Tintic!

THE MINERALOGICAL RECORD

MARCH–APRIL 2024 • VOLUME 55 • NUMBER 2 • $30

The
Mineralogical Record

The International Magazine for Mineral Collectors

VOLUME 55 • NUMBER 2 MARCH–APRIL 2024

COVER: CLINOCLASE, 3.9 cm, from the Mammoth mine, Tintic District, Utah. Rock Currier collection; Jeff Scovil photo.

Articles

Featured Collection Pages

Subscription (U.S. only): $95/one year
Subscription (outside the U.S.): $135/one year
Digital Subscription (anywhere): $54/one year, or add on to paper for $24/one year
Boxed subscription (U.S. only): $145/one year,
(Canada) $231/one year, (outside U.S.A. other than Canada) $325 for one year
Subscription (Libraries, companies and institutions): $250/one year
Subscribe at www.MineralogicalRecord.com

Notes from the Editors

Died, Alex Earl, 26

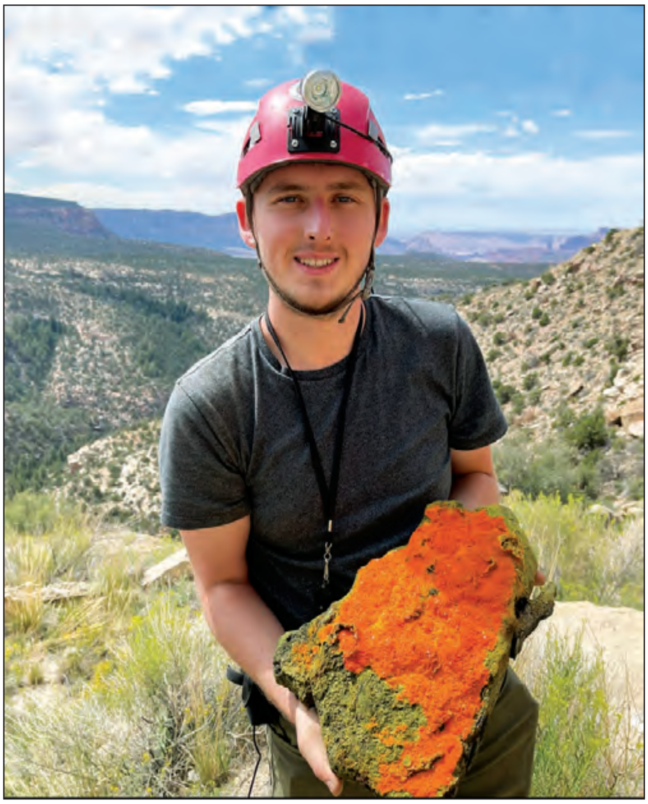
Jayson Alexander ("Alex") Earl was born in Logan, Utah, on March 20, 1997, to Shawn and Valerie Earl. Alex had a serious interest in the sciences from childhood which led him to compete in the Science Olympiad at Herriman High School in 2013. He would eventually take second place in the geology division statewide. Alex joined the Mineral Collectors of Utah club in Salt Lake City shortly thereafter and quickly fell in with the prominent Utah micromounters Brent Thorne and Chuck Adan.

By the time he graduated from high school in 2015, Alex was regularly going on mineral collecting field trips with his new friends all over the American West. A trip to the Blue Bell mine near Baker, California, in 2016 was particularly influential in solidifying Alex's interest in microminerals. By this time, Alex had also developed an interest in mineral photography, particularly photomicrography, and began posting some of his images on Mindat.

Alex served two years, 2017–2019, as a Mormon missionary in Indonesia. He had a knack for language and became conversational in several of the local languages and dialects. He spent his spare time there studying the geology and mineralogy of the country.

Upon returning from Indonesia, Alex purchased a 1987 Suzuki Samurai, a popular vehicle in Indonesia which had captured his imagination. Working on the vehicle and using it in the field became one of his passions.

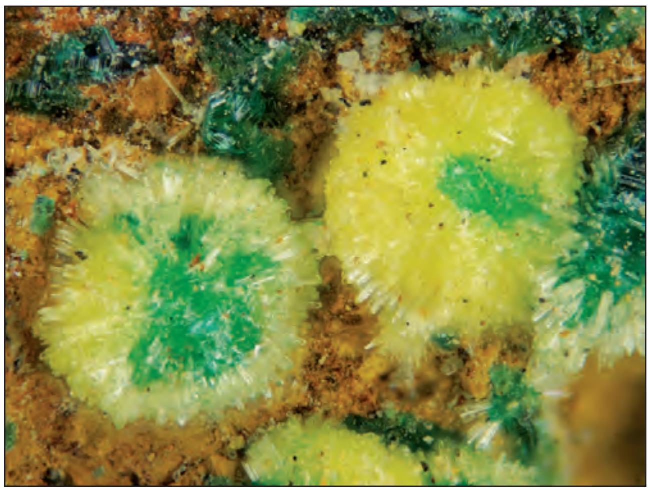
Alex began his college studies at Salt Lake Community College in 2019 with the goal of pursuing a career in nuclear engineering. To cover costs, he took a job at IKEA where he met his future wife, Hannah, who was also working there. By March of 2021 the two were dating, and by April they were going on mineral-collecting field trips together, mostly to the Thomas Range of Utah to collect topaz and associated species. They even found some rare red beryls which they later had incorporated into their wedding rings. Of the rings, Hannah wrote:



Alex Earl (1997–2023) holds a sample of a pascoite group mineral at a mine in Grand County, Utah.

> That collecting trip was specifically to get red beryl but we also collected topaz, as well as other local minerals like holfertite! However, we didn't know at the time that we would use red beryls for our rings. Jeremy since then had partnered with Tyler Bennett, a Salt Lake City silversmith, to create beryl jewelry, and when we saw the rings later at a show we asked ourselves what would be better than red beryl to use for our wedding bands; it just fit our story so well. After Alex passed, I contacted that same silversmith and had our wedding rings joined together into a pendant so the two rings would be forever together.

Alex and Hannah became regular collecting partners, visiting



Phurcalite with brochantite, 2-mm view, from the Posey mine, San Juan County, Utah. Alex Earl collection and photo.

Died, Neil Prenn, 80

Neil Benjamin Prenn had a spirit of adventure and optimism that he followed throughout his life. He was one of the youngest 80-year-olds you would ever meet. He never spoke a bad word about anyone and he always had a smile on his face. Friends describe Neil as generous, modest, soft-spoken, reserved, trustworthy, dependable, hard-working, confident and uncompromising in his ethics. He could also be lovingly eccentric. He will be profoundly missed.

