THE MINERALOGICAL RECORD

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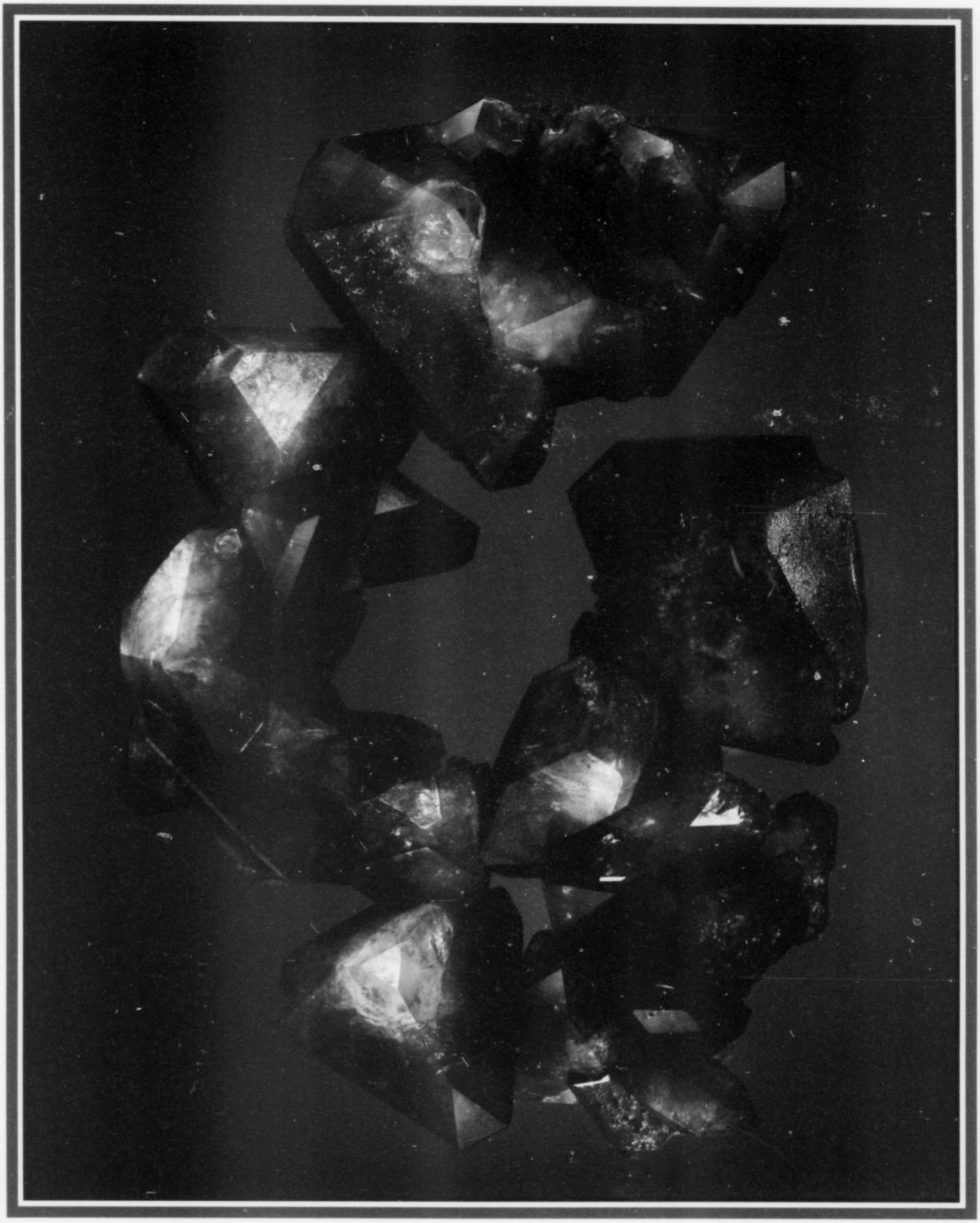

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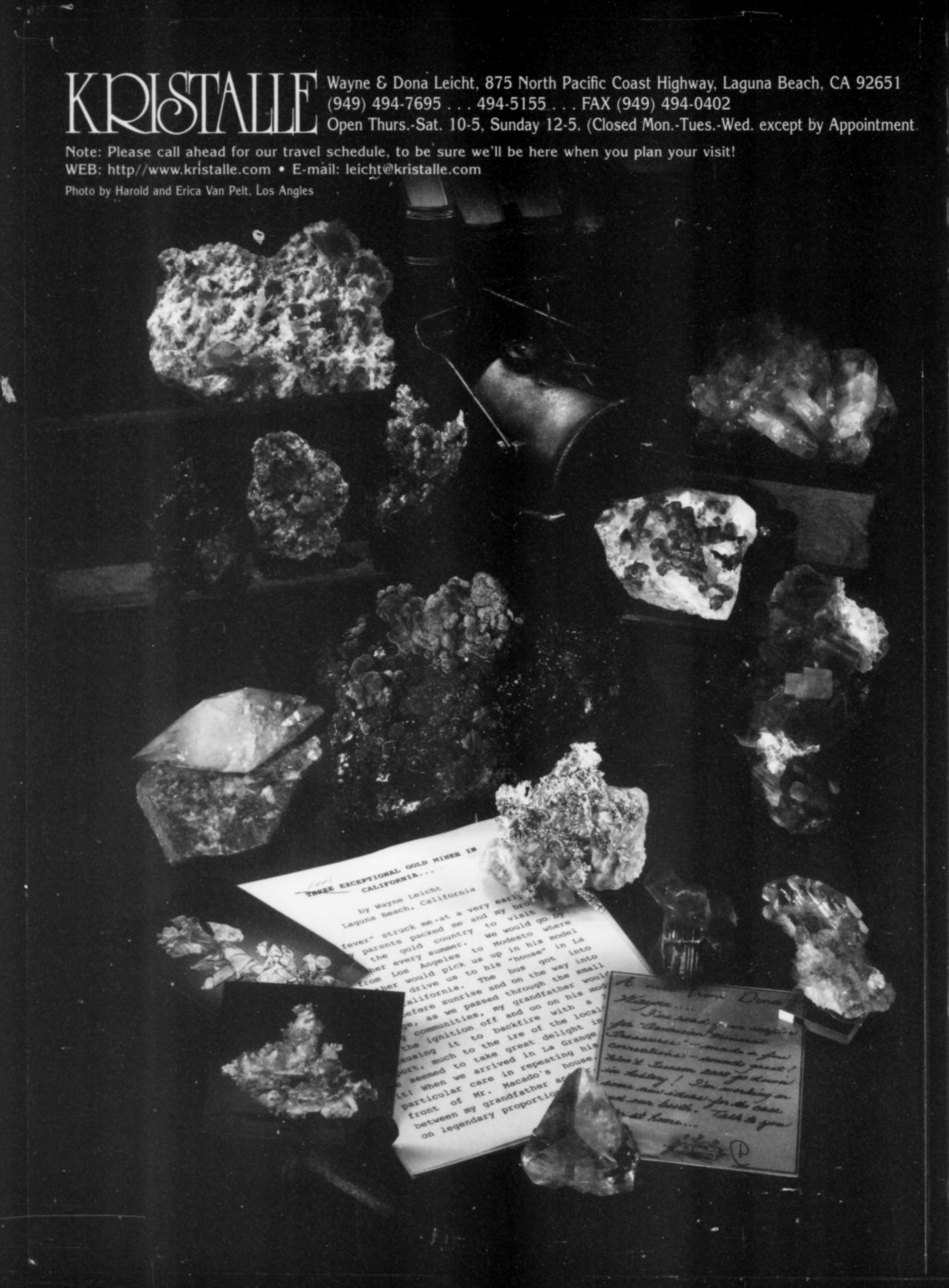

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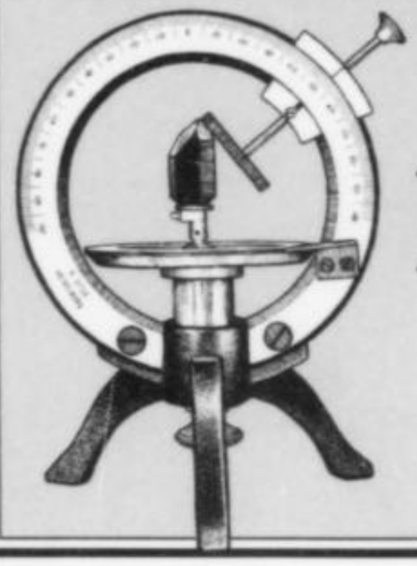

The Mineralogical Record

January–February 2008 Volume Thirty-nine, Number One

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notes from the EDITORS

American Mineral Treasures!

By the time you read this it should be ready—one of the greatest and most interesting "coffee-table" books in the history of mineralogical publishing. I am referring, of course, to *American Mineral Treasures*, the companion book to what promises to be the greatest Tucson Show in history, as well, where dozens of fabulous displays of American minerals, gathered from the finest public and private collections in the country, will come together for the first and no doubt the last time in February 2008. The book will have 44 chapters, each devoted to one of America's greatest mineral localities (as chosen by a large and distinguished panel of prominent curators, collectors and dealers), written by experts with *personal* experience at each locality. Many great specimens are being photographed for this book that have never appeared in print before. It will be a historic work and, though it is a cliché to say so, it will be a book that truly no collector should be without. The retail price of $85 is significantly subsidized, so it is also a real bargain.

There is a bonus, too! Order your copy through the *Mineralogical Record* website, or by email (minrec@aol.com) or telephone (520-297-6709), and you will be helping your favorite mineral magazine to keep bringing you the kind of indispensible, authoritative information that you as a collector need in order to stay well-informed. We really do need your help and support, and this is a great way to show that you are behind us and what we do for the collector community.

Here's another bonus—*Mineralogical Record* Editor-in-Chief Wendell Wilson is the senior editor of the book, and will be providing a signed and numbered, framing-quality print as a gift to everyone who purchases their copy of the book through the *Mineralogical Record*. This print is not available through any other outlet, so get on your computer (or phone) now and reserve your copy. Trust us . . . you will *really* enjoy this book!

Benitoite Interviews

Readers of the article in this issue on the history of the Benitoite Gem mine will note the portion of the story devoted to the 1935 visit to the mine by collecting buddies Ed Swoboda and Pete Bancroft—then high school students. These two old mineral buffs are still alive and perky; Ed is now 90 years old and Pete is 91. As a complement to the article we are pleased to direct our readers to www.MyMineralStories.com for a 10-minute video interview with Ed and Pete, wherein they reminisce about that 1935 collecting trip. If we hear from readers saying they enjoy this extra dimension, we may well do it again in the future, in cooperation with Bryan Swoboda's Blue Cap Productions, who put the current video together.

Schuh's Biobibliography

The late Curtis Schuh (see previous issue for obituary) chose for his life's work the task of creating a huge, scholarly database of information on authors of mineralogical works, from ancient times to around 1910, and the books they created. He would occasionally provide CD copies of interim versions to his friends, but he also worked with the *Mineralogical Record* to produce an online version for the *Record*'s growing website. The last thing he did was to provide us with an html version (completed just a few days before his death), along with many hundreds of painstakingly gathered jpeg images of title pages of rare works. Had this biobibliography been published in hardcover volumes the set probably would have retailed for over $1000.

The author entries, over 1,600 of them, had to be loaded onto our website one at a time, a job we completed just last month. The database is now online, and can be accessed from the Contents page of our website (click on Library—Schuh's Biobibliography). There you can select any author from the two drop-down menus, one listing them alphabetically by surname and one chronologically by birth year. For those authors whose birth dates are unknown we estimated their births as probably having taken place 30 or 40 years prior to the date of their first publication—not perfectly accurate but at least in the ballpark.

This truly is a monumental work, as readers will see when they start going through it. The late John Sinkankas prepared something similar for the field of gemology, but nothing like this has ever existed for the sciences of mineralogy and crystallography. The focus is primarily on the books and their many editions; in some cases a longer and more detailed biography for a particular person appears in the Biographical Archive portion of our website (which also includes portraits), so if you are researching a particular individual, be sure to check both places.

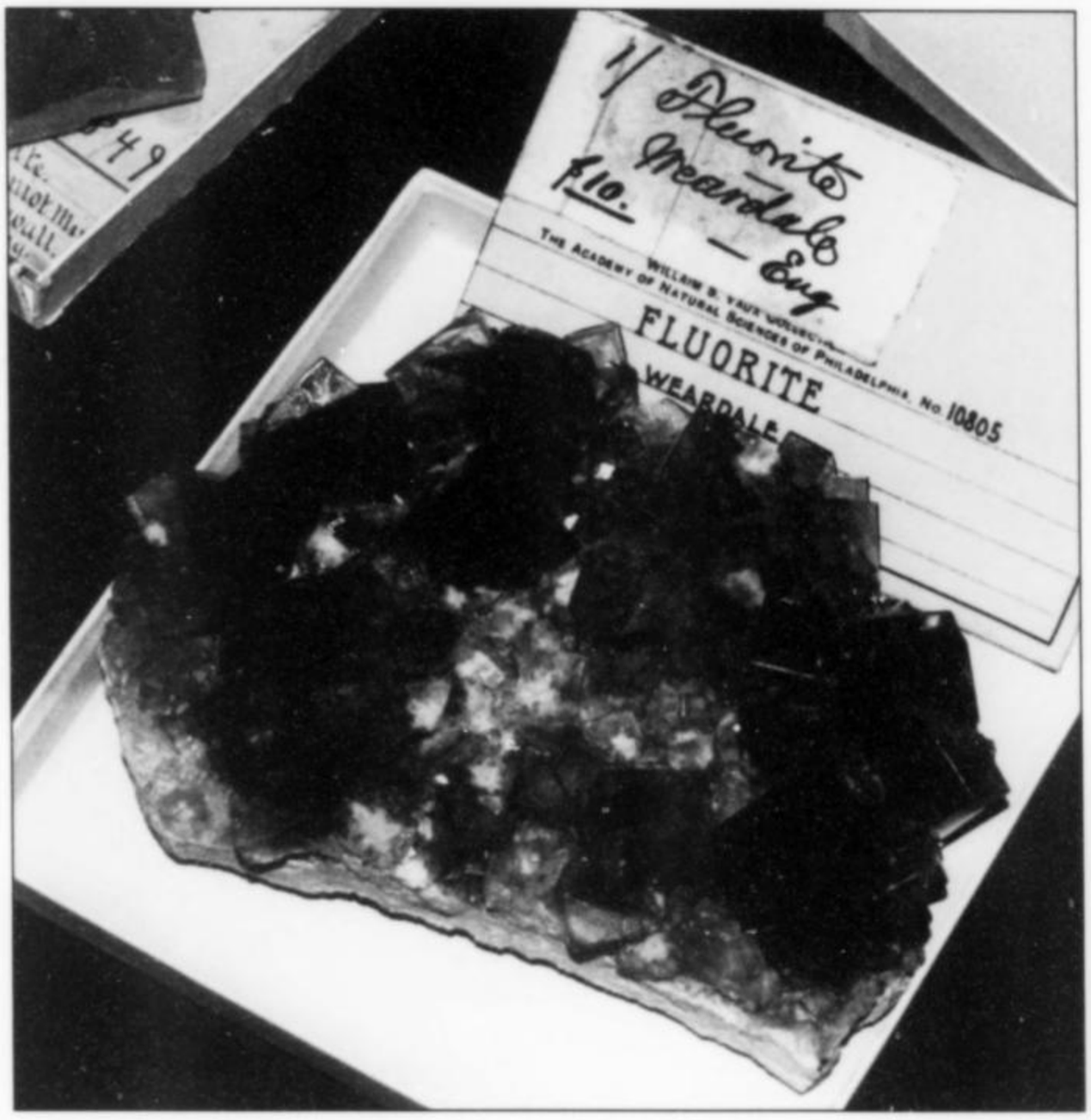
Dear Readers

Please make a note of your 4-digit or 5-digit subscriber number, shown on the address label for each magazine you receive. You will need it to log onto new portions of our website to be added soon.

Internet Directory now on Internet!

Yes, our **Internet Directory** is now posted on a new **Links** page on our website (access it from the Contents page). Instead of typing in the address from our magazine page you can now simply click on the link and go straight to the dealer's website. We like to think of our Internet Directory as a low-tech search engine that finds mineral specimen dealers for you. Google is useless in that regard. Search on "mineral dealer" and you get 83,000 hits. "Mineral specimens" gets 806,000 hits, and even "fine mineral specimens" gets 32,000 hits. You can't possibly search through them all.

Dealers who purchase a listing in our Internet Directory in the magazine (at $200/year) will henceforth also be listed in our online Links page at no additional cost. We deeply appreciate it when anyone puts a link to the Mineralogical Record website on their website—and we can provide an attractive banner upon request. However, we cannot reciprocate gratis, inasmuch as our own Links page is reserved for paying advertisers only. Paid advertising is critical to the financial support of the magazine, so we must give it priority. We always welcome new listings for the Internet Direc-



Cabinet specimen of blue-green fluorite from Weardale, England; William S. Vaux collection, still in the Academy of Natural Sciences in Philadelphia (Wendell Wilson photo). See more Vaux specimens under "William S. Vaux" in the Biographical Archive, www .Mineralogical Record.com.

tory! If you would like to be listed, contact Editor Tom Moore at tpmoore1@cox.net.

Vaux Specimens

After all the hubbub about the William S. Vaux collection, in storage for decades at the Academy of Natural Science in Philadelphia, *Record* readers are probably very curious to see what some of those historic specimens actually look like. We certainly were. So we were very happy a few months ago to have the privilege of finally having access to the locked storage room filled with 7-foot-tall steel cabinets that hold the famed mineral collection. Suprisingly, only a small percentage of the specimens are high-quality exhibit pieces; the rest are just good study specimens as one might find in any university mineral collection. But the display specimens are spectacular indeed, and fascinating as a historical snapshot of what the best available minerals were like in the mid to late 1800's.

Taking advantage of the rare opportunity, we shot a number of informal flash photographs of various specimens and drawers. Thirteen of the photos are posted under "William S. Vaux" in the *Biographical Archive* portion of our website at www .MineralogicalRecord.com. Remember that if you click on the photo you can see a larger version of the image.

Tucson Mineral Museum News

Since the Mineral World comes to Tucson every February, what happens in that city is of particular interest to mineral people, especially with regard to the Mineral Museum at the University of Arizona. Several years ago it was decided that, as part of the downtown renewal project called "Rio Nuevo," the University would transfer the mineral museum from its current location on the lower level of the Flandreau Planetarium on the University of Arizona campus to a new coplex to be constructed downtown. That plan has languished amid controversies about how the whole project would be designed and paid for, and what it would cost.

