interesting to me, Mina Tiro Estrella specimen in the collection is #19002, a gift from Tim Hanson. It is a doubly terminated Japan Law twin (i.e. four terminations, one on each end of the two crystals in the twin). The twin forms an x rather than a v shape. This is a very rare habit in general, and the size, perfection and rich smoky color and matrix make it particularly special.

*Doubly Terminated Japan Law Twin Quartz (4 cm tall), with two parallel twins on its upper half, on a cluster of untwinned crystals. From Mina Tiro Estrella, Capitan Mining District, Capitan Mountains, Lincoln County, New Mexico. 5 x 3.5 x 2 cm. NMBGMR #19002. Gift of Tim Hanson.*

An older locality for the production of Japan Law twins in New Mexico is the San Pedro Mine, New Placers District, Santa Fe County. Of particular note are specimens with numerous intergrown milky quartz twins. Many of the Museum's San Pedro Mine specimens were formerly in the collection of the famous mineral collector, dealer, mineralogist, and philanthropist Art Montgomery. These were possibly collected by him. One of my favorite quotes about minerals is attributable to Art; "Minerals are not mere bits of inert matter. They hold within their being clues to their own creation and the pages of earth history; and they symbolize, as nothing else in the universe ever can, the marvelous architectural perfection of the atomic world hidden within a crystal." For someone with such insight, I am sure twinned crystals held a particular fascination.

Although not as prolific as Mina Tiro Estrella or San Pedro, a find of smoky quartz in the Ortiz Mountains by Ron Boyd produced some of New Mexico's finest Japan Law twin specimens. NMBGMR Museum specimen #17361 is one of the finest from this locality.


*Cluster with numerous Japan Law twin milky quartz crystals. San Pedro Mine, New Placers District, Santa Fe County, New Mexico. ≈5 x 3 x 3. Formerly in the collection of Art Montgomery. NMBGMR #12697.*

*Cluster with numerous Japan Law twin milky quartz crystals on matrix. San Pedro Mine, New Placers District, Santa Fe County, New Mexico. Cluster in view ≈4 cm. Formerly in the collection of Art Montgomery. NMBGMR #12682.*

*Japan Law twin smoky quartz from the Ortiz Mountains, Ortiz Land Grant, Santa Fe County, New Mexico. ≈5 x 5 x 0.5 cm. NMBGMR Museum #17361. Gift from Ron G. Boyd. Jeff Scovil photo.*

Not surprisingly, there are other locations that have produced only a few, but notable Japan Law twin quartz specimens. Two of these are the Memphis Mine, Organ Mining District, Organ Mountains, Doña Ana County, and Philadelphia Mine, Hanover-Fierro Mining District, Grant county.

*Japan Law twin milky quartz. Memphis Mine, Organ Mining District, Organ Mountains, Doña Ana County, New Mexico. Twin crystal ≈4 cm. NMBGMR #20227.*

*Japan Law twin quartz with actinolite inclusions. 300 Ft. level, Philadelphia Mine, Hanover-Fierro Mining District, Grant County, New Mexico. 3.5 cm. Gift of Bob Eveleth.*

# *Curator's Corner*

Howdy all you mineral enthusiasts,

We saw many of you during Symposium in November, and I wanted to thank you all again for your support. It was a successful event, and I hope you all had a great time. Please keep the second full weekend in November ($10^{th}$-$12^{th}$) saved on your 2023 calendar.

*Mineral Museum curators (left to right): Bob Eveleth, Bob North, Virgil Lueth, Kelsey McNamara, & John Rakovan, 1977 to recent, not being eaten by ducks outside Macey Center, Nov. 2022. Photo courtesy of Cynthia Connolly.*

I'm hoping the warmer weather has you all venturing outside and successful in your mineral hunting adventures. We have had a busy spring here at the museum, with many schools (K-12 and NMT prospective students) and special STEM events groups visiting. Mineral donations have been consistent, and so cataloging and "re-decorating" the museum shelves are on my daily to-do list.