Neil passed away after a short battle with cancer on November 14, 2023. He was born on December 7, 1942 in Manhattan, New York, the son of Elsie B., a Polish immigrant, and Samuel B. Prenn, a Russian immigrant, both high school teachers. The family moved to the hills above Los Angeles when Neil was young. He developed his lifelong interests in the outdoors, natural resources, and minerals early in life and pursued those in a career as a mining engineer. Neil graduated from the Colorado School of Mines with an Engineer of Mines degree in 1967. His first employer was a large mining company based in Los Angeles. They had him evaluate projects in many locations, domestic and international. His experience at operating mines came in California, Nevada, Idaho, and Tucson where he worked at the Pima Copper Mine for three years. He spent the rest of his life in a career that took him to six continents working on countless projects, and he thoroughly enjoyed every minute of it. His sense of adventure was put to good use traveling to remote and wild places.

Neil's interest in collecting mineral specimens was formed early, and he pursued it eagerly as a lifelong student of mineralogy and an enthusiastic collector. Along with minerals he collected mining artifacts: cap tins, ore buckets and dynamite boxes. Living in Tucson afforded Neil many opportunities for mineral collecting at world-class localities. It was there he developed many friendships with like-minded serious collectors with whom he collected and collaborated until his last days. TAs a Tucson resident he also attended the world's largest gem and mineral show every February, where he entered competitive and educational displays until his last one in 2023.

Neil's career took him to Colorado and then Nevada where he managed a mine in the Big Smoky Valley, a remote spot he dearly loved. He met his future wife, Cami, while in Colorado and they married in 1982, first living in a remote area of Nevada and eventually settling in Reno. Neil and Cami started Mine Development Associates (MDA), a mining engineering and geology consulting company, in 1987. MDA grew slowly and steadily, never intending to become a big company. They built a close-knit group of skilled professionals with intelligence and integrity, and these people became a family. All made a positive mark on MDA. Projects spanned the globe across six continents for all sizes of companies, from the smallest of junior exploration companies to the largest mining companies. MDA was sold in 2019, with Neil and Cami staying on for a transitional period.

Neil retired last year but kept an office at MDA and spent most days there until July, when he was diagnosed with cancer. His last venture was researching all facets of the mineral quartz with the intention of writing a book. He was an avid racquetball player, switching to pickleball when gyms shut down, and he developed solid friendships on the courts. He loved cribbage and played weekly with a local group. He also played poker monthly with a special group of colleagues. He had a passion for photography, his favorite subjects being sunsets, wildlife, flowers and birds. Neil and Cami loved to travel, Africa being one of their favorite destinations. Among their treasured trips were tulip time in Amsterdam, countless beach vacations with a close group of friends, and an epic trip to Alaska, crossing the distances in a small plane. Their next adventure was to have been Patagonia.

Neil Prenn (1942–2023) at the Tucson Show, 1986.

If you wish to make a donation, a scholarship in Mining Engineering has been set up at the Colorado School of Mines in Neil's name. (Colorado School of Mines Foundation, P.O. Box 912031, Denver, CO 80291–2031: Memo; in memory of Neil Prenn). Donations can also go to the Tonopah Historic Mining Park where he was on the Board of Directors and where Neil's collection of Nevada mineral specimens resides.

Obituary, *Reno Gazette-Journal*

Our friend Neil Prenn passed into the great beyond recently (November 14, 2023) when a rapidly advancing bone cancer jumped out of nowhere. Neil was a true gentleman and a consummate professional—a quiet, private and humble man who was absolutely at the top of his game worldwide.

Neil was part of that giant family of mining professionals who came from the Colorado School of Mines. He was one of a select group that I met way back about 1976 at the Society of Economic Geologists meetings in Reno. Those meetings were instrumental in my life, and in those of the attendees, all forming long-term relationships. It was a "think tank" on the highest level—with professionals like John Livermore (the "father" of modern microscopic gold-heap leaching), Lyle Campbell, Gene McClelland (McClelland Metallurgical Labs), John Schilling (Director Nevada Bureau of Mines), Dave Fitch (exploration manager), Peter Vickre (ASARCO and USGS), the U.S. Bureau of Mines guys including Dennis Bryan and Neil Prenn, our whole Cities Service office of Neil Upchurch, Ralph Mulholland, Mike McFarlane (in the summer) and me, among others. Mike and I were the young bucks, and for the life of me, even to this day, I can't understand why the room wasn't full of other young geologists. TWe had no idea until later that this group was full of such great iconic minds in mining geology—from engineering (Prenn) to metallurgy (McClelland) to

The Tintic District

Juab and Utah counties, Utah

Alex Earl[1]

Christopher J. Stefano
The Mineralogical Record
6354 North Camino Los Mochis
Tucson, Arizona 85718
cjstefanoxls@gmail.com

One of the "big three" early mining districts of Utah, the Tintic District was among the world's largest silver producers during the early 20th century. The mines at Tintic were well known to mineral collectors of the era for fine specimens of oxidized lead, zinc and copper minerals, including some of the world's finest examples of clinoclase and tyrolite. Micromounters and systematic collectors still haunt the dumps of the district, regularly finding little treasures. The district has been nearly forgotten among collectors of larger specimens because most of the surviving specimens are "hidden away" in museums.

INTRODUCTION

Utah's Tintic District, named for the East Tintic Mountains where it is located (which in turn are named for a Native American chief who used the mountains as a base of operations for his resistance efforts against early settlers), is one of the three most successful early mining districts in the state, along with Park City and Bingham. Deposits in the district were discovered in 1869, and its strong economic impact on the Utah Territory played a role in helping Utah to become the 45th state in 1896. The Tintic Standard mine alone was among the most productive silver mines in the world during the 1920s. As in the Bingham District, mining efforts at Tintic continue into the present, but, unlike at Bingham, they remain mostly underground.

The district's complex geology has always made exploration there tricky; many valuable orebodies were discovered only after having been missed during previous efforts. But the high grades of lead, silver, zinc, copper and gold carried by the Tintic ores offered an irresistible enticement that kept people looking despite the difficulties. The rewards were stunning, with total production of the district valued at more than $16 billion in 2020 dollars (Tinticmetals.com/tintic-district-history, accessed May 2021).