Finally, in August 2007, a deal was signed between the City of Tucson and the University of Arizona for a $130 million, 125,000-square-foot science center and state museum complex that will be the cornerstone of the downtown revival effort. The science center will feature the mineral museum, a digital planetarium, an observatory, a butterfly vivarium, a gallery for changing exhibits, and an IMAX theater. The state museum will feature exhibits on Southwestern peoples and native art and jewelry.

The design phase of the project has now begun, with construction scheduled to begin next summer and a completion date set for sumer of 2011.

William Niven's Bisbee Cavern

In the July–August 2006 issue we published an article on early mineral dealer William Niven (1850–1937). Niven had become a field agent for New York mineral dealer George L. English in 1890, and in 1891, while on a trip through the Southwest, he was able to enter and collect specimens in one of the caverns at Bisbee, Arizona that were often found above secondary copper orebodies. We gleaned this information from a brief mention in an ad published by English in the August 1891 issue of *Mineralogist's Monthly*, part of a very rare and fragmentary set in the Mineralogical Record Library.

Through the gracious assistance of Bernadette Callery at the Carnegie Museum of Natural History Library in Pittsburgh, we were recently able to obtain a scan of the previous issue, July 1891, of *Mineralogist's Monthly.* In that issue English published an extract of Niven's letter describing the Bisbee cavern. Readers will surely enjoy it:

> It [the cavern] is 80 feet wide at the mouth, 270 feet wide about the center and 250 feet wide at the end, and is 500 feet in length. From the mouth of the cave to the end it is at least 150 feet high. There are four chambers, each of which has its own peculiar habit of crystal form. In No. 1 are to be found the acicular crystals of aragonite. No. 2 consists mainly of flos

ferri. No. 3 is the grandest of all, and looks like a magnificent cathedral—most of the stalactites and stalagmites are colored green with the copper, and they look like immense organs, while hanging from the roof is a bunch of stalactites which looks like a gigantic chandelier. In some places the form is like roses, again like fringe, coral, palm leaves, trees, toadstools; in others great slopes of glaciers and fields of ice &c., &c. . . . In one place there is a great number of sheets of aragonite from 3 to 4 feet long and 2 to 3 feet wide, about ¼ to ½ inch thick, beautifully translucent, showing alternate layers of green, white and blue and resembling tapestry when a light is placed behind it. . . . I spent 14 days in this vast cavern. While I was selecting specimens I had a photographer take pictures; you can imagine the singular scene the main chamber presented with 200 candles burning. It was a scene of dazzling beauty. . . . Countless stalactites of every conceivable shade of green, blue, red—intermingled by snow-white, hanging from the roof and sides—while rising from the ground great ghost-like stalagmites stood silent sentinels guarding this incomparable workshop of nature's laboratory.

Niven shipped back to English 29 boxes of specimens from the cave, totaling 1,870 pounds. "Azurite crystals, some of them extra large and fine, were secured by Mr. Niven also," wrote English, "as well as velvet malachite, very beautiful, [and] cuprite in groups of superb, brilliant crystals."

Advice from the Past

Charles H. Pennypacker (1845–1911) made the following observation in his serialized essay, "The Experiences of a Mineralogist," in the March 1892 issue of *The Mineralogists' Monthly*. It is timeless advice, as true today as it was 115 years ago.

> . . . About this time (1850) the Phoenixville Lead Mines ceased operations and the supply of specimens ended. What has become of all the fine carbonates, phosphates, and sulphates which came out of those mines? There were thousands upon thousands of specimens secured. Where are they now? Few are on the market. The writer has witnessed the rise, the full development, and the decline of many localities, and has marvelled at the disappearance of the products thereof. It only emphasizes the dictum, "get good specimens when you can, and as many as you can, for you know not when your opportunity may be exhausted."

Died, Joseph A. Mandarino, 78

Joseph Anthony Mandarino was born in Chicago on April 20, 1929, the son of Bruno and Rose (Salvo) Mandarino. Even as a young boy he had an interest in the rocks he found in the roadbeds beside railroad tracks on the outskirts of Chicago. In high school, he furthered his interest in science by serving as an usher at the Field Museum of Natural History in Chicago, where he was encouraged by both teachers and staff. At 18 he published his first article in *Rocks & Minerals* magazine. His interest in science led him to the Michigan College of Mining and Technology (Michigan Tech) in Houghton, where he graduated with a B.S. in General Science (emphasis on geology) in 1950. His summer employment during those years led to the publication of other articles.

He followed his undergraduate degree quickly with an M.S. in Geology in 1951, and took employment as a mineralogist with the Allis-Chalmers Manufacturing Company in Milwaukee, Wisconsin. But in 1950 the Korean War broke out; Joe enlisted as an officer

Joseph A. Mandarino (1929–2007)

in the United States Air Force in 1952, serving for part of his enlistment at Goose Bay, Labrador. After his discharge in 1954, he returned to academic life, spending time as a research assistant at Harvard before taking a position as Assistant Professor at Michigan Technological University in 1957, and earning his Ph.D. (mineralogy) from the University of Michigan at Ann Arbor in 1958. His PhD dissertation, "Some optical and stress-optical properties of synthetic ruby," carried on with the work that he had begun during his earlier Masters' studies.

Joe found far more than a PhD at the University of Michigan. That's where he met the love of his life. Joan Cady. They were married in Milton, Massachusetts in 1956, and had four children, James, Catherine, Joseph, and Cynthia—all born in Canada.

Joe remained at Michigan Tech until 1959, at which time he joined the Royal Ontario Museum in Toronto as Associate Curator of Mineralogy. There he found his niche, becoming a full Curator in 1965, then Head of the Department of Mineralogy and Geology. In 1980, he was cross-appointed as a Professor in the Department of Geology, and a full member of the Graduate Faculty of the University of Toronto. In the meantime, however, his administrative and teaching duties did not overshadow his work in research and publication. By 1989, he had published 60 papers, had worked on 13 new mineral species, and was still going strong.

It would have been easy for Joe to sit in Toronto and never venture outside the ivy-covered walls of the R.O.M., but that was not his way. He was outgoing, he had strong interests, and he had knowledge he wished to pass on to others. He served as President of the Mineralogical Association of Canada for three years (1973–1975); Chairman of the Commission on New Mineral Names of the International Mineralogical Association from 1983 to 1993; Senior Research Fellow of the National Research Council of Canada (1968–1969); member of the Joint Committee of Powder Diffraction Standards; Fellow of the Mineralogical Society of America; honorary director of the Canadian Gemmological Association, and President of the Walker Mineralogical Club.

Along the way, he picked up honors and awards, including the Elizabeth II Silver Jubilee Medal, and the L.G. Berry Medal of the Mineralogical Association of Canada. He was the first recipient of

the Sandor Koch Medal of the Hungarian Mineralogical Foundation, and in 2000 was inducted to the Academy of Geological and Mining Engineering and Sciences at his old alma mater, Michigan Tech. The new mineral species *mandarinoite* was named in his honor by Pete Dunn and others in 1978.

Probably the most important work he did was on the Gladstone-Dale Relationship, a mathematical model showing how the chemical composition, density, and refractive index of a mineral are related. The result of this calculation, which he called the "compatibility index," reflects the accuracy of the various parameters. This concept proved so useful that the International Mineralogical Association now requires that the compatibility index be calculated before any new mineral species can be approved. In this, and in other ways, he clearly had a strong influence over his professional colleagues, but one of his greatest strengths was the rapport and influence he had with the amateur community in mineralogy and gemology. He had always kept his early interest in mineral collecting (donating his personal collection to a high school in the Chicago area when he came to the ROM), and he carried that on into his association with the Walker Mineralogical Club and the Canadian Gemmological Association. He would even do mineral identification for collectors whenever he could spare the time.

Joe was a frequent speaker at mineral clubs, and humor was always a part of his presentations; once when he was giving a lecture at a mineral club meeting he pulled out a squirt gun and started shooting at one of the other professors in the audience, who also had a squirt gun and returned fire—it was quite funny at the time.

He co-authored the invaluable reference *Monteregian Treasures: The Minerals of Mont Saint-Hilaire, Québec* (1988), with photomicrography by Violet Anderson, and wrote *Introductory Gemology: A Two-year Correspondence Course* (Canadian Jewelers Institute, 1962, 1975). While working on *Monteregian Treasures*, he was the guiding light behind a small organization known as the Friends of Mont Saint-Hilaire (FOSH), and acted as publisher for the FOSH Newsletter. He also helped Michael Fleischer with the *Glossary of Mineral Species,* beginning with the sixth edition of 1991, and after Fleischer's death in 1998, brought out the eighth edition under his own name in 1999. He finished the ninth edition as co-author with Malcolm Back in 2004.

The Rochester Mineralogical Symposium (RMS) provides an excellent example of the support Joe gave to the study of mineralogy. In 2000, he established the Mandarino Prize—two cash awards given to the graduate and undergraduate students who presented the best papers during the Technical Session at the Symposium. He believed in what he was doing, and he put his money behind his belief.

For many years Joe also prepared abstracts of new mineral species for the *Mineralogical Record.* This led to his last work, which became one of the major projects of his life. Van Nostrand Reinhold was looking for a new author for the next edition of their *Encyclopedia of Minerals*; following Wendell Wilson's recommendation, they contacted Joe and invited him to take over the project. He agreed, and assembled a team of over 100 mineralogists to gather the data. After years of intensive labor they recently completed the project and, although it outgrew the size originally anticipated by Van Nostrand, it will soon be published independently in six to eight volumes—a fitting achievement to cap a life passionately lived in the service of the science of mineralogy.

Jay Mandarino

Died, William Moller, 87

William P. Moller (1920–2007)

William Peter "Bill" Moller was born May 18, 1920 to Aura (Brown) and William P. Moller Sr. in Santa Barbara, California. Bill, the eldest of three sons, came of age during the Great Depression, and embraced minerals at a very early age, thanks in part to his beloved Grandfather Brown. On long walks with his Grandfather there was no stone left unturned, no sky ignored, no tree passed by, no bird unnoticed. This absolute love of all things natural stayed with Bill his entire life, but it was the minerals that captivated him and held his interest. He attended Santa Barbara High School, class of 1938, and achieved the rank of Eagle Scout as a member of Troop 8. He earned his Bachelor of Science degree in Geology in 1942 from the University of California at Berkeley, and married Elizabeth Jane Lindsay, a member of the Cadet Nurse Corps, in 1946.

During the war Bill served in the U.S. Navy as skipper of a mine sweeper stationed in Cold Bay, Alaska. After his military service, Bill was an executive with the Boy Scouts of America for eight years. His day to day job for most of his life was as a production engineer with Champlin Petroleum. Wayne and I met Bill and Elizabeth in the 1960's when they lived in Long Beach. After Bill's retirement in 1986 he and Elizabeth moved back to his beloved Santa Barbara. However, Bill's retirement was anything but "retiring" He was always busy around the house, usually with Angus, his Scottish terrier, at his side and classical music playing in the garage. And now there was time to take off to parts unknown in search of the crystals he loved.

Bill was an avid field collector. Our collecting trips with him to the Grandview mine in the Grand Canyon and to the White Mountains were always special times together. Bill often collected far afield—traveling to Mexico for wulfenite at Los Lamentos and boleite at Santa Rosalia; to Spain for the famous pyrites; to Prince of Wales Island, Alaska for epidote; to the Yukon Territory for lazulite; to almost all the localities in California, Nevada, Arizona and Utah. And he was a GREAT field collector - some of the best pieces in his collection are self-collected—something that today's "silver pick" collectors should envy. Not only was he interested in the beauty of minerals but he also studied them in depth, and was the author or coauthor of several mineralogically related articles.

In Santa Barbara he worked as a volunteer Research Assistant with the mineral collection at UC Santa Barbara, under Dr. William

Wise. The staff of the Geology Department bestowed upon him the title of "Distinguished Fellow," which indicates the high esteem and respect he earned. Numerous collectors of today can point to Bill as their "mentor." Bill was always willing to share his knowledge and even his "secret collecting spots" for up and coming collectors. The mineral world has few of his kind left.

Bill's mineral collection is impressive, winning him and Elizabeth numerous awards over the years, including the prestigious McDole, Desautels and Lidstrom trophies at the Tucson Gem and Mineral Show and the H. Stanton Hill trophy at the Mineralogical Society of Southern California Show. Bill was an active member of the MSSC and served as Field Trip Chairman, Bulletin Editor and all around "go to" guy when something needed to be done.

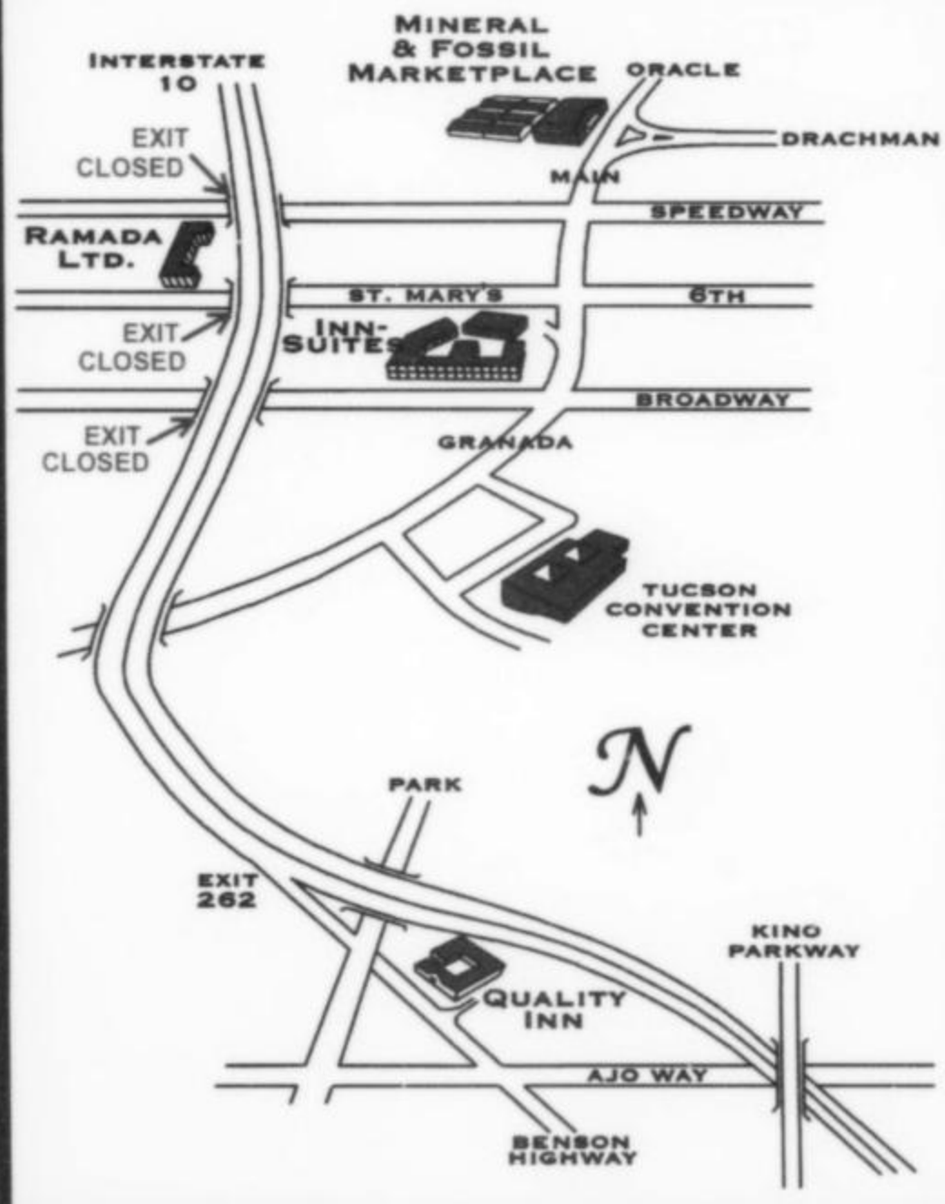
His family was his "everything" and what a wonderful family he has, including two children, David and Carol, five grandchildren and three great-grandchildren! Bill and Elizabeth had been married for an impressive 62 years! All of them with their respective spouses gathered with about 60 of his friends (some from his high school days) on a cool, sunny afternoon in one of Bill's favorite parks in Santa Barbara to remember a life well lived. The stories told gave us insight into a man who was loved, respected and trusted.

Bill died on November 10, 2007. He was once asked how he would like to be remembered. His answer: "that I had lived an honorable life." Yes indeed my friend. One of the finest examples of a man of honor, duty and commitment. Collect in peace . . . .

Dona Leicht

Erratum

The specimen pictured in Figure 8, page 483, of the November-December issue—"brucite crystal cl;usters on matrix, 16 cm, from Wood's Chrome mine, Texas, Lancaster County, Pennsylvania; originally from the collection of Jesse Cheyney (1837–1909)"—was incorrectly listed as a *Collector's Edge Minerals* specimen from the Philadelphia Academy of Natural Sciences collection. Rather it came from the Haverford College collection (also in Philadelphia), via John Betts to Terry Szenics, for whom is was being offered for sale by John Veevaert of *Trinity Minerals* (who did indeed have specimens from the Philadelphia Academy, though this was not one of them).



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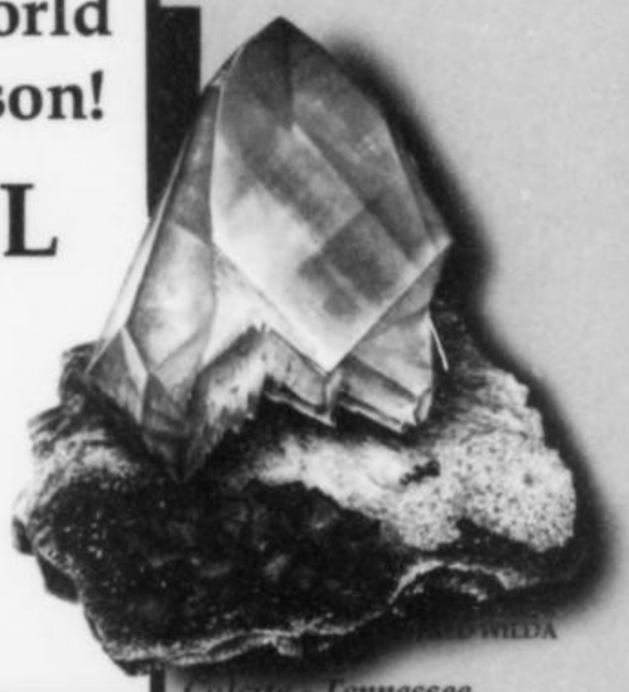

Calcite - Tennessee

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NEW!! AUGUST 15-17, 2008 Southeast Gem & Mineral Show - Holiday Inn Cartersville, GA
SEPT. 10-14, 2008 Colorado Mineral & Fossil Show - Holiday Inn Denver Central
SEPT. 12-14, 2008 Colorado Fossil Expo - Plaza Annex, Merchandise Mart, Denver, CO
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Blue Topaz on Smoky Quartz, 3 inches, from Alabashka, Ural Mountains, Russia. Ex-collection Clarence S. Bement.