We were visited by a French film crew soon after Tucson, who are making a documentary comparing quartz from France's "white mountain" (Mont Blanc) to New Mexico's "white mountain" (Sierra Blanca). Ray DeMark shared his vast knowledge for this piece, and I made a few appearances (mostly pointing out famous quartz pieces from NM). It will be interesting to see the film in its finality, and this might be my big Hollywood break—don't worry, I'll still think of you all when I'm killin' it in show business (insert bad joke laugh here).

**GEM & MINERAL SHOWS**

Unfortunately, I had to miss out on Tucson this year, as I was experiencing lower back pain (I hear this is what happens when you turn 40) and couldn't lift anything or walk comfortably. Good thing John saved the day! I heard that the NMT alumni banquet was fun and the shows were happenin'. A display of NM Quartz was put up by John at the Tucson convention center, nice job John!

The Albuquerque Treasures of the Earth Show and the Sierra County Rock and Gem Society Show were also bustling events. In Albuquerque, John set up a new acquisitions display, and in Truth or Consequences we were represented by Virgil (who gave a presentation), and our bookstore staff (who set up a vendor booth). Spring is just flying by with so many events!

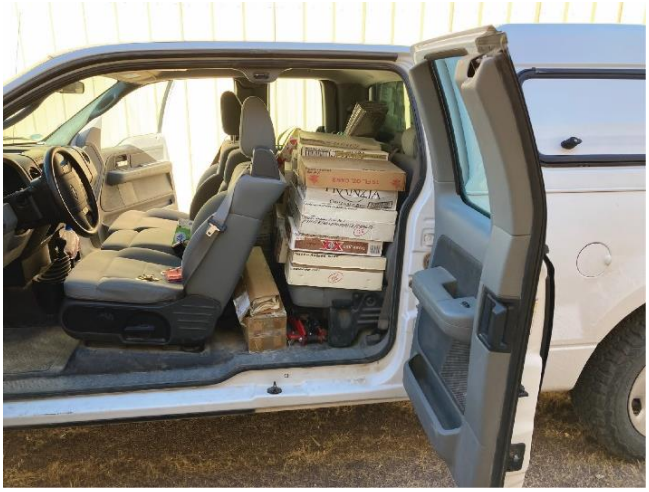

*John set up a NM Quartz display at the Tucson Gem & Mineral Show, February 9-12, 2023.*


*John also set up a case of new acquisitions at the Albuquerque Treasures of the Earth Show. March 17-19, 2023.*

*Bureau of Geology vendor setup at the Sierra Co. Rock & Gem (SCRAGS) first annual gem & mineral show, March 25-26, 2023. Photo by Brenda Whitt.*

## NEW ACQUISITIONS

Since Symposium, I have added over 100 minerals to the museum collection! I am grateful for our donors who are giving me job security and supporting the museum. It is quite something to see it transform and improve each day. This section of the newsletter highlights new acquisitions (some, not all!) since our last volume, please enjoy the photo gallery!



*We make house calls! Photos from the Roger C. & Terri Maynard donation pickup in mid-November 2022. The truck was so loaded that the headlights pointed up in the air!*

*Brilliant quartz with hematite(?) inclusions, Winston-Chloride area, Sierra Co., New Mexico. Gift of Tony Potucek.*

*No, that's not blueberry jam on quartz, it's fluorite on quartz! Huanggang Fe-Sn deposit, Inner Mongolia China. Gift of Martin Zinn III.*

*A Sweet Home rhodo! Finally! A big thanks to Martin Zinn III for this amazing piece!*

*Cute little forsterite & magnetite, Sapat Gali, Khyber Pakhtunkhwa Province, Pakistan. Gift of Joan Massagué.*

*A water clear, doubly terminated topaz from Shengus, Gilgit-Baltistan, Pakistan. Gift of Joan Massagué.*

*An amazing gem quality aquamarine from Shigar Valley, Gilgit-Baltistan, Pakistan. Gift of Nancy Attaway.*

*Rosasite, Silver Hill Mine Group, Graham County, Arizona. Gift of Richard Meese.*

## OUTREACH NEWS

### New Mexico Water Leaders Workshop

The NM Water Leaders (represented by legislators, federal delegation staffers, various agency staff, scientists, and conservators) held a workshop at the Bureau of Geology from December 1-2, 2022. The workshop consisted of two days of water-themed presentations, panels, and field trips to highlight the challenges to water management in New Mexico.