The rocks of the Tintic District are deeply weathered, and ore is oxidized even at depth in the mines. This has resulted in the formation of a great diversity of colorful oxide-zone minerals which delighted mineral collectors who acquired them during the district's heyday in the late 19th and early 20th centuries. Tintic is perhaps best known for some of the world's finest clinoclase and tyrolite specimens. In all, nearly 100 mineral species have been reported from mines in the Tintic District, and it is the type locality for 15 species. Most of these classic Tintic specimens have, by now, found their ways into museum collections.

LOCATION

The Tintic District is located in north-central Utah, about 90 km southwest of Salt Lake City and 55 km southwest of Provo in the central part of the East Tintic Mountains, straddling the border of Utah and Juab counties. The district is approximately 8 km wide and 9.5 km long, but there are low-grade deposits outside this

[1]Deceased.

Figure 35 (left). **Aragonite, 14 cm, from the Number 2 shaft, Tintic Standard mine. Rick Dalrymple collection; Adrienne McElwain photo.**

Figure 36 (bottom left). **Aragonite, 6.5 cm, from the Tintic District. Ex Washington Roebling collection. Smithsonian Institution collection; Chris Stefano photo.**

Figure 37. **Aragonite, 11 cm, from the Tintic District. Smithsonian Institution collection; Chris Stefano photo.**

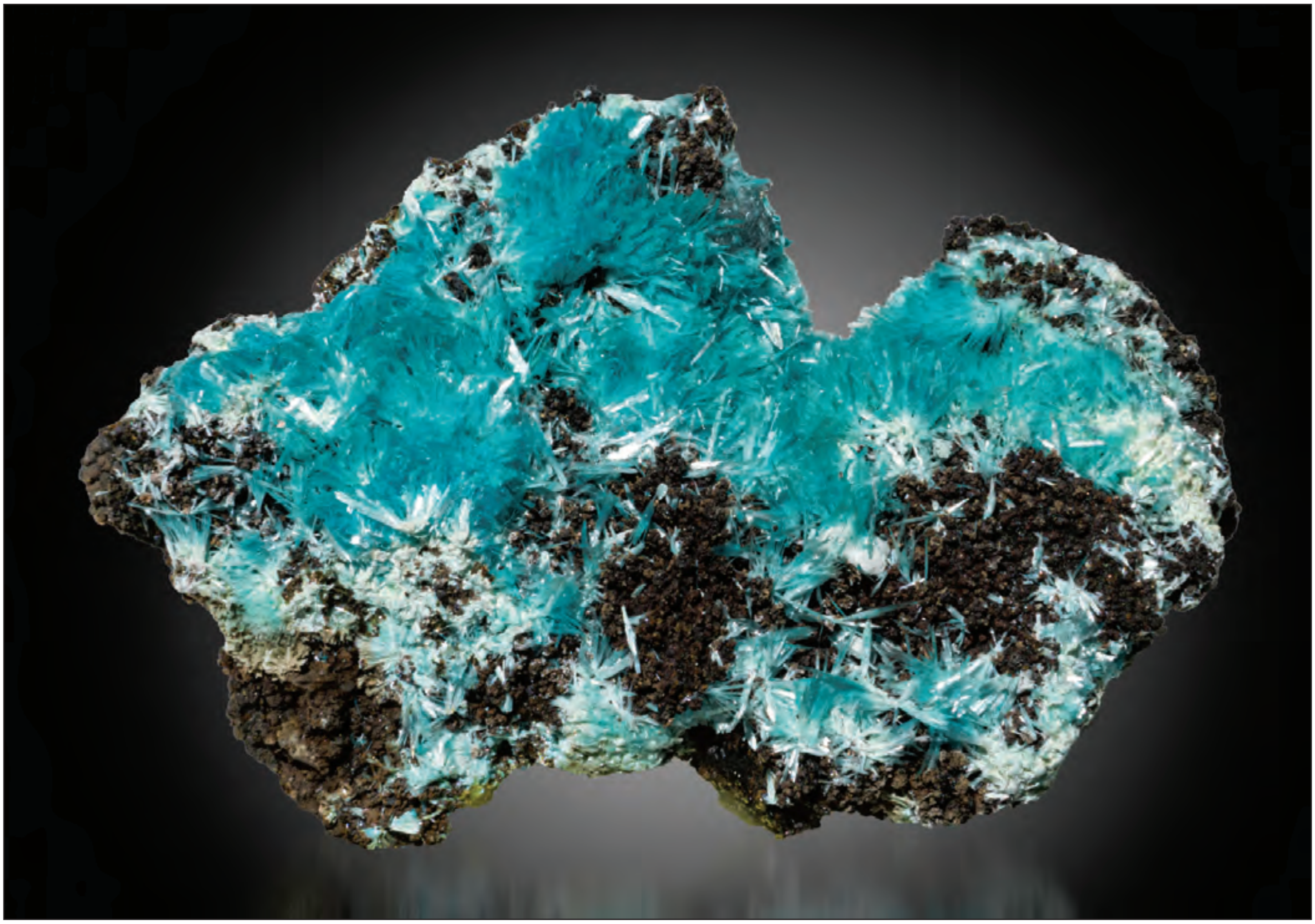


Figure 50. **Aurichalcite crystals, 8 cm, from the Tintic District. Lorin Pugh collection; Alex Earl photo.**

Figure 51. **Barite crystals stained by iron oxides, 13 cm, from the Centennial Eureka mine. A. E. Seaman Mineral Museum collection; Chris Stefano photo.**

Many mines have produced large masses of barite, particularly the Centennial Eureka and Grand Central mines. A 50-foot mass of barite was encountered at the Carisa mine (Lindgren and Laughlin, 1919). Tabular crystals are often found with sulfides and quartz in orebodies.