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CALCITE ON MALACHITE, 5.4 CM. FROM THE MASHAMBA MINE,
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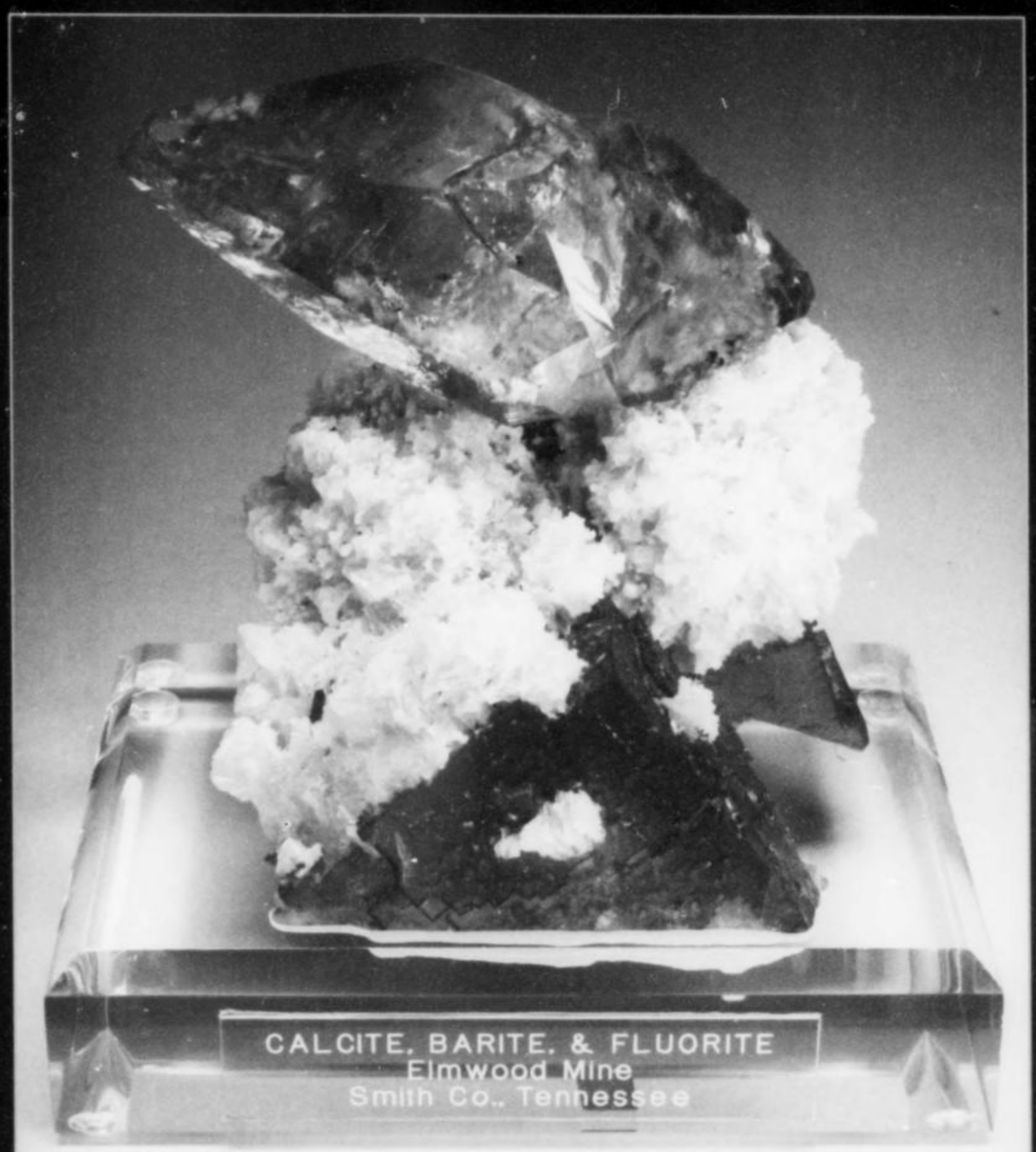

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The 100-year History of the Benitoite Gem Mine

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The Benitoite Gem mine (also known as the Benitoite mine, the Dallas Gem mine or simply the Gem mine) has been known for 100 years as the source of a crystallographically unique and aesthetic mineral and gem species, benitoite. The primary associated species, neptunite and joaquinite, are attractive and highly desirable as well. The deposit appears finally to be exhausted, though stockpiles of unprocessed vein material may yet yield additional specimens.

Introduction

Benitoite, a barium silicate with a unique triangular crystal habit, is distinctive in the mineral world for being the only known representative of the ditrigonal dipyramidal crystal class. It is popular for its lovely pale to dark cornflower-blue to sapphire-blue color (some crystals are actually colorless), and is accompanied by an interesting suite of associated minerals including lustrous black-red neptunite and honey-brown joaquinite. Naturally it is a special favorite among collectors.

For many years after its original discovery, benitoite was known only from a limited area in the New Idria district, San Benito County, California, which now includes the original discovery site (the Benitoite Gem mine) as well as the Victor claim,[1] Mina Numero Uno,[1] Santa Rita Peak property,[1] and the Junilla (Junnila) mine.[2] Crystals have recently been identified at four other locations in California: on Rush Creek[3] and Big Creek[4] in Fresno County, in the Lost Hills[5] area of Kern County, and Trumbull Peak[6] in Mariposa County. It has also been found in small crystals at Magnet Cove, Arkansas,[7] at Ohmi, in Niigata Prefecture, Japan[8] and at Broken Hill, New South Wales, Australia.[9] None of these subsequent occurrences have yielded specimens that can come close to matching the quality and beauty of the specimens from the original find.

In honor of the 100th anniversary of this extraordinary occurrence, we will review here the long and involved history of the mine as a producer of beautiful mineral specimens and gemstones. For this project we have been given access to a remarkable lode of historical information: the original mine logbook, check ledger, stock book and financial records of the Dallas Mining Company which originally worked the deposit from its discovery in 1907 until late 1910.[10]

1907

The story of the benitoite mine begins with **James Marshall Couch** (1857–1943),[11] born near Bear Creek, Henry County, Georgia, the son of Catherine and A. G. Couch, a physician.[12] His parents were killed in the Civil War, and he never received any schooling. As a young boy he worked his way westward doing chores on farms and other odd work until he arrived in Austin, Texas, where he found work with Rev. Benjamin Drake Austin (a nephew of Stephen Fuller Austin, the founder of Anglo-American Texas). He married the Reverend's oldest daughter Ada Belle, in 1885 and she taught him how to read and write.[13]

In 1898 he and his wife and six children settled on a homestead near Coalinga, California and raised melons. The farm eventually failed, and he went out prospecting, finding a cinnabar deposit which he worked for several months. In early February 1907 he went to the nearby oil fields in hopes of finding a job, and there he met oil company superintendent R. W. Dallas.[14]

Roderick William Dallas (1874–1950) was born in New Jersey, the son of Scottish immigrants.[15] He had attended Connecticut Agricultural College in Mansfield, studying to be a poultryman,[16] but within a few years he and his sister Margaret[17] had moved to California where he ended up working in the Coalinga oil field as a superintendent for the Independent Oil Production Agency.[18] He married **Lyda Evelyn Matthis** (1878–1959)[19] around 1906 or 1907, and Margaret Dallas married Fresno mine superintendent Max Shaffrath.[20]

Dallas and **Thomas Edwin Sanders** (a mining man born in California in 1875)[21] agreed to grubstake Couch $25 each, and they sent him into the Diablo Range to prospect near the already successful Idria mine. Couch hitched his big bay horse to a wagon and set out for Los Gatos Canyon, where he camped the night, then abandoned the wagon in order to follow a rough horse trail up into the mountains in the direction of the Idria mine. A little before sundown he arrived in a beautiful, pine-studded glade as level as a floor, near the headwaters of the San Benito River, at an elevation of over 4,000 feet; many of the trees were over a hundred feet tall. A stream glistened about 50 feet away, and there was plenty of tall grass for his horse, so he decided to make camp there.

The next morning he made a leisurely pot of coffee and decided to take a walk up the hill on the other side of the creek. To his amazement, he found the ground there littered with thousands of blue gems that had weathered out of the natrolite veins and accumulated in the surface. The sight was so spectacular that his first thought was "blue diamonds!" He gathered up a pocketful of the blue gems and raced down to Coalinga where he excitedly announced his find to Dallas—who promptly sent him back into the mountains to actually stake the claim before anyone else did.[22]

Once the claim had been properly staked and filed, the problem was to determine exactly what they had. Dallas asked his friend **Leland Barnes Hawkins, Sr.** (1838–1920's),[23] a mining engineer, to take some of the crystals to a lapidary in Los Angeles, but the so-called expert dismissed them as blue obsidian. Ed Sanders took five or six of the crystals himself and sent them to his younger brother, **Hal Sanders** (1877–1920's), a faceter and watchmaker in San Francisco.[24]

According to Louderback's preliminary report,[25] the deposit had been discovered by T. Edwin Sanders and L. B. Hawkins. That's what they had told him, anyway—he had no direct knowledge. Couch's story (recorded later by his son in a 1961 booklet, *The Benitoite Story*) was decidedly different. Louderback struggled with this problem in 1909 when he wrote:

> It has been found very difficult to determine just who is the discoverer of this interesting deposit. Different individuals have laid claim to this title, and a comparison of their various accounts shows that the ambition to be so called has led to misrepresentations of the facts. Mr. J. M. Couch, a prospector of Coalinga, grubstaked by Mr. Dallas, had in December found some deposits that seemed to need further examination, and Mr. Dallas induced Mr. L. B. Hawkins of Los Angeles to accompany Couch into the mountains for that purpose. While out to examine some copper prospects, they happened on the benitoite deposit, and each claims to be responsible for the discovery.

Here again, Louderback had no direct knowledge of what had happened, and could only speculate, trying to reasonably combine the conflicting stories he had been told. According to James Couch's son, however, the deposit was discovered by Couch alone, and not while he was inspecting the area with Hawkins. There are no copper deposits in the area. The story is believable because in Couch's excitement filling out the claim forms he entered his own name as the claim name, so the claims, totaling 40 acres, were named (and later patented) as the "James Couch No. 1" and the "James Couch No. 2." The location notice stated "Located by James Marshall Couch. March 1907" (actually it was February).[26] Other errors indicative of a lack of formal training show that a professional mining engineer such as Hawkins could not have been present at the discovery. This clearly discounts Hawkins' later claim that he was the discoverer or co-discoverer of the deposit.

Using Crouch's original paperwork, the claims were then filed officially by Dallas and Hawkins. Claim documents for the benitoite deposit indicate that the occurrence was discovered on February 22, 1907, and the claim was formally filed eight days later on March 2. The claims were filed as "lead" claims to maintain secrecy about the true nature of the occurrence and avoid a messy stampede to the area.[27] Actually the deposit must have been discovered somewhat earlier, inasmuch as Dallas and his partners had already incorporated the Dallas Mining Company on February 16. Couch had apparently told family members that February 7 was the real discovery date, which sounds about right.

As mentioned above, the first benitoite specimens to appear on the market were shown by Hawkins to a local expert in Los Angeles, to determine if they had some gem value, but were pronounced volcanic glass. The specimens shown around by Sanders were identified as spinel on the basis of their color.[28] In early 1907 a faceted sample was sent by a local cutter to **George Godfrey Eacret** (1874–1930's),[29] head of the diamond department of the jewelry firm of George C. Shreve & Company in San Francisco,[30] offered for $40 as a spinel. The memorandum bill indicated only that the stone had been found somewhere in California. Close examination told Eacret that it was not a spinel or, for that matter, sapphire. Whatever it was, it was new to California. The cutter, when questioned, would reveal only that it had been brought in for faceting by a stranger who wouldn't say where it had been found.

Eacret purchased the stone and took it to his friend, Dr. **George Davis Louderback** (1874–1957)[31] at the University of California at Berkeley. Louderback confirmed that it was not spinel or sapphire, and that it might actually be a species new to science. But he needed more study material, and asked Eacret to try to obtain some uncut crystals. Returning to the cutter, Eacret was able to apply enough pressure to extract the name of the stranger who had brought the stone in for faceting: a local watchmaker and jeweler named Hal Sanders. When Eacret paid a visit to Sanders, however, he was given a coldly suspicious reception, but came away with a few uncut crystal fragments which Sanders insisted on calling "sapphires." He would not, however, divulge any information about the location of the find.

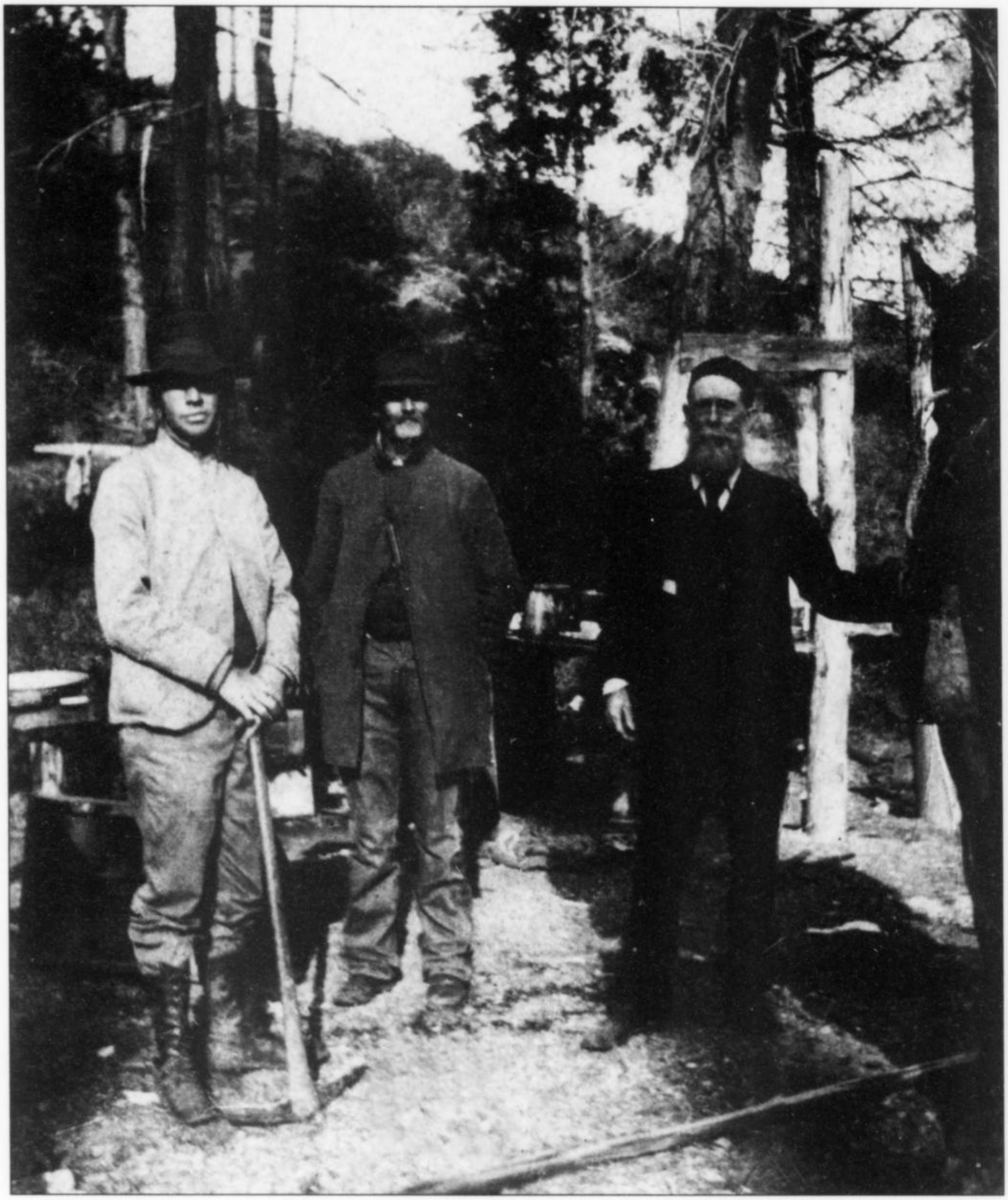


Figure 1. **At the Dallas mine in 1907. On the left is Roderick Dallas, supervisor of a petroleum company in the nearby Coalinga Oil Field, who grub-staked the discoverer of the benitoite occurrence and became the principal stockholder and leading figure in the history of the mine. At center is James Couch, a Coalinga farmer who actually discovered the deposit. On the right is 71-year-old Leland Hawkins, a mining engineer and friend of Roderick Dallas. (Photo courtesy of *Collector's Edge Minerals*.)**

The crystal fragments were quickly passed on to Louderback, who sent word two or three days later that the material did indeed represent a new species, and that an examination of the occurrence was now essential. With further prodding, Hal Sanders revealed that the stones had been sent to him by his brother, Thomas Edwin Sanders, who had an interest in the claim. He made arrangements for Eacret and Louderback to meet his brother in the small mining town of Coalinga on July 19, 1907. Arriving there by train, they were greeted by Leland Hawkins and James Couch, backed by an unfriendly, rough-looking, gun-toting group of their associates. Eacret explained their academic interest in the specimens and their desire to examine the property first-hand, but was told bluntly by Hawkins that "nobody is going to be taken to that mine now." The interview was ended.[32]

The visitors made ready to return to San Francisco but, after Hawkins had left, Sanders overruled him and took Eacret and Louderback to the mine by himself—much to Hawkins' annoyance the next day when he found out what had happened.[33]

Figure 2. **George Eacret, diamond expert for the San Francisco jewelry firm of George C. Shreve & Company, who first recognized the crystals of benitoite as something new to California. (California Historical Society.)**

Meanwhile Tiffany's in New York had heard of the discovery and sent a telegram (probably to Dallas[34]) asking for more information on the new gemstone. Eacret realized that George F. Kunz of Tiffany's was now on the trail of the discovery and would surely want to name the new species, so he advised against responding to the telegram in order to give Louderback time to complete his researches and name the new species himself, bestowing a "California name." Another telegram followed, while Eacret urged Louderback to speed up his investigation. Louderback was speedy indeed; he published a preliminary report[35] to establish precedence on July 30, 1907 (just 11 days after his visit to the mine!), officially bestowing the name "benitoite." He also proposed naming the associated black prismatic mineral "carlosite," but corrected himself the following year,[36] realizing it to be the species neptunite, which had been described from the Narssârssuk pegmatite in Greenland by Gustav Flink.[37]

Eacret and the Shreve company were granted exclusive rights to handle the gemstone output of the mine in December 1907.[38] The performance of the Shreve company must have been unsatisfactory, however, because the agreement was terminated on September 15, 1908.[39]

The **Dallas Mining Company** was promptly incorporated in February 1907 to work the deposit.[40] Leland B. Hawkins was elected President, Roderick W. Dallas Vice President, Lyda E. Dallas (Roderick's wife) Secretary and Treasurer; James M. Couch and attorney S. R. Bowen (who shortly thereafter resigned) were Directors, and all except Bowen were allotted 51% of the capital stock divided equally four ways. Thomas Sanders was then added to the Board of Directors to replace Bowen and was allotted Lyda Dallas's quarter-share of the stock. Sanders then sold his share[41] to **Curtis D. Martin**[42] (1835–1920's) of Los Angeles, who replaced him on the Board. Company attorney **Henry H. Welsh** (1857–1920's)[43] was then issued stock in payment for legal services, and J. M. Couch was voted a salary of $3/day for his services at the mine. Over the next three years additional stock was sold to a variety of investors, most of whom were associated in some way with the mine.[44]

The official mine logbook for 1907–1910 has survived and provides an interesting glimpse into the early mining operations. Much of the following information, up to 1920, comes from that diary, handwritten by a succession of managers, which has been passed down from the Dallas family through the succession of lessees and owners to the present day.