*A pre-workshop fieldtrip started with presentations on the history of clearing sediment and straightening the Rio Grande channel north of Elephant Butte in order to deliver water more efficiently to the reservoir.*

*Attendees rode on airboats in the Rio Grande just north of Elephant Butte, where amphibious excavators were dredging sediments in the delta channel.*

## Science Olympiad

The 2023 NM State Science Olympiad tournament was held on NMT's campus on Saturday, February 25th. Middle and high school students battled for the number one spot in 25 to 26 events, including Rocks and Minerals, supervised by myself and Cynthia Connolly, the Bureau outreach education manager. Here's a breakdown of the Rocks and Minerals event, by the numbers: 83 quiz questions, 78 middle and high school participants, 28 rocks, 12 minerals, 4 testing sessions, and 2 hours of grading. Socorro High School and Sierra Middle School came in first place, and Socorro's own Cottonwood Valley Charter School competed in the National Tournament in Wichita, Kansas in May! So proud!

## New Mexico Geological Society Spring Meeting

Over 175 geoscientists attended the NMGS Spring Meeting, which was held on the NMT campus on April 21, 2023. The spring meeting consists of a full day of presentations (both talks and posters) given by scientists, faculty, and students on geoscience research in New Mexico and surrounding areas (including Mexico).

*Photo taken during the NMGS poster session. Many students present their research here, which is great practice for budding geoscientists.*

This year the keynote presentation focused on the effect of bedrock geology and mines on post-wildfire water quality. The results of my research suggest that there is a strong correlation between this event and the Capital Bar running short on beer (haha).

## Bureau Periodicals

Did you know that "each electric car currently requires about 20 lbs of lithium, 29 lbs of cobalt, 54 lbs of manganese, 88 lbs of nickel, and 146 lbs of graphite?" The latest edition of NM Earth Matters, written by Dr. Ginger McLemore and Dr. Alex Gysi, is all about Critical Minerals in New Mexico. This short and informative publication

defines critical minerals, highlights those found in New Mexico and beyond, and covers the challenges in production. Additionally, the ore deposits and critical minerals lab and current research projects at the Bureau are discussed. Interested in knowing more? This publication, as well as others, are available for free download from this website: https://geoinfo.nmt.edu/publications/periodicals/home.cfml


*In this edition of Earth Matters, Ginger McLemore and Alex Gysi discuss critical mineral deposits in the state and essential research in order to guide future exploration.*

## PUBLICATIONS STORE NEWS

### Bookstore Staff

I'd like to introduce Roberto Villagomez, who is the new Publications Resource Specialist II at the Bureau. He is working with Brenda, the Publication Sales Office Manager, in the bookstore and you will likely meet him during Mineral Symposium! He is the primary contact for the store, and manages the inventory, day-to-day operations, and all of the student assistants (to name a few of his duties!). We are happy to have Roberto join us!

*Brenda and Roberto at the Truth or Consequences Gem & Mineral Show in some sweet museum t-shirts!*

For updates and photos on what's happening at the museum, I try to post weekly/bi-weekly on our Facebook page:

## *Museum Facebook Page*

www.facebook.com/NMBGmineralmuseum

The New Mexico Bureau of Geology ALSO has a Facebook page! Please check it out at this address:

www.facebook.com/NMBGMR

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## *Friends of the Museum*

https://geoinfo.nmt.edu/museum/friends/home.html

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