Bariopharmacosiderite $Ba_{0.5}Fe_4(AsO_4)_3(OH)_4{\cdot}5H_2O$

The Centennial Eureka, Mammoth, and North Star mines have yielded good specimens of bariopharmacosiderite. At the Centennial Eureka mine it has been found as both single cubic crystals and as druses on quartz. It occurs associated with arseniosiderite, azurite, beudantite, clinoclase, scorodite and tyrolite (Marty *et al.*, 1994). At the North Star mine, it usually occurs on quartz or goethite, with associations of barite, enargite, mixite, olivenite, pyrite and volborthite. Individual cubic crystals measure only a few hundred microns, but druses of these crystals may cover up to a few square

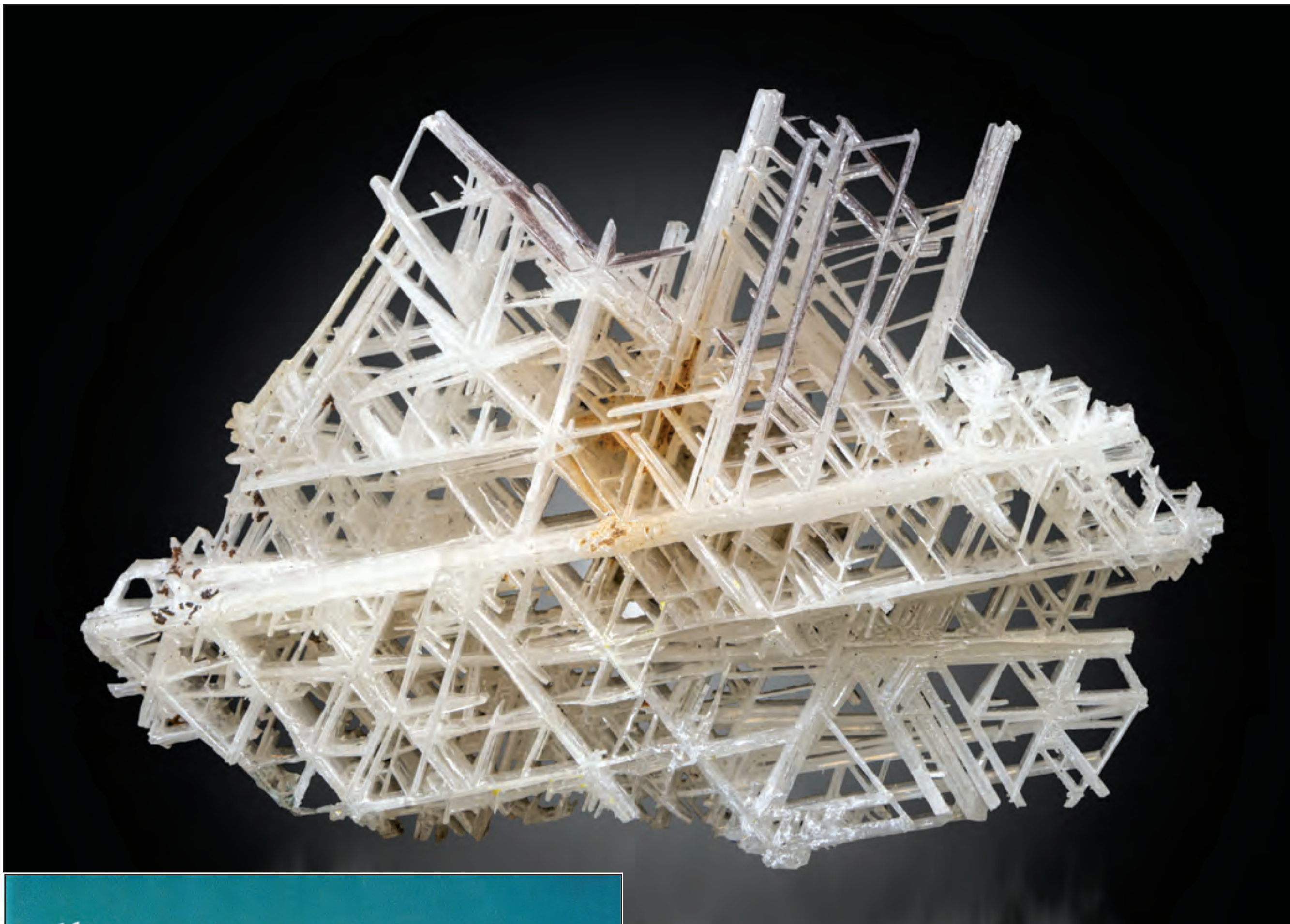


Figure 68. **Cerussite, 6 cm, from the Tintic District. This specimen was featured on the cover of the *Mineralogical Record* 5(1), January–February 1974. Ex Washington Roebling collection. Smithsonian Institution collection; Chris Stefano photo.**

and Iron Blossom mines, it occurs in very large masses. Silky tufts of slender crystals are common in the oxidized ores, but the mineral is more abundant in granular or massive, earthy and sandy aggregates of white to yellowish color, in great part directly replacing massive galena. The cerussite invariably contains silver, at least when in granular or massive form. Assays of pure material from the Iron Blossom gave about 20 ounces of silver to the ton.

Cerussite has been found as a direct alteration of galena, in which case it forms in small voids that have been produced by the corrosion and oxidation of the galena. It has also been found associated with many of the other minerals of the oxidation zones of the ore deposits.

Cesbronite $Cu_3TeO_4(OH)_4$

Cesbronite is an extremely rare mineral whose type locality is Moctezuma, Mexico; the Centennial Eureka mine in the Tintic District is its second-known locality in the world. It was found in only a few specimens from boulders collected near the top of the dumps of the Centennial Eureka mine, where it is associated with other secondary tellurium minerals. Several dark green single euhedral crystals on quartz have been found that are around 0.5 mm in size. It has also been found as grass-green clusters not larger than 1 mm occurring on quartz (Marty *et al.*, 1994).

Chlorargyrite AgCl

Likely the most common silver mineral of the Tintic District, chlorargyrite has been found in many of the mines in the area, particularly where galena and other lead minerals are more common.