The mine logbook begins July 19, 1907, just a few days before Louderback's first brief notice naming the new mineral "benitoite" was published on July 30. A mining expert from the Shreves Jewelry Company (Eacret) and a "university geologist" (Louderback) had come to see the mine. The "expert" gave his approval for the mining operation and "was satisfied it would run into ruby"—an odd statement, perhaps meaning sapphire, which the as-yet unnamed benitoite crystals resembled.

On July 23 Sanders sold all of his interest in the mine to C. D. Martin for $2,500.[45]

On July 25–26 they began digging the open cut on the hill. They were already concerned about the difficulty of getting benitoite gem crystals out of the hard, white natrolite without breaking them, and so they packed up a representative chunk of benitoite-rich vein material to ship to L. B. Hawkins' son, **Leland Barnes Hawkins, Jr.** (1879–1951)[46] in Los Angeles. He was then to pass it on to their Los Angeles gemstone outlet, jeweler and gemstone expert Mrs. **Gertrude Sarah Reynolds McMullen** (1872–1950),[47] owner, with her husband Robert McMullen, of the Southwest Turquoise Company. Mrs. McMullen was to experiment on the piece, and

Figure 3. **Prof. George Louderback from the University of California at Berkeley; he identified the blue crystals as a previously unknown mineral and described it as a new species, naming it benitoite in July 1907.**

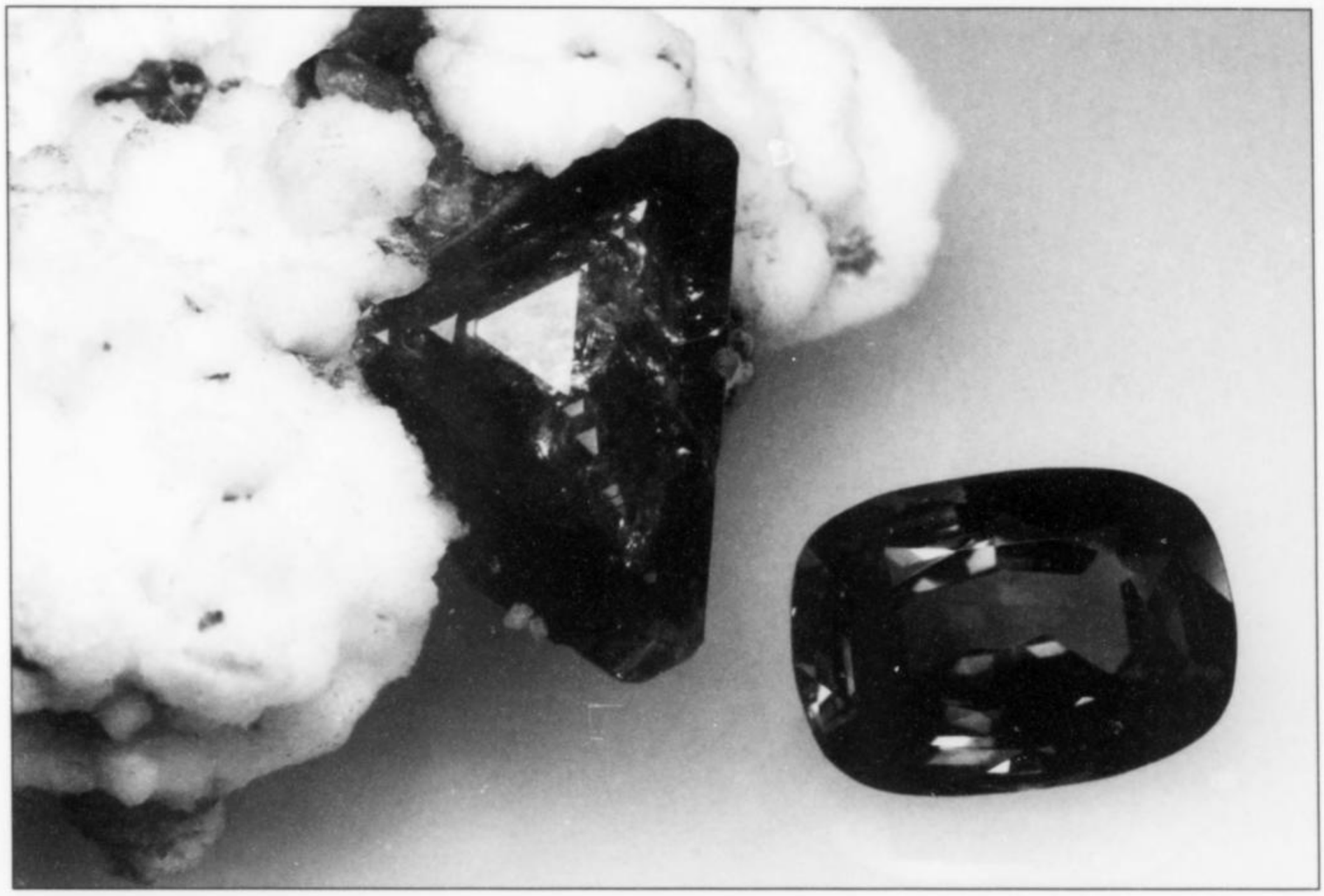


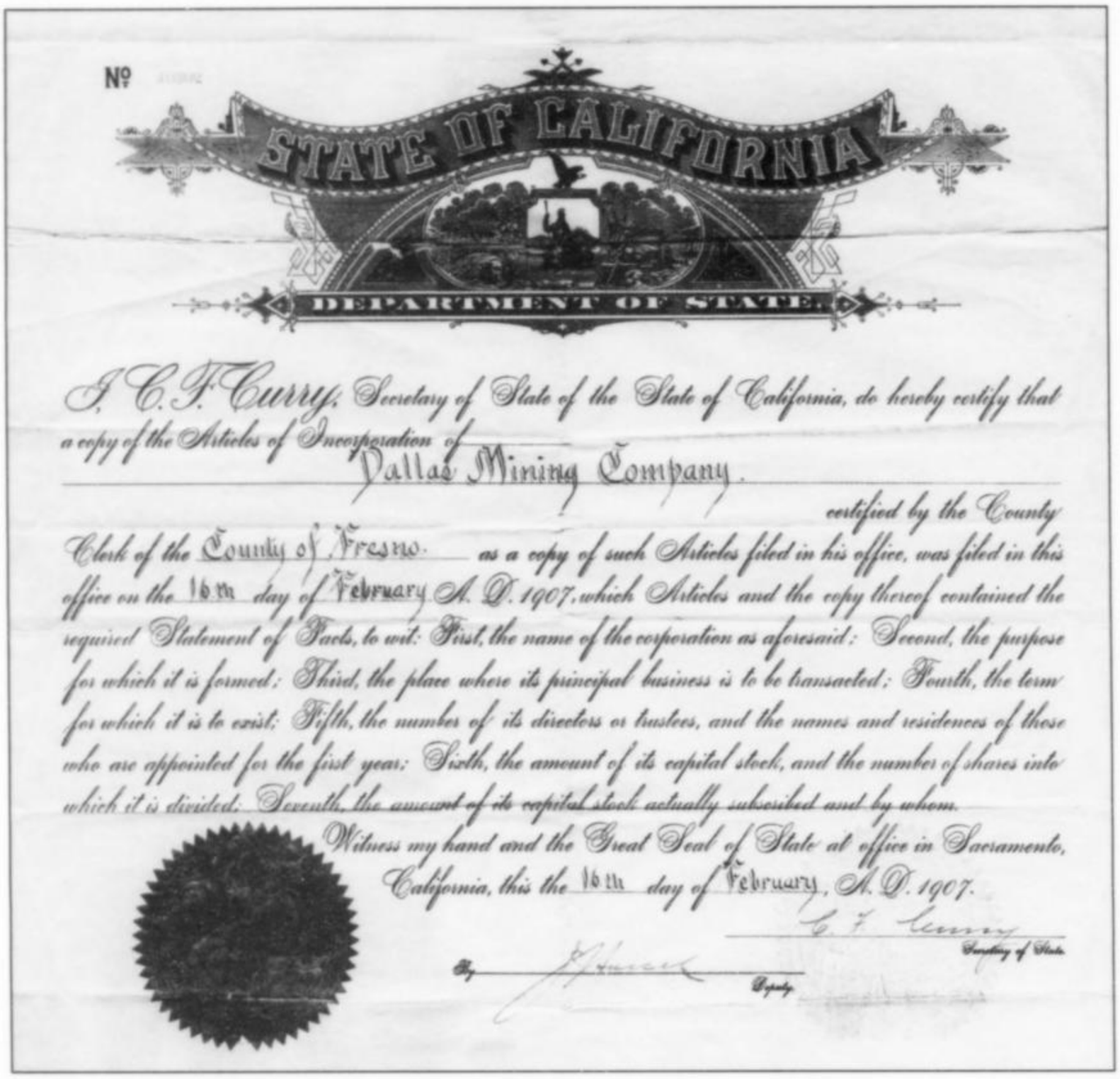
Figure 4. **Benitoite crystal, 1.8 cm, with white natrolite; the crysta! has not been covered by the natrolite and is therefore lustrous on all faces. The 13-mm sapphire-blue cut stone shows why the mineral was at first thought to be sapphire. Smithsonian Institution collection, originally from the Carl Bosch collection.**

Figure 5. **Storefront of George C. Shreve & Company, located on Montgomery Street in San Francisco, "under the Occidental Hotel," in 1907. This store, where George Eacret was employed, sold many of the first faceted benitoites.**

is sometimes credited with discovering the acid removal method for gently cleaning natrolite from benitoite). Twenty-three stones that had been faceted (for $30, according to the company check ledger) by the Moser Brothers were also sent to McMullen to sell for the company.

On August 12 "[William] Prater and two men commenced to chop trees for [building a] cabin, agreed to put up the log part and rafters minus doors, windows and shakes for $35. Building to be $14 \times 20 \times 9$ inside." The next day they began digging the adit into the hillside to intersect the natrolite veins.

A miner from Los Angeles, **Arthur Leslie Klock** (1862–1936),[48] joined the staff on August 31, along with stockholder C. D. Martin. Prater finished the basic structure of the log cabin on September 3, and everyone joined in "dobbing" the cabin with mud to fill the cracks between logs. Klock built a table and bunk beds for the cabin, and on September 12 he installed a new stove and hung the



No

STATE OF CALIFORNIA

DEPARTMENT OF STATE.

I, C. F. Curry, Secretary of State of the State of California, do hereby certify that a copy of the Articles of Incorporation of

Dallas Mining Company.

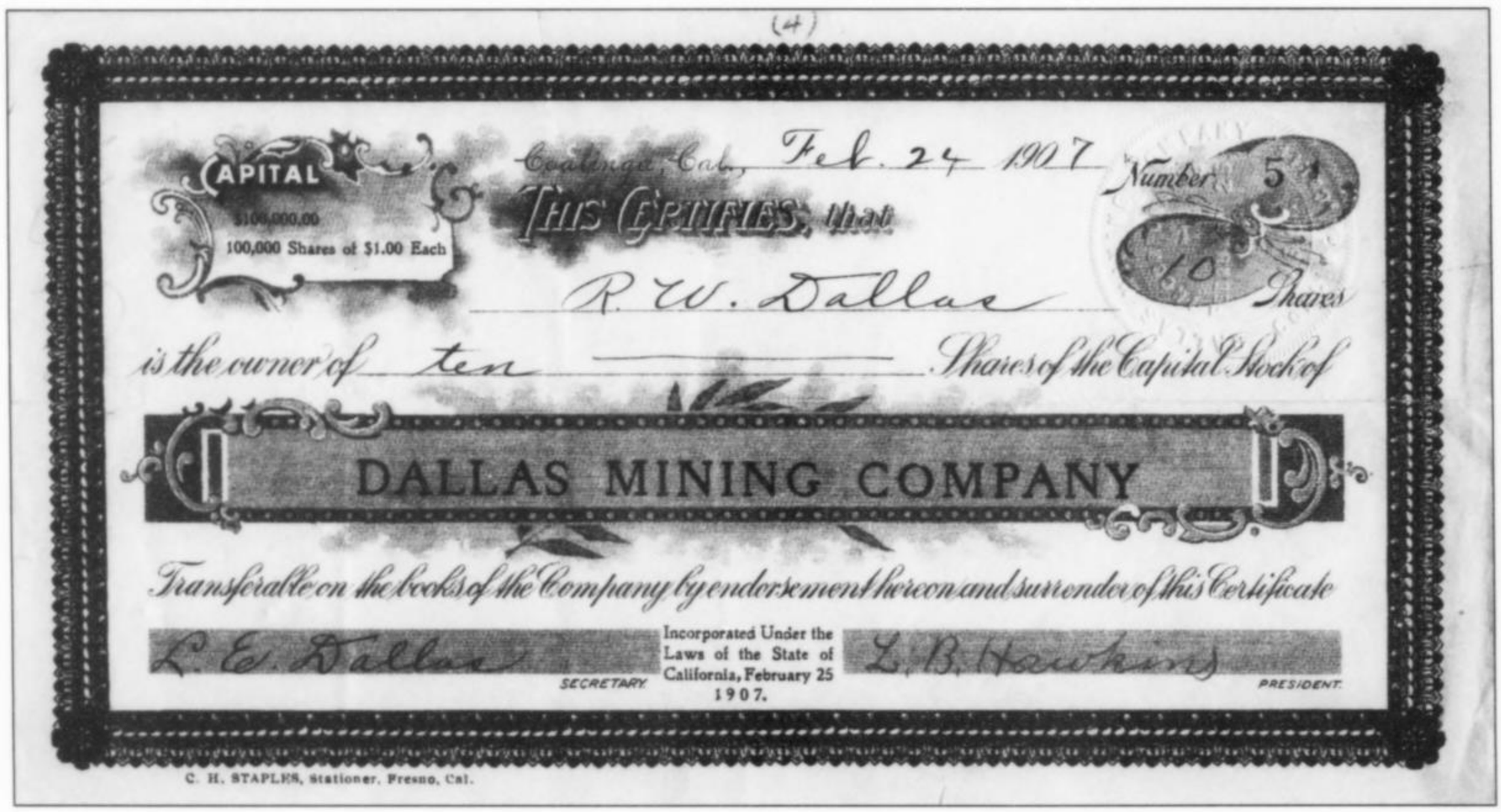
certified by the County Clerk of the County of Fresno as a copy of such Articles filed in his office, was filed in this office on the 16th day of February A. D. 1907, which Articles and the copy thereof contained the required Statement of Facts, to wit: First, the name of the corporation as aforesaid: Second, the purpose for which it is formed: Third, the place where its principal business is to be transacted: Fourth, the term for which it is to exist: Fifth, the number of its directors or trustees, and the names and residences of those who are appointed for the first year: Sixth, the amount of its capital stock, and the number of shares into which it is divided: Seventh, the amount of its capital stock actually subscribed and by whom.

Witness my hand and the Great Seal of State at office in Sacramento, California, this the 16th day of February, A. D. 1907.

C. F. Curry
Secretary of State

By _____ Deputy

Figure 6. Certificate of Incorporation for the Dallas Mining Company, dated February 16, 1907. (Courtesy *Collector's Edge Minerals*.)



(4)

CAPITAL
$100,000.00
100,000 Shares of $1.00 Each

Coalinga, Cal., Feb. 24 1907

THIS CERTIFIES, that

Number 51

R. W. Dallas

10 Shares

is the owner of ten Shares of the Capital Stock of

DALLAS MINING COMPANY

Transferable on the books of the Company by endorsement hereon and surrender of this Certificate

L. E. Dallas
SECRETARY

Incorporated Under the Laws of the State of California, February 25 1907.

L. B. Hawkins
PRESIDENT

C. H. STAPLES, Stationer, Fresno, Cal.

Figure 7. Stock certificate for ten shares in the Dallas Mining Company, issued to Roderick Dallas on February 24, 1907. (Courtesy *Collector's Edge Minerals*.)

door. (The cabin was soundly built and stood until 1945 when it was destroyed by a forest fire.[49])

Mining continued, as did experimentation "with process to remove gems from matrix by heating. Not very successful."

On September 2 the mine was visited by **Ralph Arnold** (1875–1961), a 1902 Stanford PhD graduate and a geologist for the U.S. Geological Survey[50] who was studying the fossils of the Coalinga region. Dallas, always more hospitable than his superintendent, had supplied Arnold with a note addressed to Hawkins instructing that Arnold be allowed to examine the mine, collect specimens and take photographs, which he did.

On October 11, 1907 "Mr. Dallas arrived at camp bringing

Figure 8. **The 14 × 20-foot log cabin at the Dallas mine, built in August-September 1907 by William Prater for $35. Seated on the left, and pointing a pistol at the camera, is miner Arthur Klock, who joined the staff in August 1907. Seated next to him, studying a map, is the original discoverer of the benitoite deposit, James Couch. The two young men are Klock's 19-year-old son Ralph (pointing a rifle at the camera) and miner Frank Smith. (Courtesy *Collector's Edge Minerals*.)**

with him Prof. Louderback of the State University and Mr. Eacret representing Shreves & Company of San Francisco, who desired to inspect the gem property and obtain specimens of the different ores and formations. Also to determine if possible the best means of extracting the gems from the matrix."

October 12: Arthur Klock was joined on the staff by his 19-year old son, **Ralph Lewis Klock**.[51] "The day was spent in inspecting the gem property and experimenting on the gem bearing rock with acids and heat. Prof. Louderback secured many specimens and he and Mr. Eacret took photographs of the mine."

That same day a mineral specimen dealer arrived on the property, **Robert Max Wilke**[52] (1862–1946) from Palo Alto, California. "Mr. Wilke came to make arrangements whereby he could secure specimens of the gem-bearing rock to sell. A proposition was made him by Mr. Dallas and accepted, whereby he is to take specimens not bearing salable gems to sell, giving this company 50 percent of the receipts."

Wilke became the main route by which good specimens were saved and sold to collectors instead of being chopped up to yield gem rough. The following day Wilke left with 50 pounds of specimens, while Louderback and Eacret spent more time in further experimentation and in visiting the mine. Louderback secured more specimens and Eacret took a picture of the cabin. Unfortunately, "no certain method of extracting the gems was decided upon, as it was impossible to experiment extensively with the apparatus at hand, so it was proposed that Prof. Louderback and Mr. Eacret take samples of rock home with them and continue their experiments where better facilities are available." Klock and Martin were to begin stockpiling matrix chunks in preparation "for extracting the gems when some method is decided upon."

On October 17, perhaps following a suggestion by Louderback and/or Mrs. McMullen, they "succeeded in getting several good gems from matrix by the use of acids and various tools." There is, unfortunately, no further mention of the use of acid in the company logbook. Today we think of acid as being the only method that should be used; however, it works only very slowly, removing around half a millimeter of natrolite coating per hour. To process a significant volume of benitoite/natrolite vein material would take hundreds of gallons of expensive hydrochloric acid, which would have to be hauled laboriously up into the mountains on pack animals. And so, despite the knowledge of acid-etching, it appears that they continued to chisel out the gem crystals instead. (The check ledger of the company shows no expenditures for muriatic acid.) Especially on rainy days, the logbook often recorded that all of the employees worked in the cabin "dislodging gems." The "cutting table" with its mechanical punch-press continued in use, destroying an estimated 99% of the crystals in order to salvage the occasional gemmy fragment.

On November 5 Couch headed down the mountain to Coalinga carrying a can of benitoite gem rough estimated at about 1,000 carats (less than half a pound).[53] Couch also collected samples of "black ones" (neptunite) for Wilke.

On December 9, to replace Hawkins who had quit the month before, Arthur Klock was promoted to the position of mine superintendent.

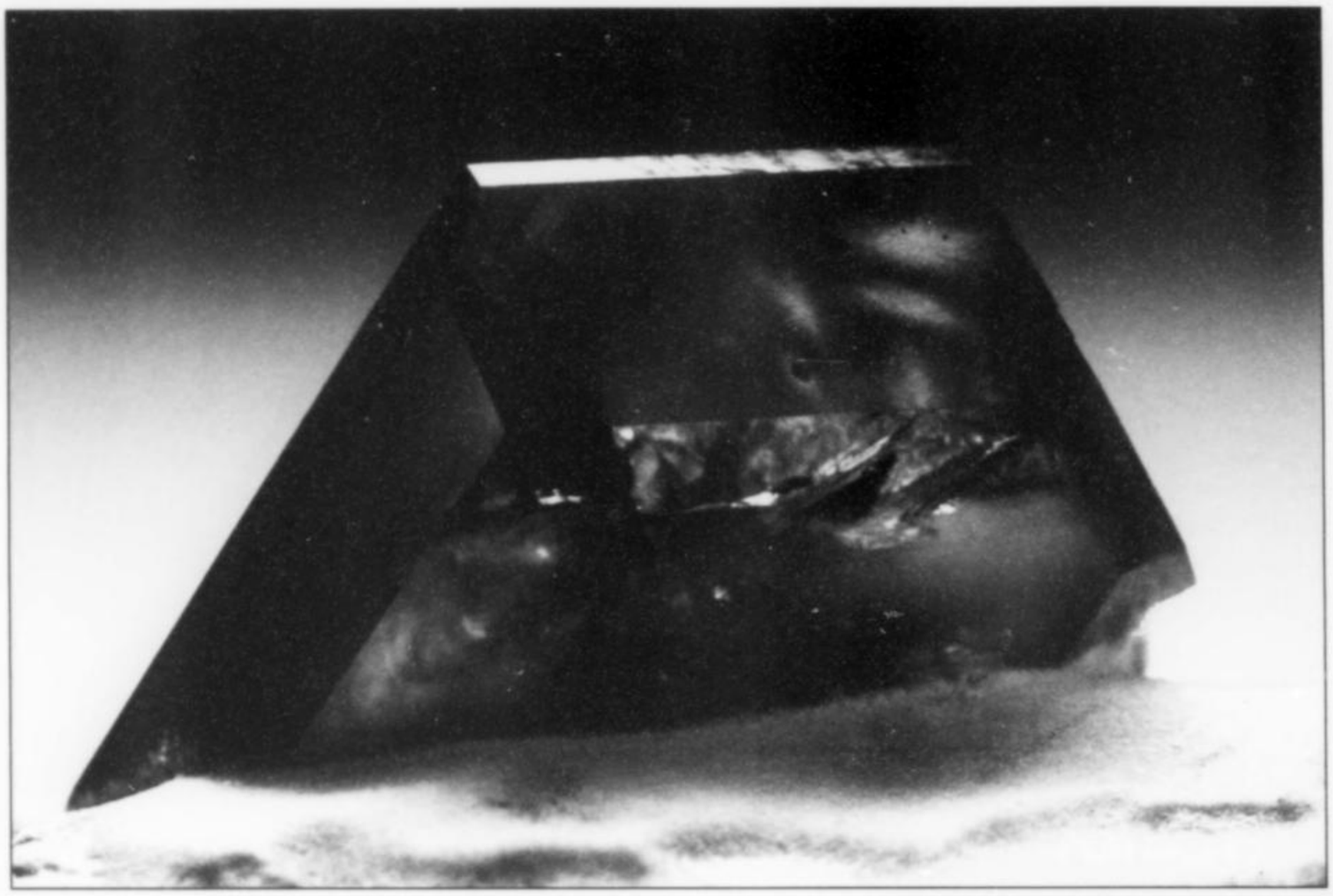


Figure 9. **Gemmy tabular benitoite crystal, 2.5 cm, of the type that were usually broken from matrix and sold as gem rough. Norm and Roz Pellman collection; Wendell Wilson photo.**

Figure 10. **"Triply terminated" benitoite crystal, 1.7 cm, on natrolite. Ralph Clark collection; Wendell Wilson photo.**

1908

Work at the mine continued year-round, and winters on the mountain wrought a severe hardship on all who worked there. The weather tended to be changeable and violent, with freezing rain, heavy snowstorms and blizzards, and temperatures plunging below zero. The logbook notes that on February 1, 1908, "Mr. Couch came in about 1 o'clock pretty near dead, an experience of walking that nobody cares to repeat after once trying it through 4 ft. of snow. He feels much better this eve."

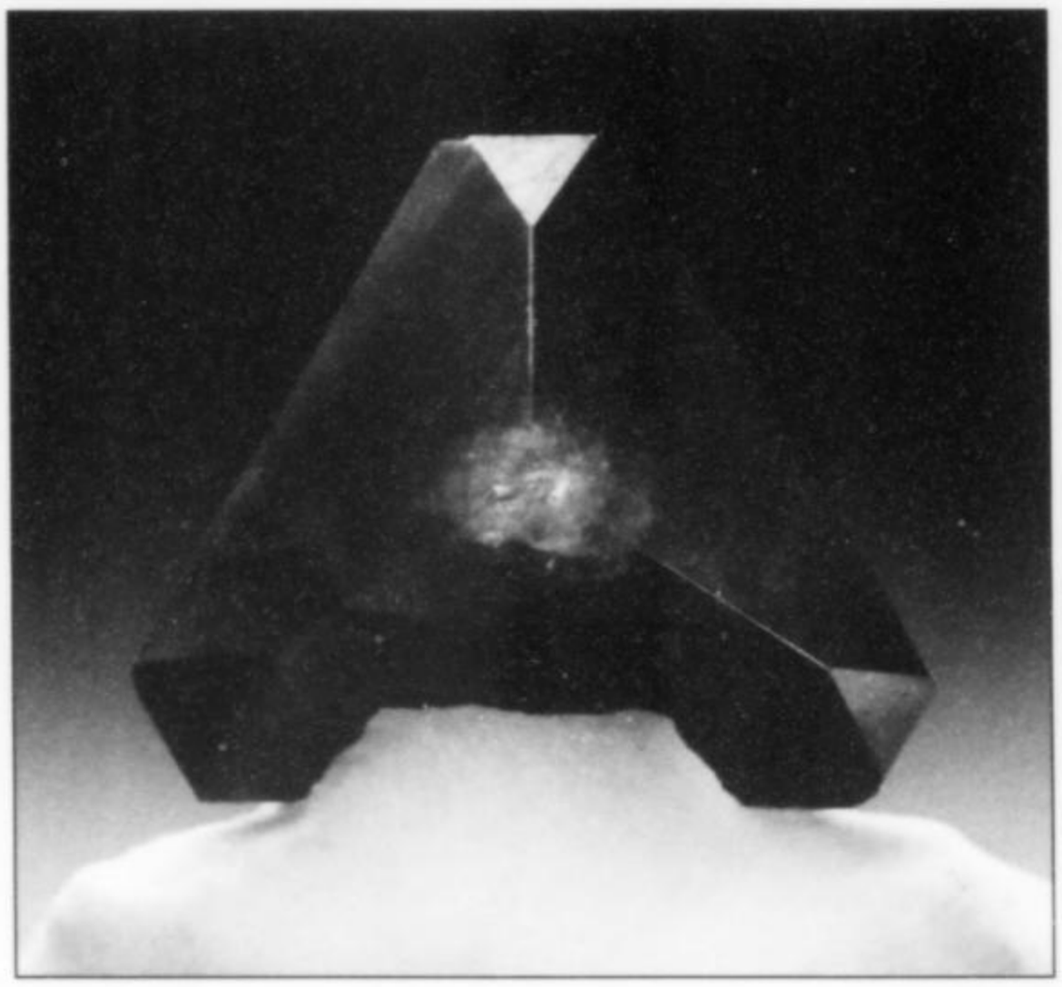
On March 18 **Thomas Hayes** (1852–1925)[54] arrived to take charge of the supervision of the mine from Arthur Klock, who remained as a miner.

On April 1 the logbook states: "Weather clear and cold. Thick ice this morning. Tunneled in the bank this morning and caved down many tons of rock and earth, the best blast of the season. Couch still absent. Boys fear provisions will soon give out." Provisions did at last arrive some days later, just in time.

The miners had a passing interest in the neptunite as well, even though it was worthless from a gem standpoint. On May 8 Hayes wrote: "Mr. Couch and myself went over to the north end of the claims this forenoon, saw the black crystals there."

On June 6 Thomas Hayes (writing the logbook entries) notes that he took cabinet samples and gems down to Coalinga and attended a meeting of the company. Roderick W. Dallas, Henry H. Welsh, C. D. Martin, James M. Couch and Mrs. Lyda Dallas (serving as corporation Secretary) were present. Hayes "was appointed with Mr. Dallas to go to the city of San Francisco and other places to ascertain the best method of extracting the gems from the matrix." They visited Shreve & Company, spending all forenoon in their factory getting what information they could in regard to possible extraction methods for the stones, then went to Berkeley and spent the afternoon with Prof. Louderback. The next day they visited Robert Wilke, their specimen distributor, who was presumably using the acid cleaning method by that time in order to prepare his specimens for sale to collectors.

On June 25 Wilke arrived at the mine for a second visit and gathered specimens for shipment back to Palo Alto. The miners collected specimens for him as well, sending three boxes to him in July.



Louderback arrived at the mine for his third visit on August 12. He took many photographs of the mine and gathered various chunks of "gem rock," spending four days collecting specimens to take back with him to Berkeley.

Three boxes of specimens (one weighing 65 pounds) were shipped to Robert Wilke in September, and in November Wilke made another personal visit to the mine for several days to collect three crates of specimens himself.

In April 1909 more boxes were shipped to Wilke. By the following month the adit had reached a distance of about 65 feet and it was decided to begin a crosscut from that point. By July the miners were encountering "nice specimens of gem rock in the crosscut about 20 feet in."

Dallas decided that a little advertising wouldn't hurt the sale of stock in the company. So he had Hayes build a display cabinet, put a large benitoite matrix specimen in it and placed it in the lobby of the Pleasant Valley Hotel in Coalinga on July 7.

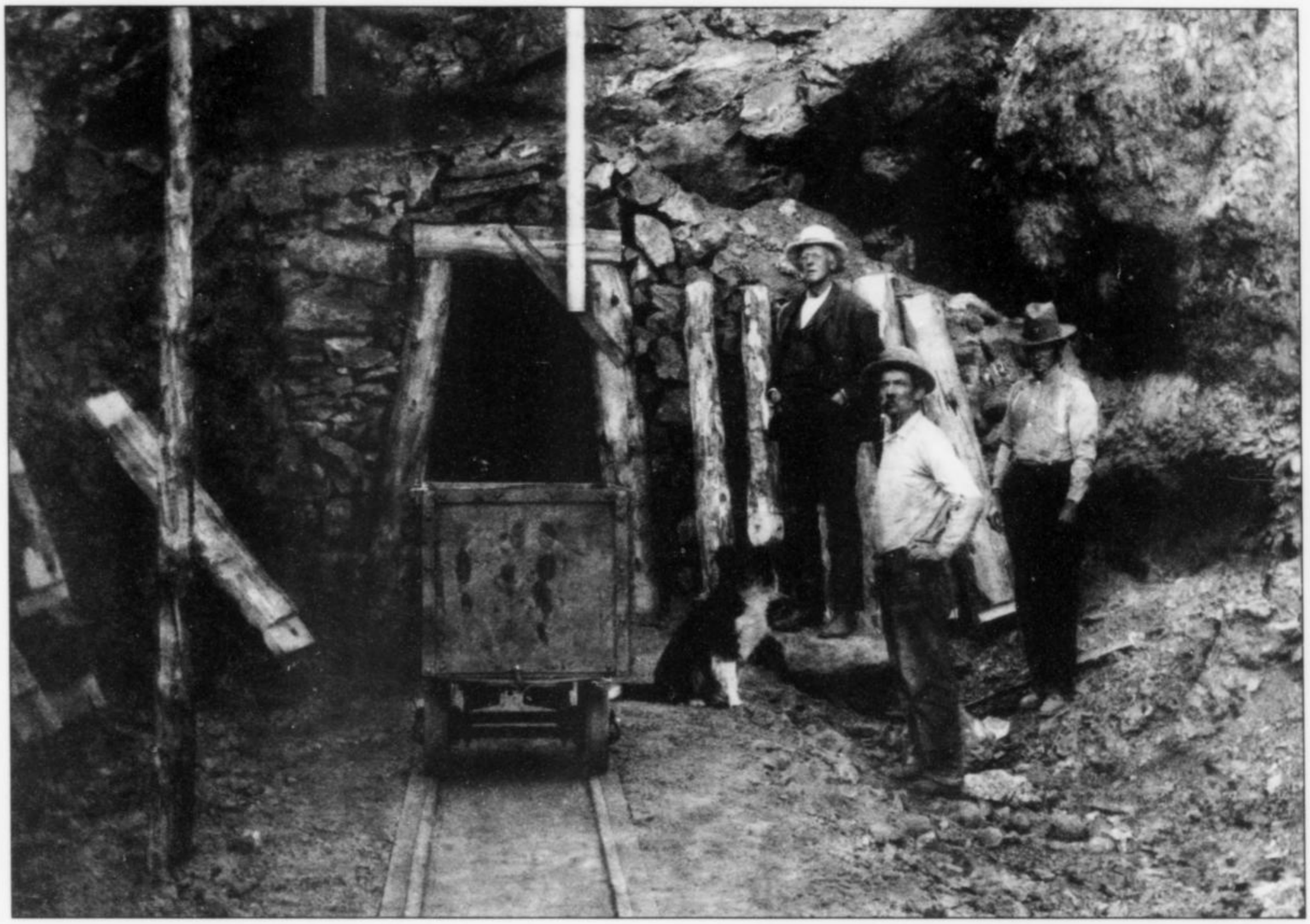


Figure 11. **The adit entrance to the Dallas mine in 1908. At left is Thomas Hayes, mine supervisor, with miners Arthur Klock (center) and Emerson Humphries. By the ore car is the camp dog, Fritz. (Courtesy *Collector's Edge Minerals*.) This adit extended at least 50 meters into the hillside (Gray, 2008).**

Figure 12. **Headframe for one of the two 16-meter inclined shafts at the Dallas mine. (Courtesy *Collector's Edge Minerals*.)**

Mining operations in the crosscut took a bad turn on July 17, when Hayes noted that the rock showed "signs of a formation that has been misplaced." The crosscut entered an area of loose rock and boulders that was very difficult to stabilize; heavy timbering was required and the rate of advance slowed to a crawl. The situation persisted for months, and one wonders why they didn't redirect their efforts, but perhaps the bad ground was also yielding gem-containing rock.

On August 9 **Douglas Bovard Sterrett** (1882–1969)[55] of the U.S. Geological Survey arrived to examine the mine. Sterrett, a geologist and mining engineer, had a special interest in California gem deposits. He wrote an article on tourmaline from San Diego County, California for the *American Journal of Science* in 1904, and had recently published the gemstone section of the report on the *Mineral Resources of the United States* for 1906. In 1911 he published a chapter on benitoite in the *U.S. Bureau of Mines and Minerals Yearbook* for 1907.

By the end of October the Dallas Camp (as it was called) had grown to include not just the original log cabin but also a barn for the horses, a company office, a powderhouse, a blacksmith shop complete with forge, a woodshed, an outhouse and a corral.