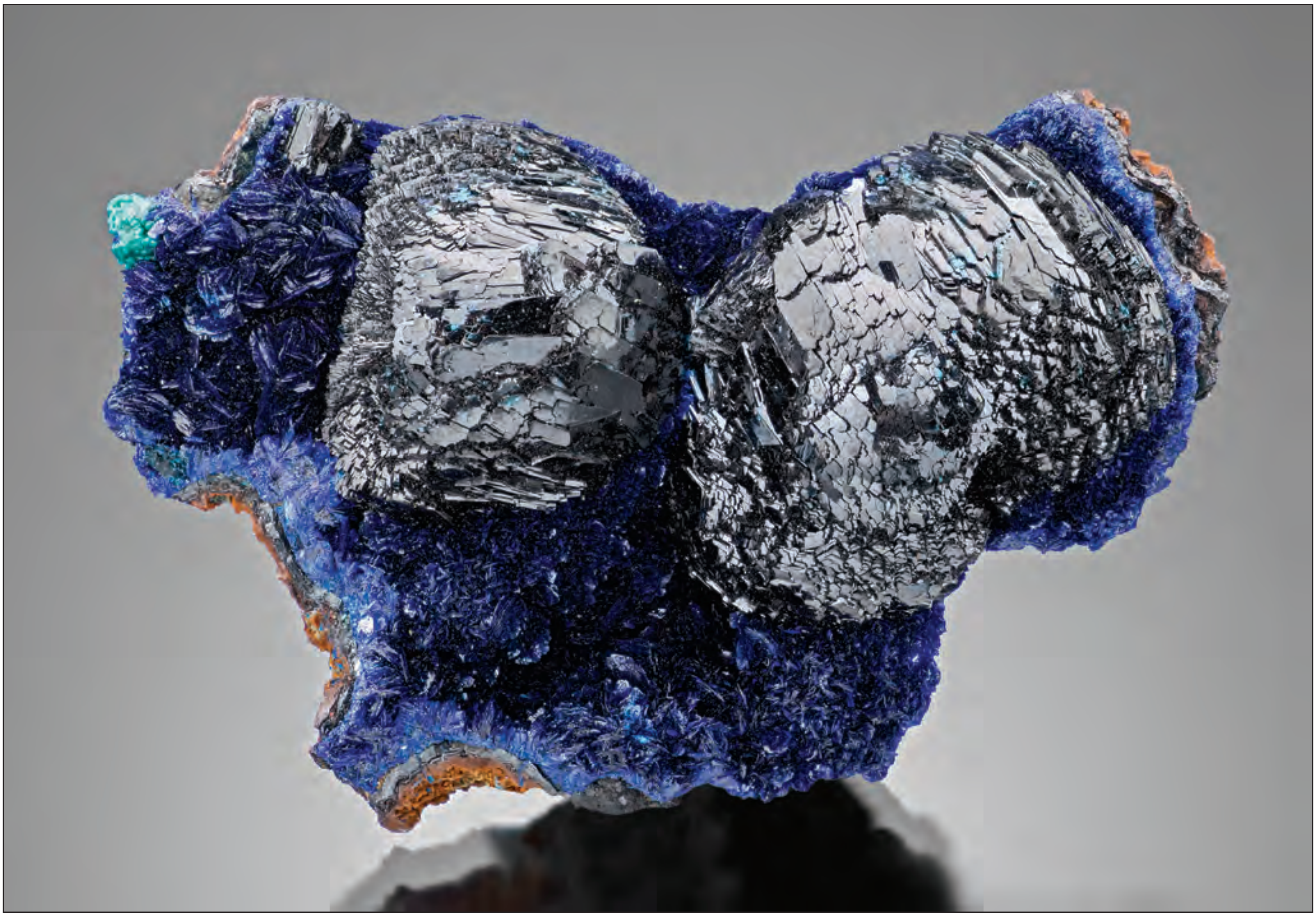


Figure 79. **Clinoclase with azurite, 3.9 cm, from the Mammoth mine. Rock Currier collection; Jeff Scovil photo.**

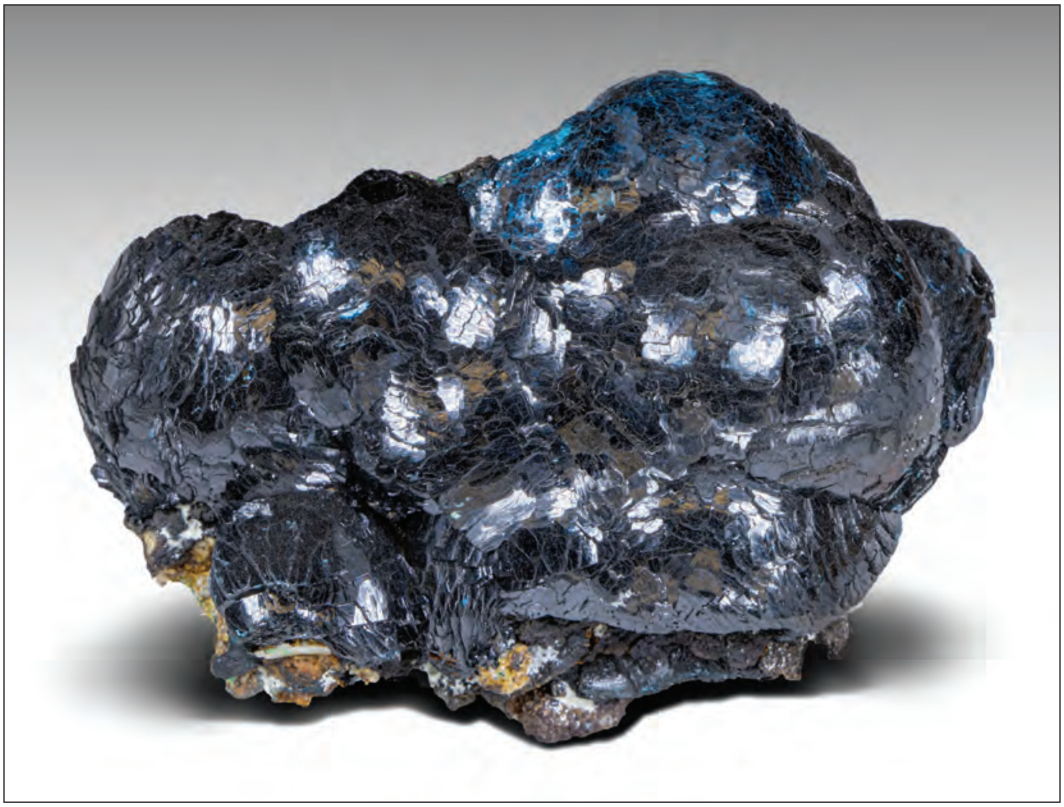


Figure 80. **Clinoclase, 6.5 cm, from the Mammoth mine. Smithsonian Institution collection; Chris Stefano photo.**

Figure 120. **Malachite after enargite, 1-cm view, from the Centennial Eureka mine. Joe Marty collection; Paul Adams photo.**

Figure 121. **Malachite after gypsum, 10.5 cm, from the Tintic District. Ex Clarence Bement collection. American Museum of Natural History collection; Chris Stefano photo.**

Figure 122. **Malachite, 13.5 cm, from the Ajax mine. Harvard University collection; Chris Stefano photo.**

ter-size, dark greenish black nodules lining drusy quartz vugs. It was first noted to occur at the McAlpine mine, Tuolumne County, California, for which locality it was named. Specimens from the Centennial Eureka mine were also noted in the paper describing mcalpineite as a new mineral; that paper observed that mcalpineite occurs with hinsdalite, svanbergite, xocomecatlite and with two

Ferrierite

From the Kamloops Lake Area southern British Columbia

Paul L. Broughton
P.O. Box 6976,
Calgary, Alberta, Canada T2P 2G2
broughton@shawcable.com

The area around Kamloops Lake in southern British Columbia is the type locality for ferrierite and has produced hundreds of fine specimens over the years, especially during the 1970s and 1980s. Unfortunately the availability of newly collected high-quality specimens is very limited, as the occurrences are mostly depleted.