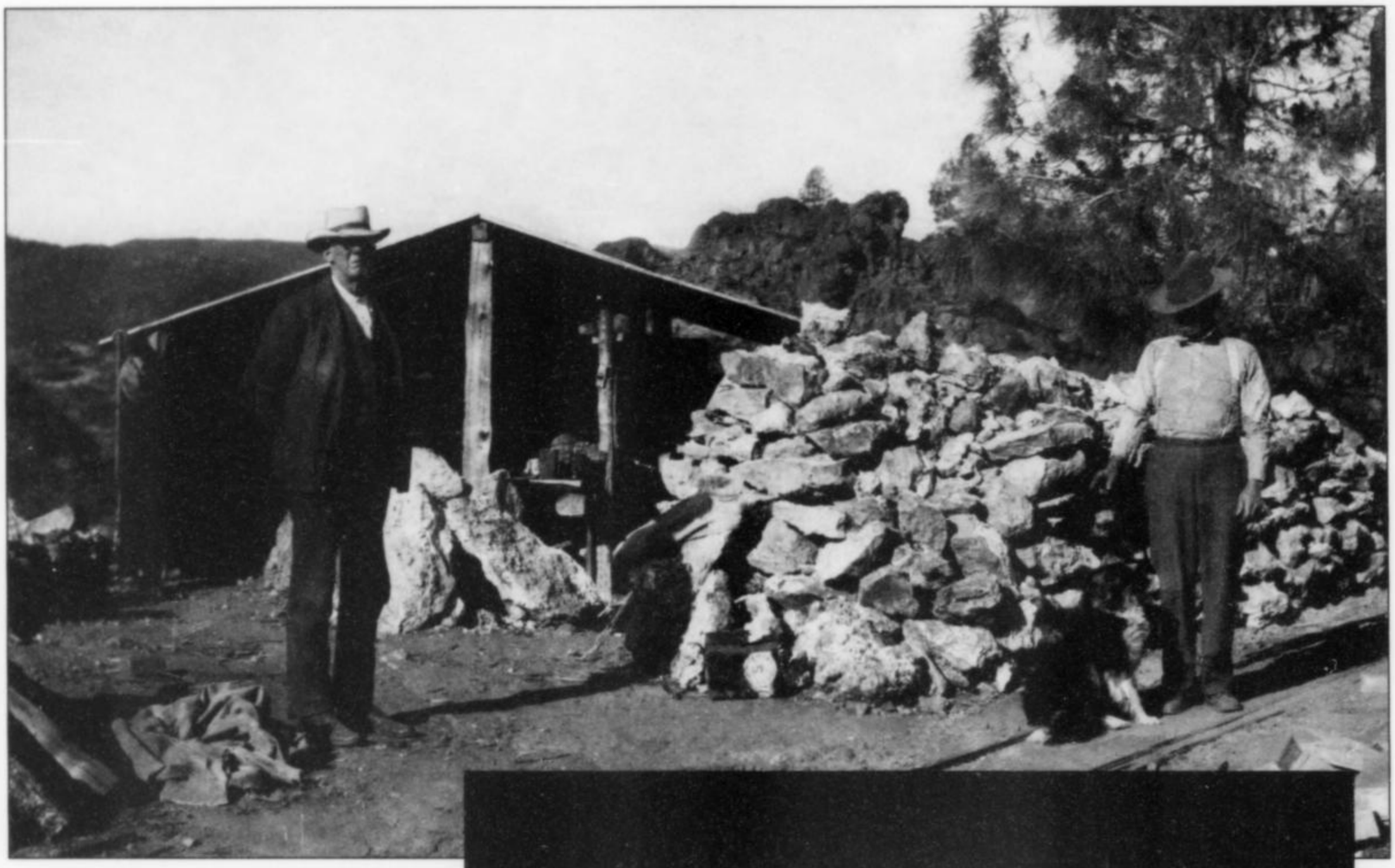


Figure 13. **Dallas mine superintendent Thomas Hayes (left) and miner Emerson Humphries (and camp dog Fritz) in 1908, standing in front of a large stockpile of benitoite-containing natrolite vein material awaiting "processing," that is, manually breaking out the gemmy crystals to sell as gem rough. Only the non-gemmy crystals were saved for sale as specimens via mineral dealer Robert M. Wilke. (Courtesy *Collector's Edge Minerals*.)**

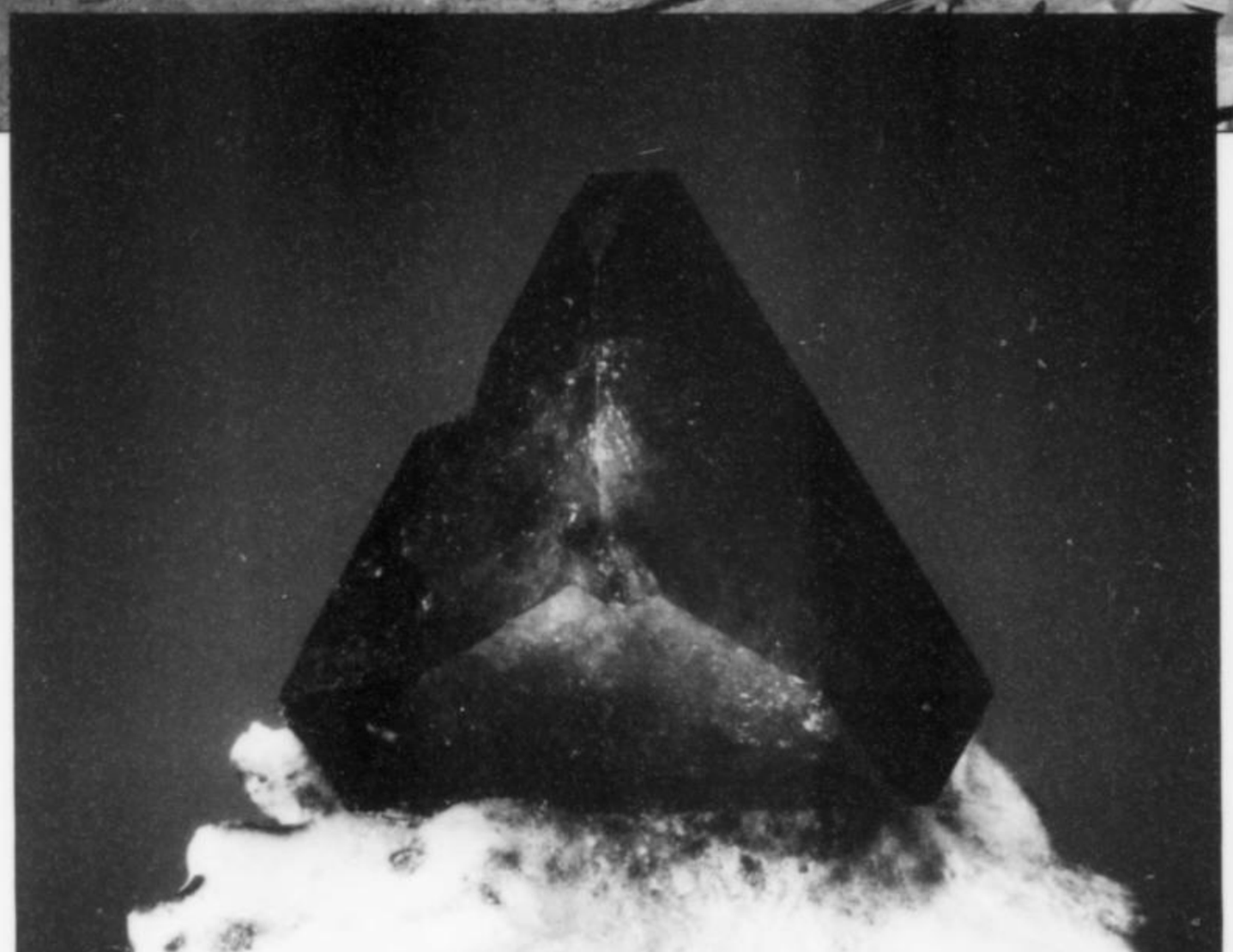


Figure 14. **Superb "triply terminated" benitoite crystal, 2 cm, on white natrolite. Andy Seibel specimen; Jeff Scovil photo.**

Figure 15. **Dallas mine superintendent Thomas Hayes standing beside the stockpile of benitoite-containing natrolite vein material to be processed for gems.**

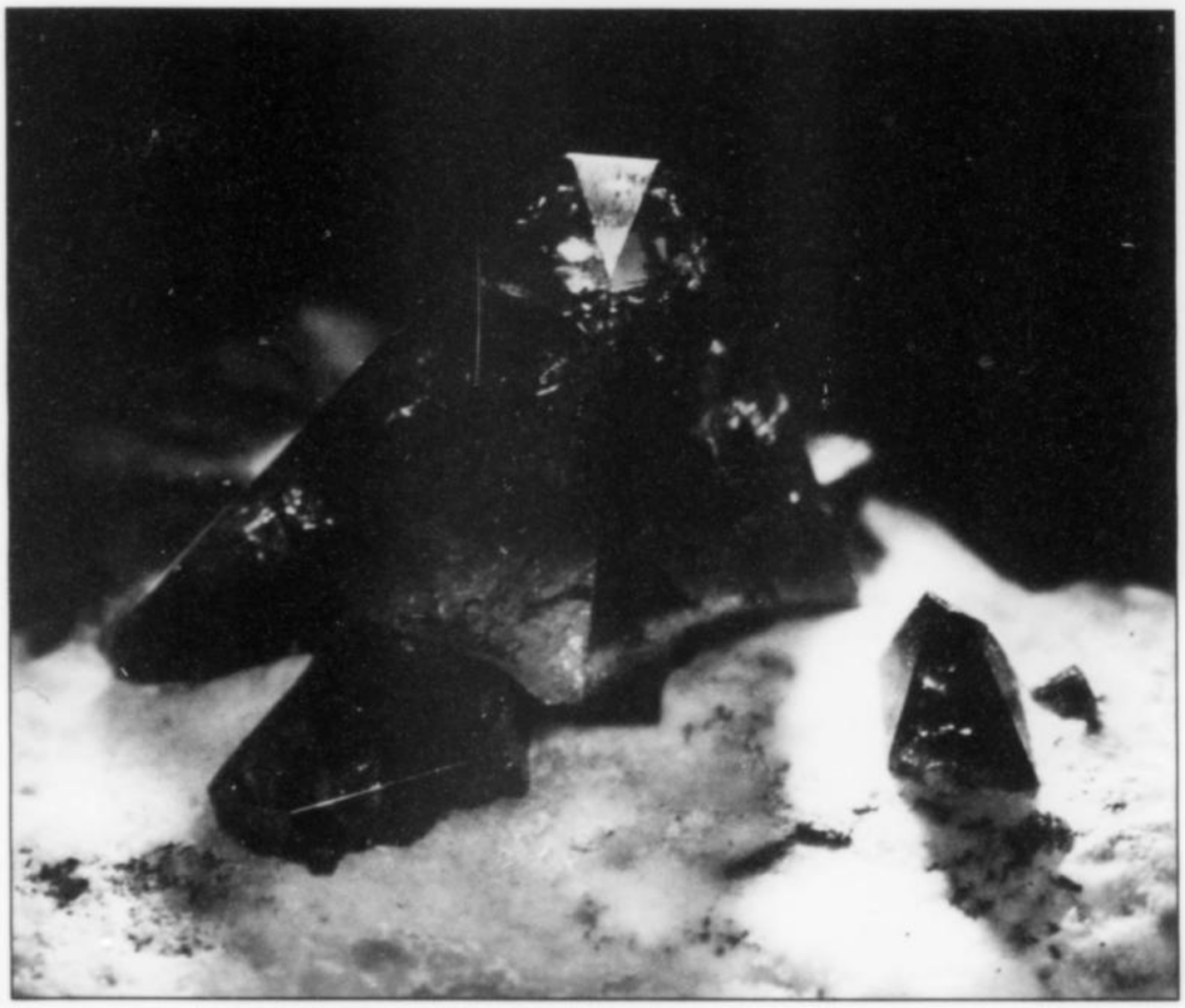


Figure 16. **Benitoite crystal, 1.8 cm, on natrolite matrix with small brown joaquinite crystals. Keith Proctor collection; Wendell Wilson photo.**

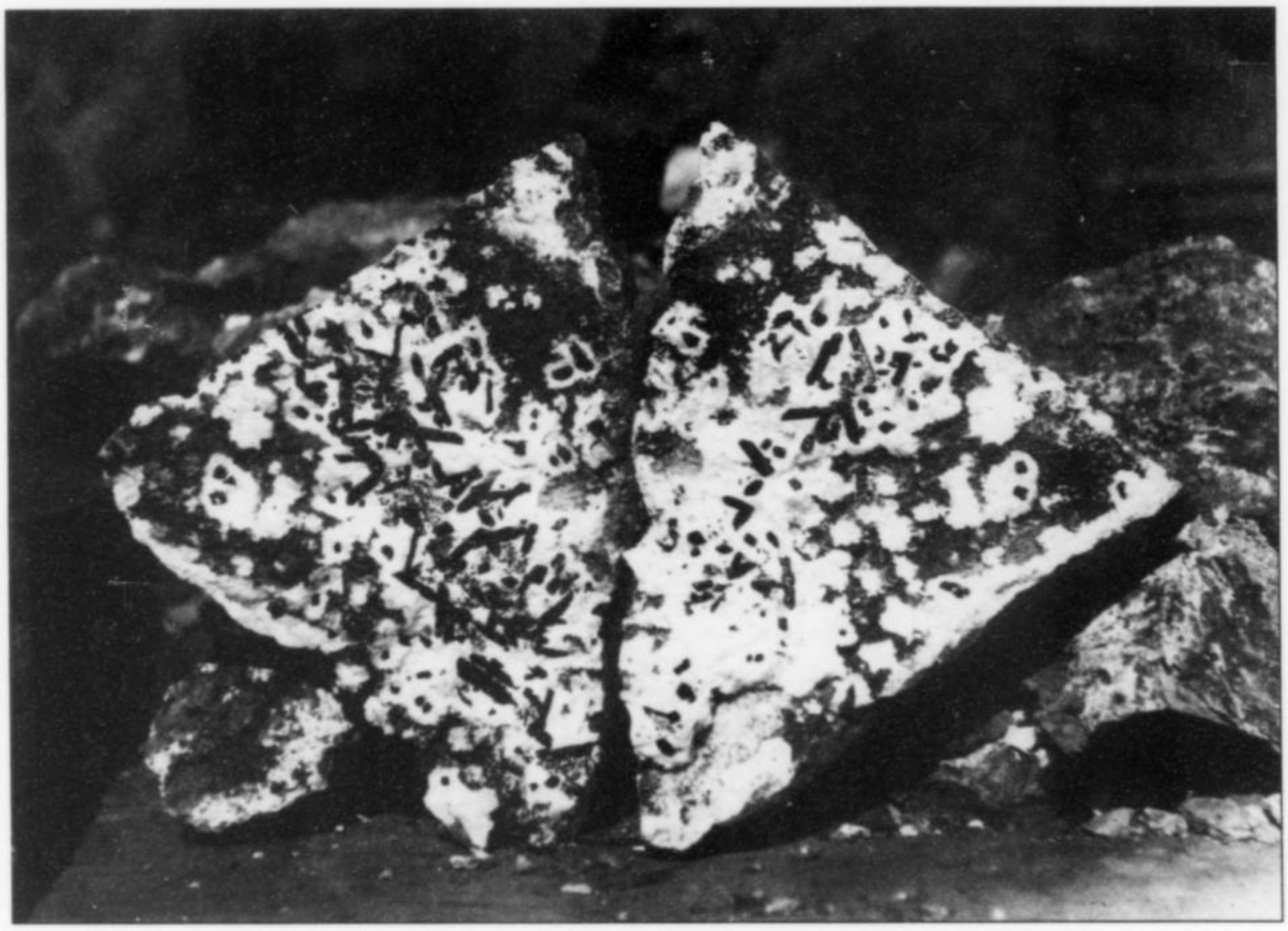


Figure 17. **A large section of vein, probably 40–50 cm across, broken open to reveal prismatic black neptunite crystals coated by natrolite. This specimen, photographed at the mine in 1908, probably came from the north end of the deposit where neptunite was most abundant in the veins. (Courtesy *Collector's Edge Minerals*.)**

1909

The problem with owning stock in a mining company is that stockholders can be billed "assessments" in order to raise operating capital. If they can't or won't pay the assessment, their stock is confiscated. When an assessment for ten cents per share went out in July 1909, Couch was unable to pay the $1275, and many of the other stockholders except Dallas defaulted as well, turning their shares back to the company.[56] Couch accosted Dallas in Coalinga, pressed a gun into his stomach and demanded that his assessment be marked "paid," but a couple of Dallas's bodyguards grabbed the gun away from him.[57] Couch and C. D. Martin had lost all of their stock in this way and, because they were no longer stockholders, they lost their place on the Board of Directors in May 1912.[58] The Dallas family hung on by paying the assessments on their own shares, and eventually became sole legal owners of the mine. Roderick Dallas's sister, Margaret Shaffrath, was made a Director in place of Couch, and **Reuben Carlton Baker** (1872–1957) replaced C. D. Martin.[59]

In August 1909 **Robert Van Vleck Anderson** (1884–1949),[60] a recent Stanford graduate working for the U.S. Geological Survey in Washington, D.C., paid a visit to the mine, where he was met by Thomas Hayes, his wife, his 15-year-old daughter Leslie and 13-year-old son Leland Hayes, and miners Chester Firlum and Tom McDermit. Anderson made a study of the mine and surrounding area, and was "greatly interested"; he also took photographs before moving on a couple of days later to examine the New Idria mine a few miles away. He was in the area primarily to investigate the nearby Coalinga oil field; the following year he published U.S.G.S. Bulletin 398. "Geology and oil resources of the Coalinga District, California," co-authored with his friend and fellow Stanford alumnus, Ralph Arnold, who had visited the Dallas mine in September 1907.

Apparently Dallas required that his employees observe the sabbath; mention is sometimes made in the logbook of attendance at services held at the nearby logging camp. Thomas Hayes was not altogether happy about complying with this requirement, as one can sense from his entry for July 4, 1909: "Sunday was observed in the usual and dignified manner in accordance with the pious and sanctimonious principles of the gentleman for whom the mine was named."

At the end of October 1909 Thomas Hayes departed and **Edmund B. Walters** (1850–1920's)[61] arrived to take over the operation, with the occasional help of his son, **Thornton Craig Walters** (1887–1959). The logbook notes: "We begin prospecting for lode." Shortly thereafter they started sinking an inclined shaft and found good gem benitoite just 4 feet below the earlier workings.

1910

Production continued satisfactorily into January 1910: "Things look good in the shaft. Today we took out some fine looking gems."

Logbook notes are unusually scanty over the next few months, suggesting that things were not going well. On September 21–24 Robert Wilke arrived for another personal collecting visit: "Mr. Wilke commenced to gather specimens, finding some very beautiful cabinet specimens. Very good prospects in the tunnel."

The following month (October 1910) a stockholders meeting was held and it was decided to shut down the mine.[62] Superintendent Walters made an inventory of tools and equipment, and turned over the property to caretakers, **Samuel R. Richardson** and his wife

Figure 18. **Neptunite crystal group with white natrolite, 6.8 cm. Francis Benjamin collection; Jeff Scovil photo.**

Alice—who were to remain alone on that desolate outpost for the next two years.[63] On October 1, 1913, Richardson held an auction on Dallas's behalf and sold off all of the tools and equipment of the Dallas Mining Company.

On October 3 Richardson wrote his last entry in the logbook: "How thankful I am to be through staying in this awful forsaken place, for it takes the life and strength out of a person to go over these awful roads, but I am sorry to end my employment with such kind and considerate people as we have found the Dallas Mining Co. to be, and we certainly appreciate their kindness to us. I have tried to do my best for their interest, and so we shall bid the Old Mine good bye in the a.m."

Production 1907–1910

Thus the mine ceased operations in 1910 (not 1912, 1913 or 1914 as various reports have said) and stood totally abandoned after October 1913. Nevertheless, Dallas kept up his assessment work and the claim was patented in 1914; thus it remained the property of Roderick Dallas and his family, though it stood dormant for the next six years.