INTRODUCTION

Ferrierite was first described as a new zeolite mineral by Graham (1918), and named after the discoverer, Dr. Walter F. Ferrier, who sampled the type locality along the northern shore of Kamloops Lake in south-central British Columbia, western Canada. The sampling was done during a 1917 geological survey and resource evaluation of the area at the time of World War I, under the auspices of the Munition Resources Commission of Canada. Confirmation of ferrierite as a new high-silica zeolite mineral was documented in the July 1919 issue of *The American Mineralogist*. The type specimen was collected from Tertiary volcanic rocks at a spot which marked the only known occurrence of this mineral for approximately 50 years. It was not until the 1960s that additional occurrences of ferrierite were recognized (Alietti *et al*., 1967; Yajima *et al*., 1971). The mineral is now found in fractures and vesicles of altered basalt and andesite at more than 30 worldwide localities (Wise *et al*., 1969; Regis, 1970; Zirkl, 1973; Tschernich, 1992).

The author first collected ferrierite specimens from the type locality at Kamloops Lake during the 1970s (Leaming, 1973; Broughton, 1975), and last visited the type locality and two nearby occurrences in 2022. Notable changes have occurred in the availability of high-quality specimens during the past five decades. A large number of very fine specimens were found at the Kamloops Lake type locality during the 1970s, providing stock to many American mineral dealers. Rudy Tschernich (1945–2017), a renowned collector, dealer and authority on zeolite mineralogy, collected extensively at these south-central British Columbia ferrierite localities during the late 1970s and early 1980s (Wise and Tschernich, 1976; Tschernich, 1992). The author possesses copies of Tschernich's handwritten field notes (1979) which describe his collecting at the three occurrences.

Tschernich disposed of many ferrierite specimens from his zeolite collection in the early 2000s, resulting in the dispersal of many very fine, if not classic, specimens to numerous collectors and mineral dealers. His remaining collection of zeolites, numbering approximately 12,000 specimens including many ferrierites from southern British Columbia, was donated to the Rice Northwest Museum of Rocks and Minerals in Hillsboro, Oregon, where he was a curator.

REGIONAL GEOLOGY

The host rocks for the three ferrierite localities in south-central British Columbia are lower to middle Eocene volcanics of the Kamloops Group—a prominent assemblage of sedimentary and volcanic rocks which crop out across the area between Kamloops and Vernon, British Columbia (Ewing, 1981a, 1981b, 1981c). The Kamloops Group volcanic host rocks at the type locality along the northern shore of Kamloops Lake were originally described by Graham (1918) as Miocene in age, but subsequently they have been dated with K/Ar methodology as early to middle Eocene, not Miocene. The K/Ar dates range from 54 to 42 million years (Ewing, 1981a; Mathews, 1981), consistent with the 45 million year range reported by Bordet *et al.* (2014).

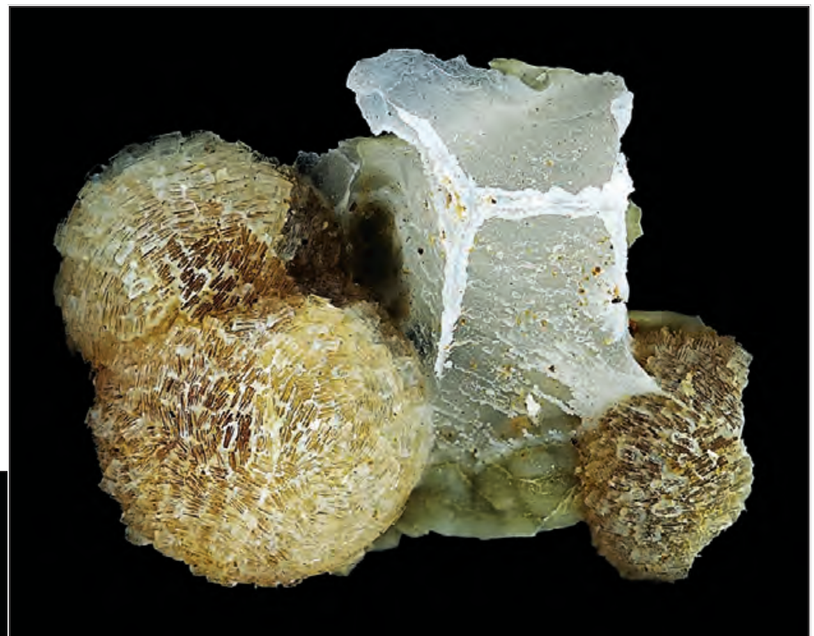


Figure 11. **Ferrierite spherulites adjacent to chalcedony cavity wall crust, 1.1 cm, from the Kamloops Lake deposit. Volker Betz collection and photograph.**

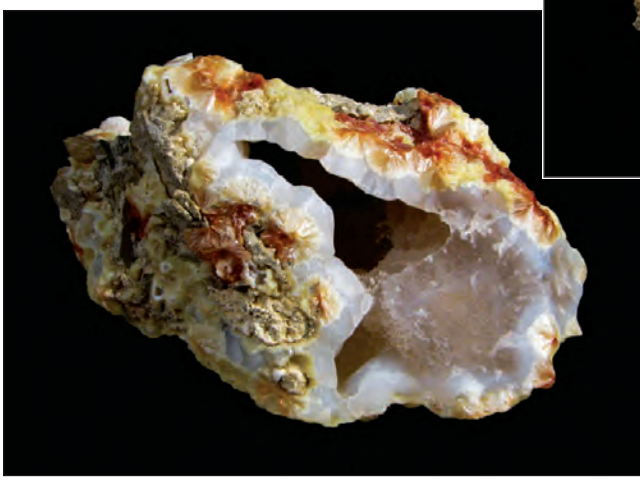


Figure 12. **Radial-fibrous ferrierite crystal fans covered by chalcedony along an interior cavity surface from the Kamloops Lake deposit; specimen measures 3 cm. Dakota Matrix Minerals specimen; Thomas Loomis photograph.**