So how much did the mine produce in its first three and a half years of operation? It appears that many hundreds of pounds of specimens were collected by, or on behalf of, Robert Wilke and shipped to him in Palo Alto. Payments received from Wilke for the mining company's 50% share of the income from the sales of specimens were $57 in 1907, $653 in 1908, $307 in 1909, and $345 in 1910.[64] Actually these are fairly substantial sums considering that a dollar in 1908 was worth roughly 20 to 100 times what it is today (depending on the method of inflation calculation used).[65] And this

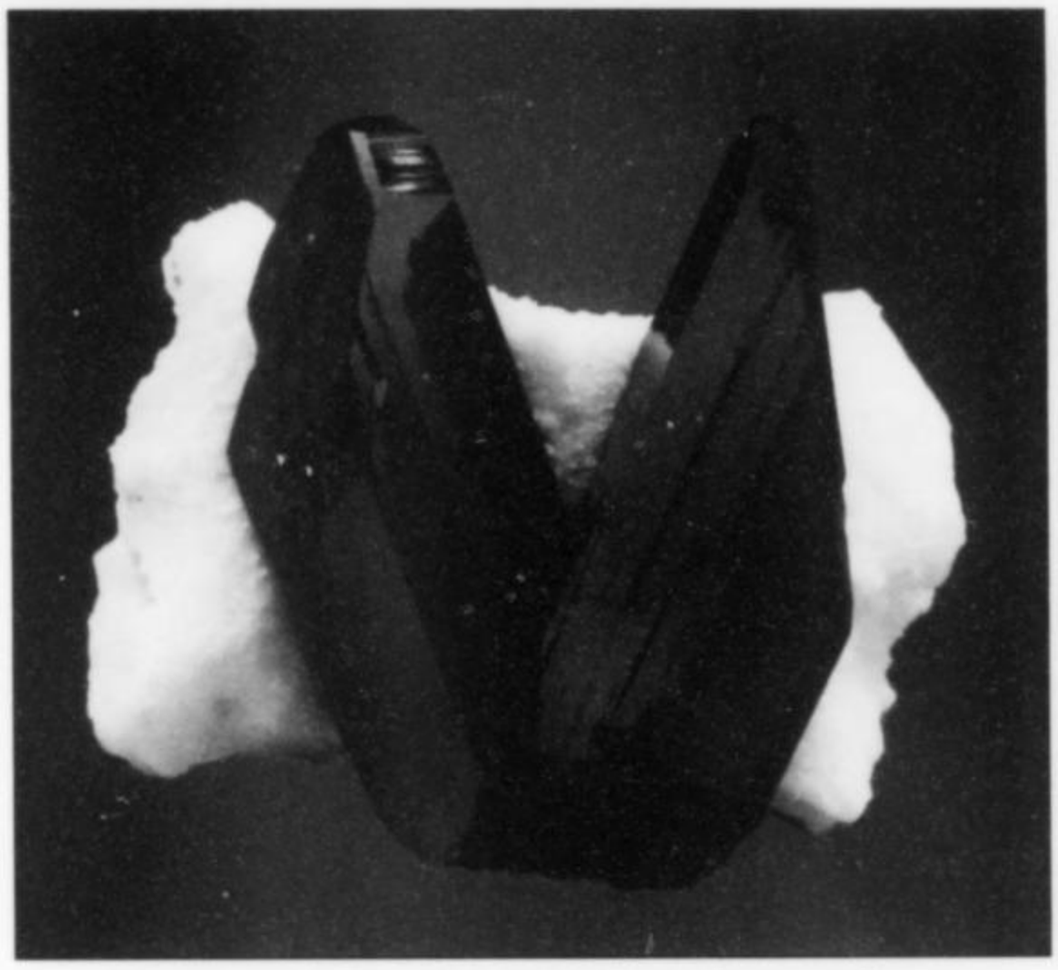


Figure 19. **Neptunite twin on white natrolite, 2.8 cm. Tim Sherburn Collection; Jeff Scovil photo.**

may only be a part of what was received; the deposit record for sales of gemstones has not been preserved, and may have included additional payments from Wilke as well.

As for gemstone production, it must have been substantial. Laurs *et al.* (1997) estimate 1,000 carats but this is surely far too low. Gem rough was delivered to Dallas in Coalinga on a more or less weekly basis, usually by the superintendent, who would then stock up on provisions to take back to the mine. Sometimes Dallas himself would ride up to the mine to pick up the accumulated production and drop off supplies. On October 18, 1907, part-owner

C. D. Martin "carried a cartridge box filled with blue gems" to Dallas. A single parcel that Couch transported from the mine down to Coalinga on November 5, 1907 weighed 1,000 carats. The fact that, over several months, Couch may well have carried a parcel down to Coalinga with him every week when he went to get provisions is not always specifically mentioned in the logbook but probably went without saying.

When Thomas Hayes took over as superintendant in April 1908 he was a bit more specific in his logbook entries: "Took down a sack of stones . . ." (April 7), "Took down jewels . . ." (May 1), "Took down many jewels . . ." (May 23), "Took many gems . . ." (May 28), "Took cabinet samples and gems . . ." (June 6), "Shipped package of gems to Shreve & Co . . ." (June 23), "Took fine lot of gems . . ." (July 20), "Took a nice bunch of gems . . ." (July 31), "Packed jewels for shipment to Dallas in Coalinga . . ." (August 31), "Took down . . . a sack of gems and gave them to Mrs. Dallas . . ." (November 11), "Put a sack of gems in the Coalinga Bank . . ." (November 28), "Took down a fine lot of gems . . ." (December 9), and so on. The ultimate total of these weekly deliveries must have been many tens of thousands of carats. Unfortunately, as mentioned, the records of the income generated by their sale (and of any dividends paid to the stockholders) have not survived, and were probably kept very confidential by the Dallas family.

1920

According to the mine diary, "B. C. Suit" (**Benjaman Casner Suit** of Hollister, California) contacted Roderick Dallas in October 1920 about buying the benitoite mine. All the record says is that they "closed a deal for the mine, giving an option until January 1st, 1921." Suit (he called his business the San Benito Gem Company) was a 43-year-old newspaper journalist from Maryland who had come west following the death of his wife.[66]

1929–1930

In the late 1920's Otis Dunn (1907–1983) from Santa Paula, California leased the mine and took out many beautiful crystals. Oscar Couch also dug specimens there in 1929, with E. R. Shane, and discovered some good pieces. Dunn was inactive there for most of 1930–1933, but then reopened it.[67] He donated some nice specimens to the Natural History Museum of Los Angeles County and the California State Mining Bureau.[68]

1934–1939

In 1934 a jeweler named Arthur Dibbern obtained permission (and probably approximate directions) from the Dallases to visit the mine. He invited two friends to accompany him: watchmaker Roy Martindale and Frank Gulick, a chemistry teacher at Glendale High School in the Los Angeles area. Hiring a trail guide and camp cook to accompany them, they went into the mountains on horseback. After searching for five or six days they finally found it, and spent at least another week on the site collecting specimens. Dibbern found a benitoite crystal that yielded a flawless 1.65-carat cut stone.

Back in Glendale the following year, Frank Gulick had two enthusiastic students in his chemistry class: **Pete Bancroft**[69] and **Ed Swoboda**.[70] One day he told them of how he and Dibbern had visited the mine site, and the specimens they had found. Swoboda and Bancroft were riveted by the story and anxious to go collect there themselves. Gulick encouraged them, so they obtained permission and directions from the Dallases and planned a trip for Easter vacation in 1935. Gulick even gave them a ride from their

Figure 20. **Roy Martindale (left) and jeweler Arthur Dibbern, organizer of a collecting expedition to "rediscover" the site of the Dallas mine in 1934. (Courtesy Ed Swoboda.)**

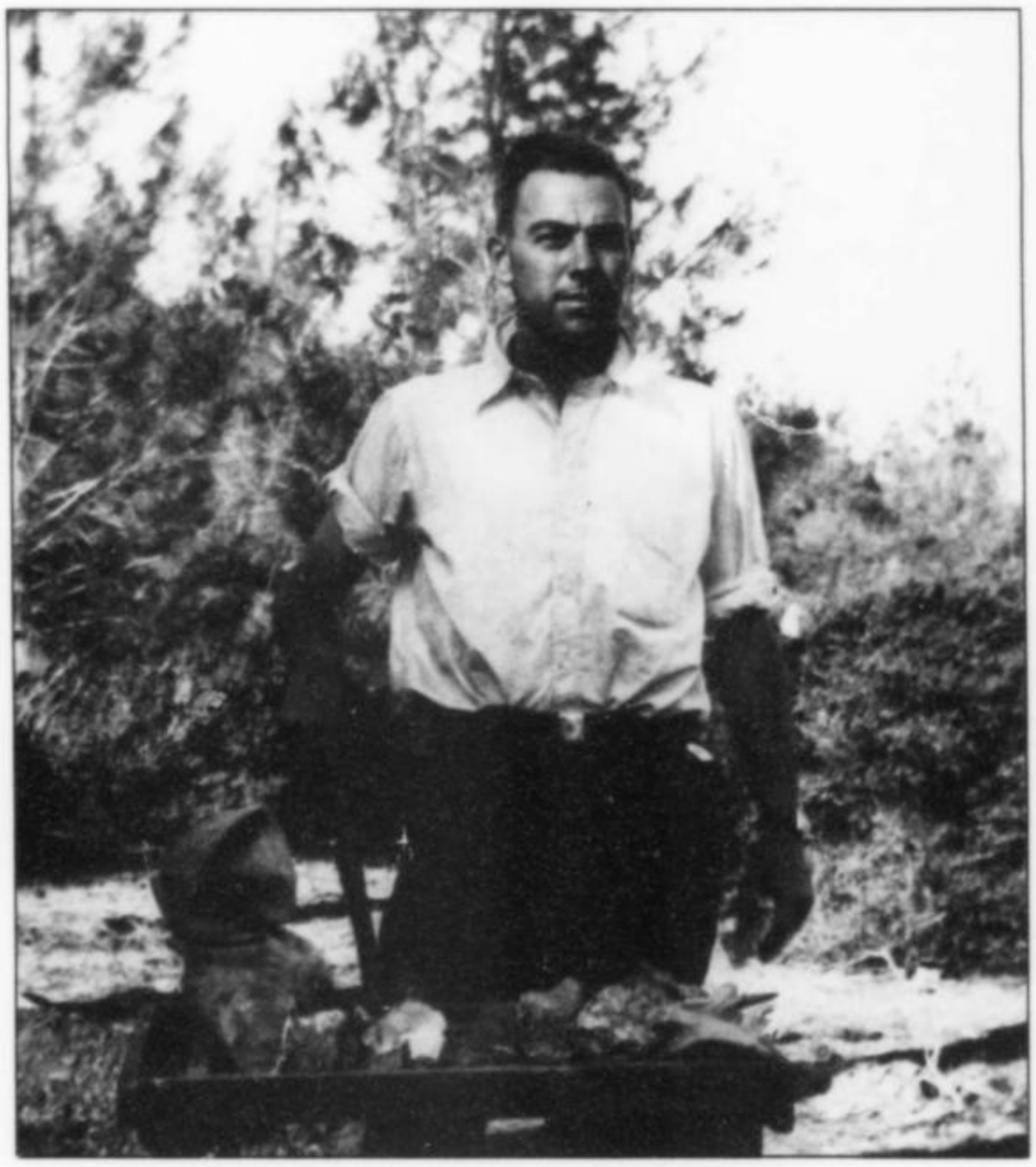


Figure 21. **Frank Gulick, Glendale High School science teacher, was the third member of the Dibbern party in 1934. He encouraged his students Ed Swoboda and Pete Bancroft to visit the mine in 1935. (Courtesy Ed Swoboda.)**

Figure 22. **The Dallas cabin was still in good condition in 1938, when Pete Bancroft and Ed Swoboda collected there; Swoboda's Model A Ford is visible at right. (Courtesy Ed Swoboda.)**

Figure 23. **Pete Bancroft at the Dallas mine in 1938, posing with the week's haul of benitoite and neptunite specimens that he and Ed Swoboda had gathered. (Courtesy Ed Swoboda.)**

homes in Glendale, dropping them off in Coalinga. They loaded their backpacks with food, blankets, cooking utensils, mining tools, dynamite, blasting caps, rifles and pistols, and set out on the 36-mile hike into the Diablo Mountains. Arriving at the mine, they saw that Roderick Dallas's log cabin still stood there amid the tall pines, its wood-burning stove intact and the walls and ceiling still watertight—though a group of rattlesnakes had to be routed before they could safely sleep there.

The next day they examined the workings and found a number of barren natrolite veins before coming across a "decomposed section of the mine which was extremely rich in weathered-out benitoite crystals." The dumps also proved productive of good crystals. After two weeks of work they had filled each of their backpacks with about 45 kg (100 pounds) of fine specimens and gem rough. They made five more collecting trips after that, coming away with good specimens each time.

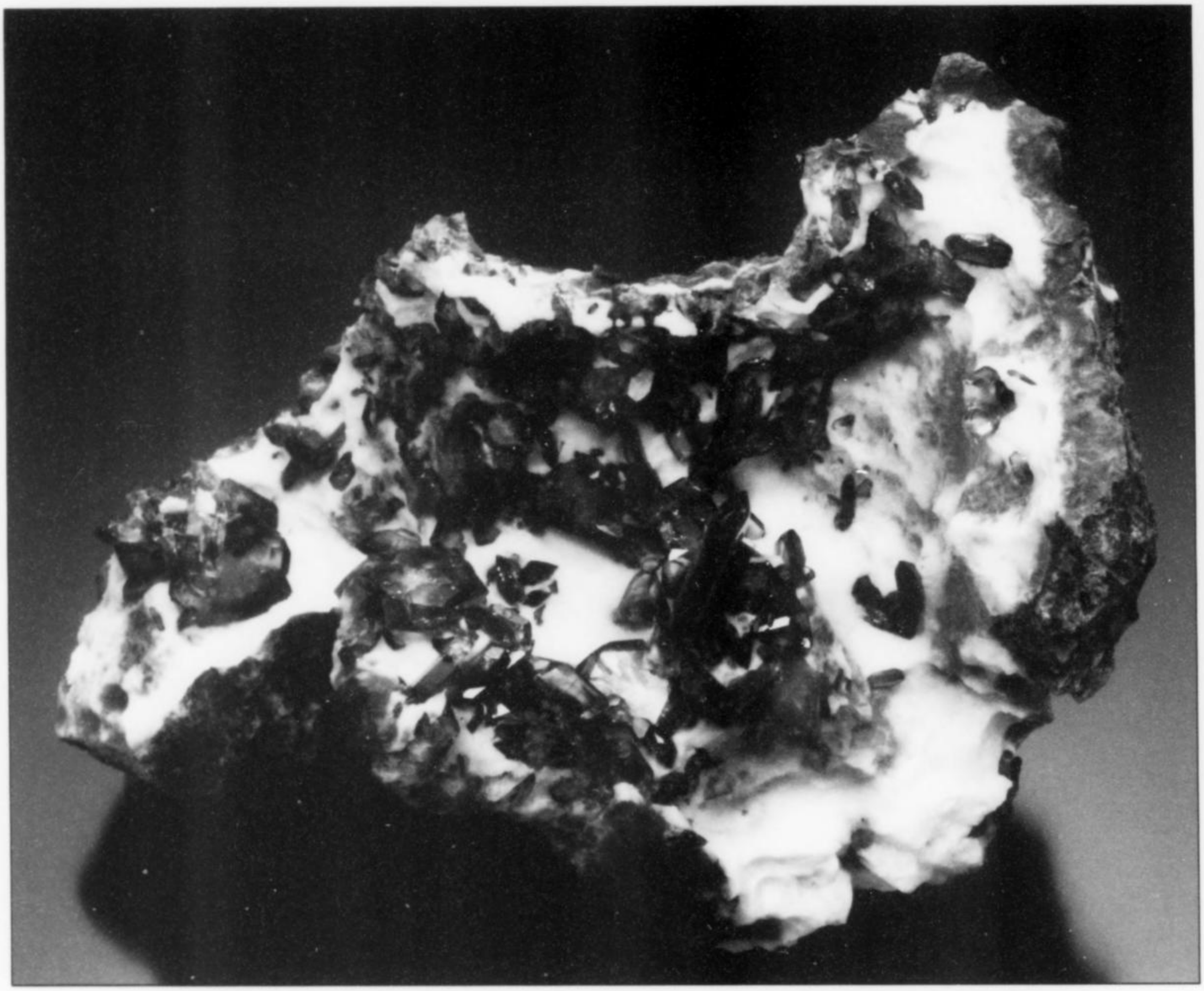


Figure 24. **A large (15.5 cm) and spectacular specimen of very gemmy and lustrous benitoite crystals with minor neptunite, collected prior to 1930. Early surviving specimens of such high gem quality are extremely rare because they were generally sold as gem rough. Rob Lavinsky specimen, now in the William Larson collection; Wimon Minorotkul photo.**

1943–1950

James M. Couch, discoverer of the benitoite deposit, died in San Bernardino County, California on October 31, 1943.[71]

Roderick Dallas became a broker in petroleum stocks and lived in Los Angeles in the 1930's; he died in Fresno County, California on December 10, 1950[72]; ownership of the mine then passed to his wife, Lyda E. Dallas, who died nine years later.

During the mid-1940's, San Francisco mineral dealers Julius Gisler (1888–1959) and his son Oscar Armine Gisler (1912–1978) are said to have mined some fine specimens from the old tunnels.

1952

After being inactive for many years, probably since 1914 (except for unauthorized collectors), the benitoite mine was leased in early 1952 by **Miller F. Hotchkiss** (1910–1968)[73] of Firebaugh, California, owner of the newly formed Benitoite Mines, Ltd. His first ad appeared in the February 1952 issue of *The Mineralogist*, offering single gem crystals and cut stones. Subsequent ads also offered specimens, promising that a "complete selection" would be available by July 1st. Hotchkiss used a bulldozer to enlarge the open cuts at the top of the hill; unfortunately very little gem material was produced during this period. The operation proved unprofitable, and in a December 1952 ad the company announced than it would close and would be selling out the 1952 production at wholesale prices.