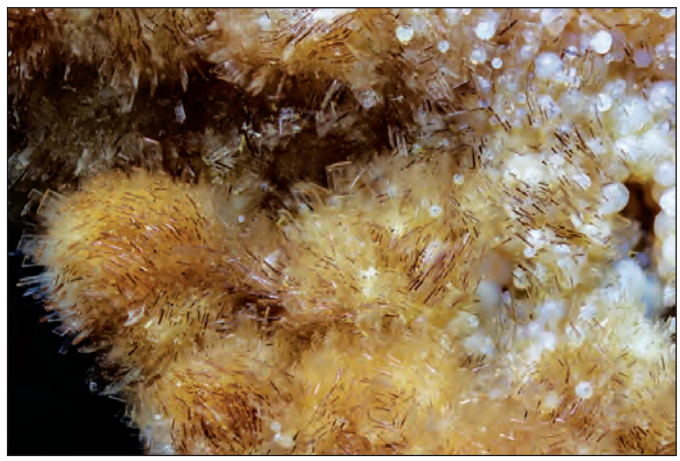


Figure 13. **Representative tabular ferrierite crystal habit, flattened on the {100} face with {101} terminations, extending outward from the spherulites of the Kamloops Lake deposit; field of view 3 mm. Micro-spherulites of chalcedony have accumulated between the ferrierite crystals. Henk Smeets collection and photograph.**

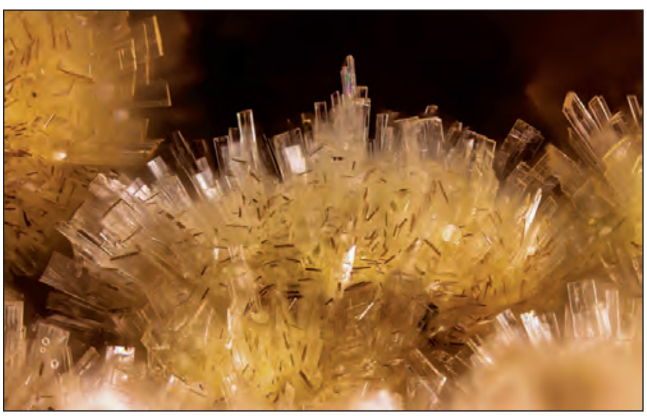


Figure 14. **The surface of a ferrierite spherulite from the Kamloops Lake deposit, illustrating projections outward by the tabular crystallites; field of view 6 mm. Henk Smeets collection and photograph.**

mineral precipitation with deterioration of the host rock. These micro-laminae cavity linings of silica may or may not cover over an ultra-thin (under 0.5 mm) layer of greenish clay derived from deterioration of the host basalt, with associated hematite derived from the widely distributed magnetite grains in the basalt. The nucleation of the ferrierite crystal fans and spherulites on this ultra-thin silica cavity lining followed. Most of the ferrierite crystal fans and spherulites have an orange-red stain derived from the hematite (oxidized magnetite) which is common in the host rock. The same orange-red staining appears commonly on the siliceous substrate of the ferrierite.

Ferrierite crystallization occurs at an intermediate phase between the two stages of silica precipitation. The ferrierite nucleation followed the formation of the silica shell which lined the vesicles, but before the voluminous precipitation of silica that infilled the interiors of the vesicles. That is, the phase of ferrierite crystal growth occurred within vesicular voids, before any subsequent envelopment by chalcedony or calcite. The chalcedony that covers the ferrierite may or may not completely fill the interiors of the vesicles.

Specimens from the Kamloops Lake type locality may have micro-spherulites of silica precipitated on the ferrierite crystals, unlike specimens from the deposits at Monte Lake and Pinaus Lake. The coarsely crystalline calcite accumulates in the remaining space after the precipitation of silica has ceased. Some vesicles lined with ferrierite were not covered by the chalcedony but, unusually, were enveloped by the late-stage calcite precipitation. Wise and Tschernich (1976) record the very rare occurrence of heulandite crystals at the deposit, but this author has not observed the mineral in the

Figure 19. **Ferrierite crystal sprays lining a vesicle, 3.2 cm, in altered basalt of the Monte Lake deposit. Volker Betz collection and photograph.**

Figure 20. **Calcite-filled amygdule, 6.5 cm, from the Monte Lake deposit, acid-etched to expose the ferrierite crystals distributed along the cavity lining. Volker Betz collection and photograph.**

Figure 21. **Acicular to fibrous ferrierite, 8-mm view, from the Monte Lake deposit. Henk Smeets collection and photograph.**

Figure 24. **Ferrierite crystallization along vacuole lining of specimen, 2.5 cm, from the Pinaus Lake deposit. Volker Betz collection and photograph.**

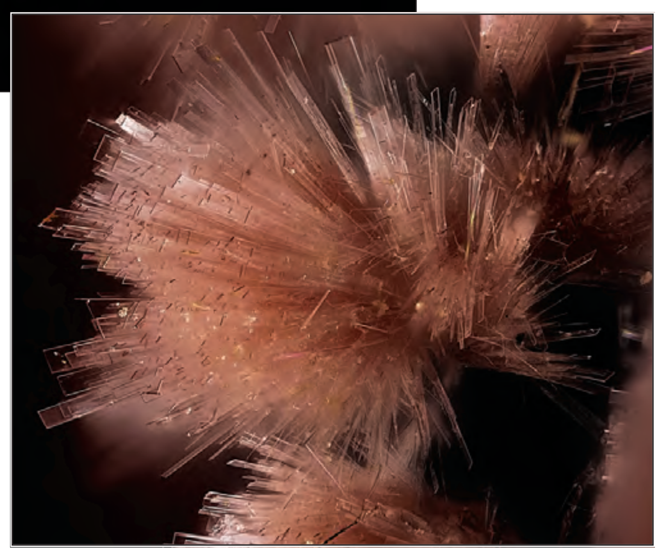


Figure 25. **The tabular crystal habit representative of the Pinaus Lake deposit ferrierite, characterized by flattening on the {100} face; specimen measures 1.7 mm. Volker Betz collection and photograph.**

Figure 26. **Ferrierite specimen, 2.5 cm, from the Pinaus Lake deposit. Rui Nunes collection and photograph.**

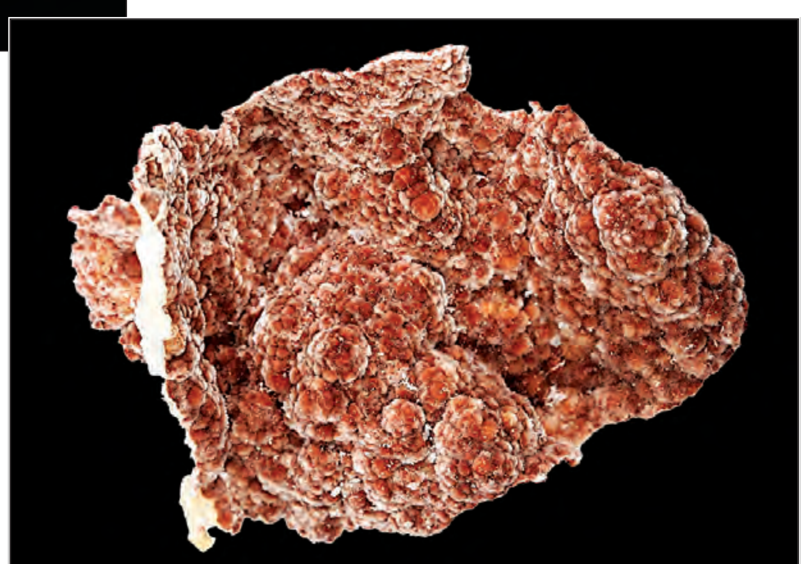
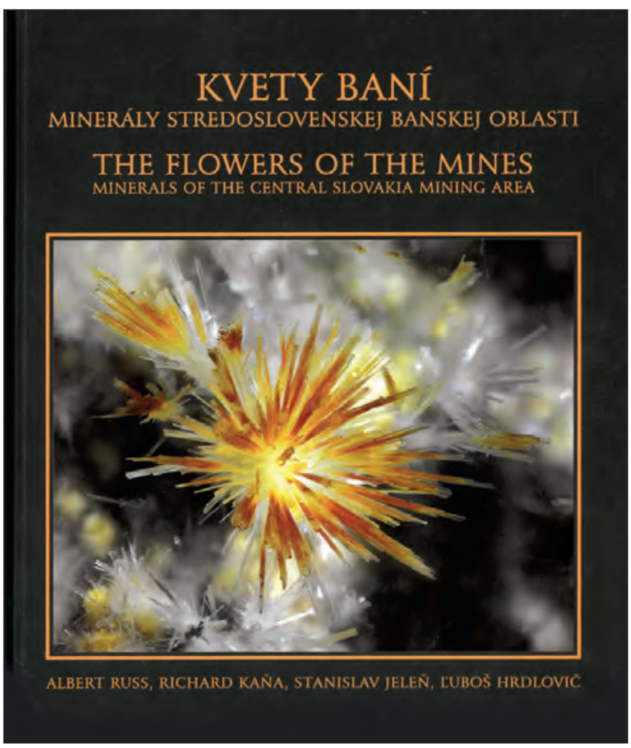
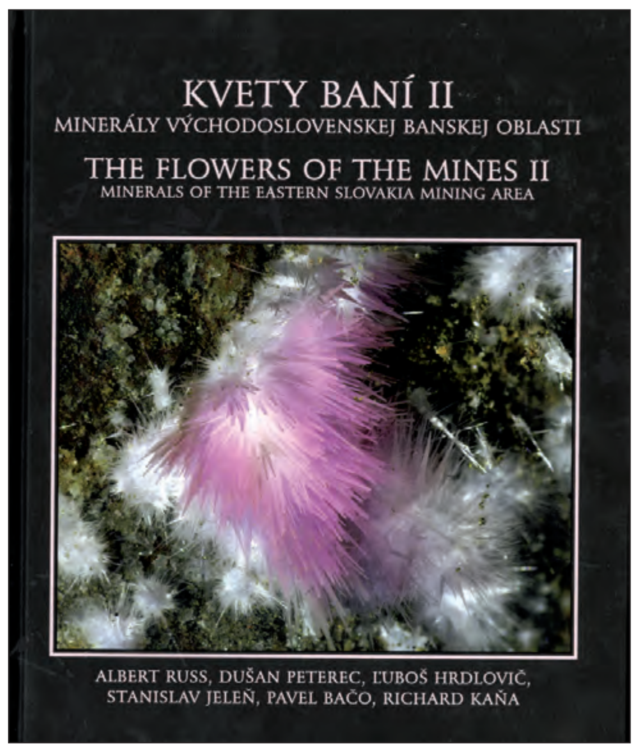


Figure 27. **Ferrierite specimen, 3 cm, from the Pinaus Lake deposit. Volker Betz collection and photograph.**





BOOK REVIEW:

The Flowers of the Mines: Minerals of the Central Slovakia Mining Area I and II

by Albert Russ, Dušan Peterec, Richard Kaňa, Stanislav Jeleň, Pavel Bačo, and Ľuboš Hrdlovič. Published (2023) by the Mining Association of Banská Štiavnica and Hodrusa; hardcover, 30.5×25.5 cm, 288 and 256 pages, €60+shipping each. Order by emailing Albert Russ albertruss@ yahoo.com .

I have gotten into the habit of starting my book reviews with a personal story that is relevant in some way to the book I am reviewing, usually a story about how I first became familiar with the book's subject. I've enjoyed writing those stories down, and I hope they have helped to pique your

Subscription (individuals, U.S. only): $95/one year
Digital Subscriptions (anywhere): $54/one year or add on to paper for $24/ one year
Boxed subscription (individuals, U.S. only): $145/one year, (Canada) $231/one year,
(outside U.S.A. other than Canada) $325 per year
Subscription (individuals, outside the U.S.): $135/one year
Subscription (Libraries, companies and institutions): $250/one year

Affiliated with the Friends of Mineralogy, an independent non-profit organization. See www.FriendsofMineralogy.org

THE MINERALOGICAL RECORD (ISSN 0026-4628) is published bimonthly at $95/year (U.S.) by Mineralogical Record, Inc., a 501c(3) non-profit scientific/educational organization, with business office at 10694 Hiker Peak View #207, Colorado Springs, CO 80921. Periodicals postage paid at Tucson, Arizona and additional mailing offices. Postmaster: Send address changes to the above address.

ADVERTISERS INDEX