1952–1967

The mine remained in the hands of Roderick Dallas's heirs. Beginning in 1952 and for at least nine years thereafter it was operated sporadically under lease by **Clarence L. Cole** (1879–1967) of Oakland, California.[74] Cole advertised as "Cole's Mines" in *Lapidary Journal*, and subleased the mine to various parties when he wasn't trying to work it himself, including **Gerald Bosley** of San Diego and his partner **Josephine Louise Scripps** (1910–1992)[75] of San Luis Rey, California, heir to the Scripps-Howard newspaper fortune and a dedicated mineral collector. They had waste rock and overhanging overburden around the upper opencut bulldozed out of the way in 1966, although the unskilled operator actually covered up the productive zone rather than exposing it. Consequently only random

Figure 25. **Roderick and Lyda Dallas (right) presented this meter-wide specimen of neptunite on natrolite to the University of California at Berkeley in the 1940's—an appropriate donation considering that it was Prof. George Louderback of that institution who first described the mineralogy of the Dallas mine. (Courtesy *Collector's Edge Minerals.*)**

Figure 26. **Benitoite crystal, 2 cm, on natrolite with neptunite. Stuart Wilensky collection; Jeff Scovil photo.**

specimens were found loose in the bulldozed material, and none were found in place. When not subleasing the mine Cole opened it up occasionally to fee collecting by the public at $2/day.[76]

1967–1999

In the fall of 1967 far more competent operators, **Elvis Leroy "Buzz" Gray** of Fallbrook, California and **William C. Forrest** of Fresno, obtained a five-year lease on the property and renamed what had been called the Dallas Gem mine as the Benitoite Gem mine. Some collectors have wondered whether there had been two mines—the Dallas Gem mine and the Benitoite Gem mine—however they are both the same locality. Specimens correctly labeled "Dallas Gem mine" were collected in 1907-1967, and those correctly laberled "Benitoite Gem mine were collected since 1967.

Forrest and Gray initiated an ambitious rehabilitation program, and began mining the in-place vein. During their first years they worked over the old dumps, screening out considerable benitoite gem rough and crystal specimens, as well as neptunite specimens. The opencut was cleared of debris and untouched in-place vein material was exposed. This resulted in the discovery of many large, high-quality matrix specimens and gem rough in 1969, and in 1970 a large vein section was mined which yielded much splendid neptunite but negligible benitoite. They also purchased many of the unetched

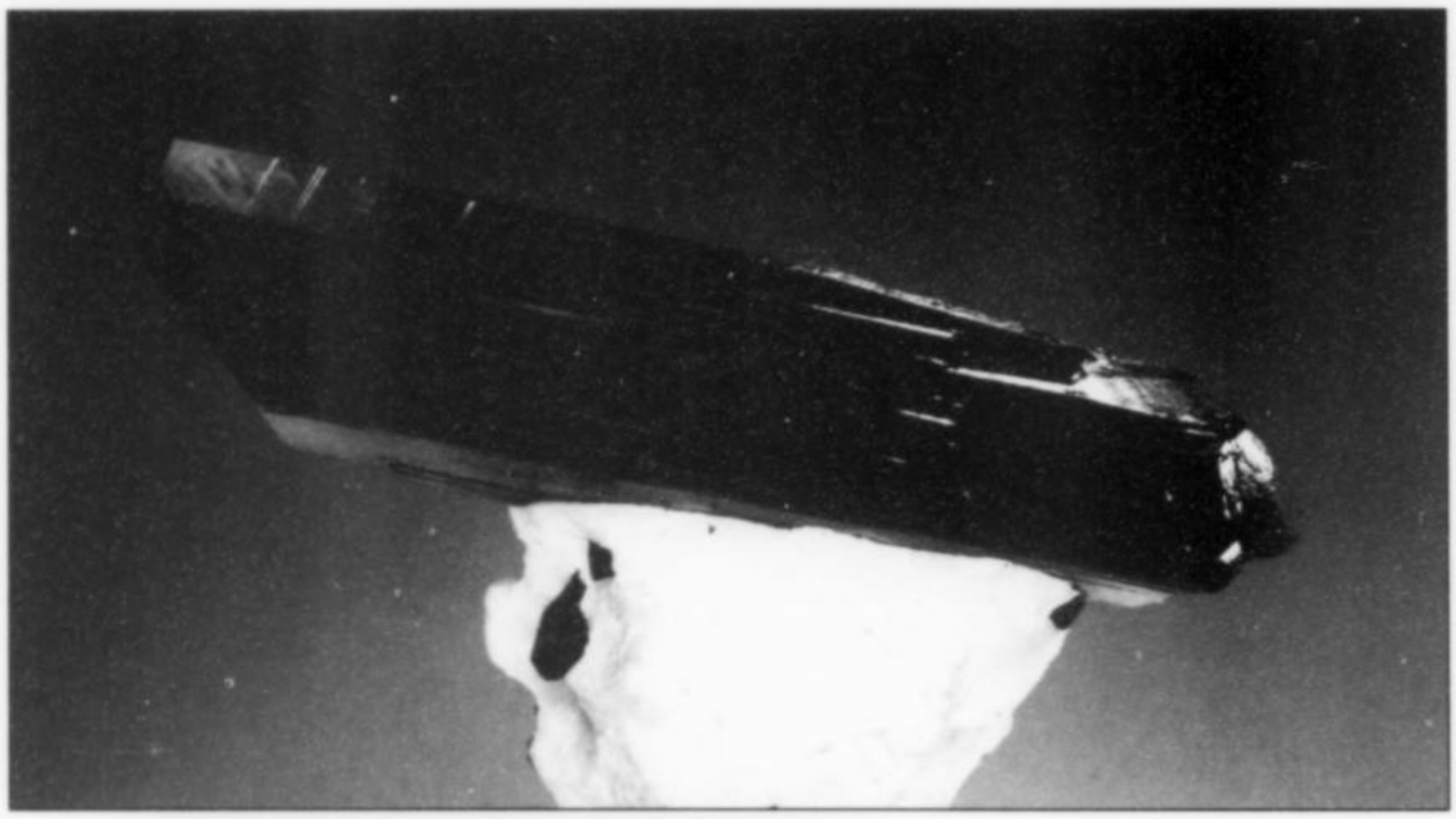
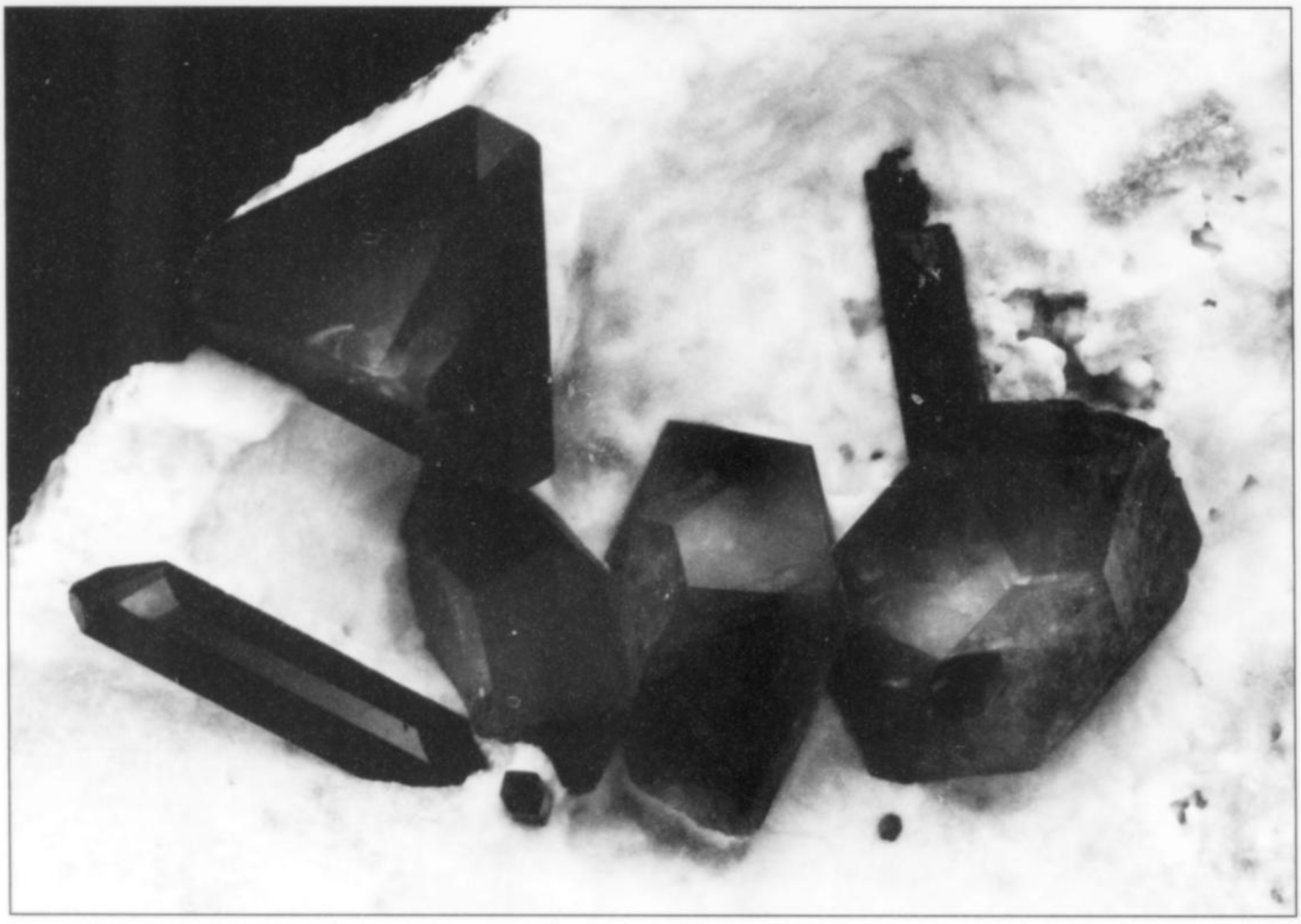


Figure 27. **Doubly terminated neptunite crystal, 4.2 cm, on natrolite. Smithsonian Institution collection; Wendell Wilson photo.**

Figure 28. **Benitoite crystals to 1 cm, with neptunite and joaquin-ite on natrolite. Steven and Clara Smale collection; Jeff Scovil photo.**



benitoite specimens that Clarence Cole had stockpiled. Cole had set aside several tons of unprocessed vein material; one of the chunks (mined in 1956) later yielded the exquisite Josie Scripps specimen featured in Peter Bancroft's book *The World's Finest Minerals and Crystals* (1973). A very fine specimen was buried with Cole when he died (Gray, 2008).

In 1971–1972 they began mining what proved to be a new bonanza that no one had previously considered: the eluvial and colluvial material that, over the millenia, had weathered from the outcrop and slumped downhill. Using hydraulic methods they washed away the loose soil to expose abundand large and small blocks of vein material which proved to be rich in benitoite and neptunite crystals and matrix specimens. Their lease was renewed in 1972, and work continued; by December 1974 the opencut had grown to 45 meters long and 4 meters wide, penetrating downward to the original adit level.

In 1983 Gray and Forrest brought in heavy excavating equipment to explore the deeper beds of eluvium, and more excellent material was uncovered, including a piece of rough that yielded an extraordinary 15.42-carat cut stone, far larger than the previously record-holder (7.5 carats) in the U.S. National Museum of Natural History.

It is worth noting that Gray and Forrest's activities mining and publicizing benitoite had brought the gemstone before the public eye. In 1985 benitoite was officially declared the State Gemstone of California.

Gray and Forrest purchased the property outright from Roderick and Lyda Dallas's daughter, Hellen Dallas Read, in 1987 and con-

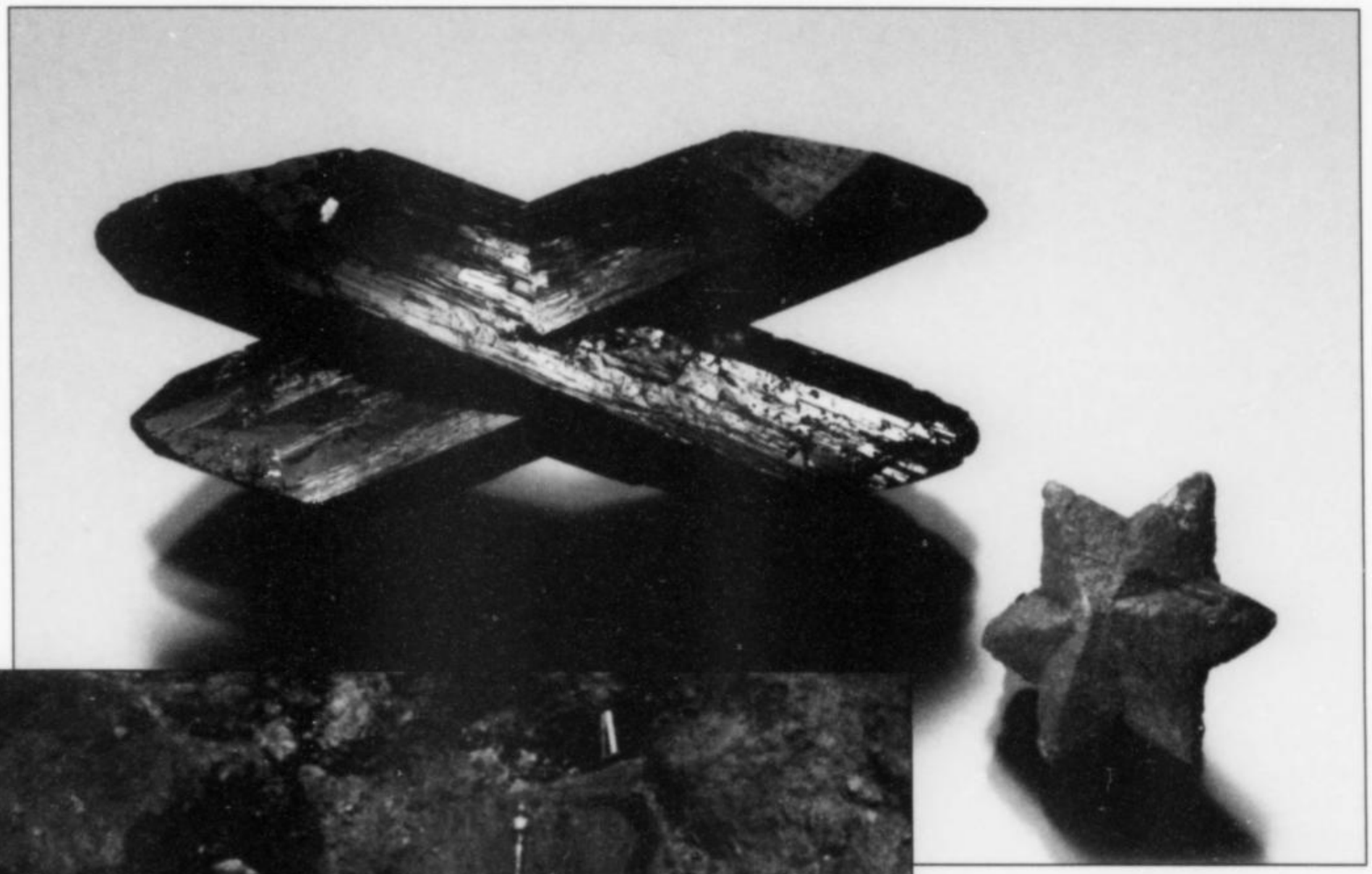


Figure 29. **Twinned neptunite crystals, 4 cm, with a heavily included twinned benitoite crystal. William Larson collection; Wimon Minorotkul photo.**

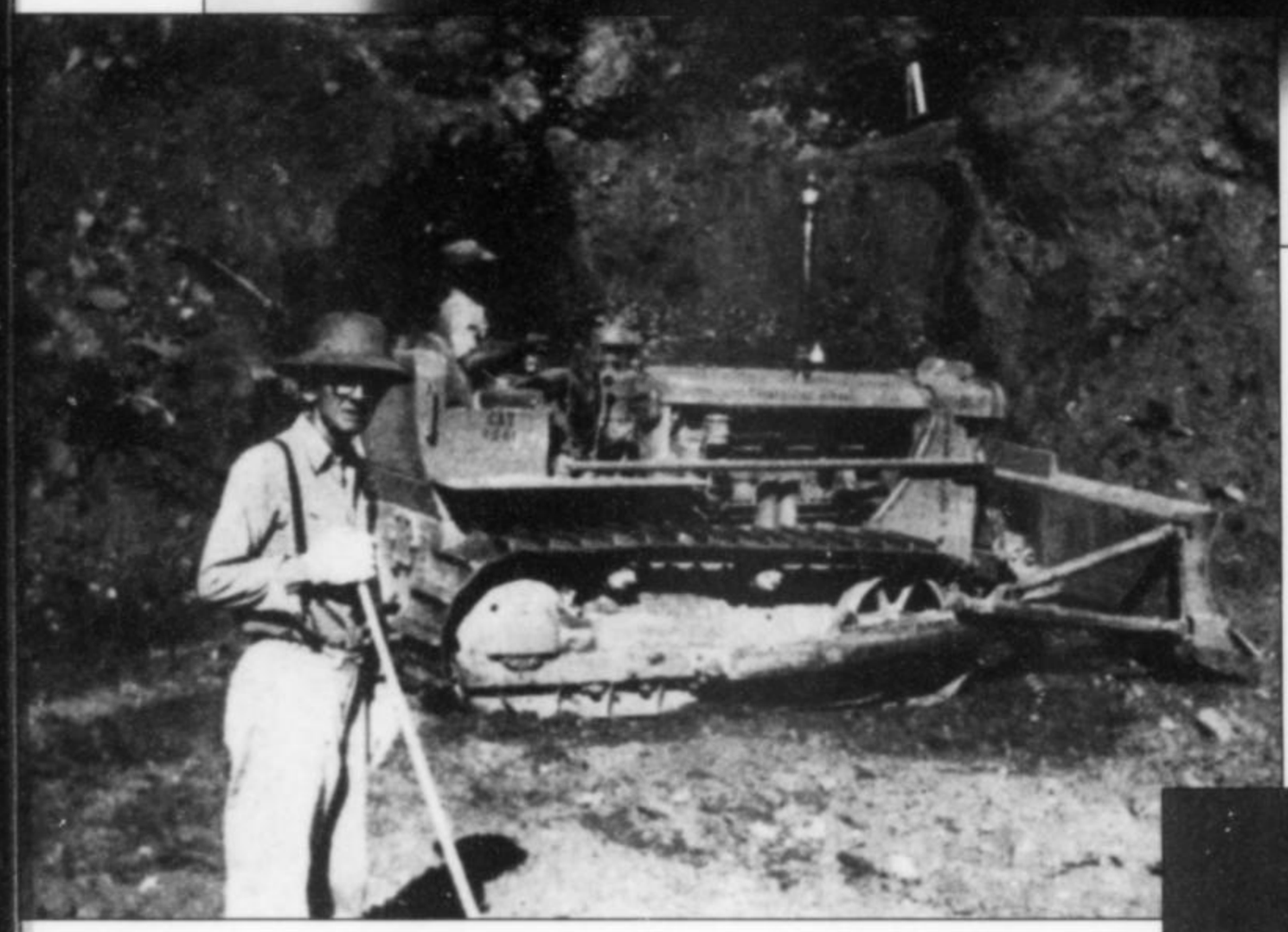


Figure 30. **Clarence Cole, lessee of the Dallas mine from 1952 to the early 1960's. (Photo taken in 1957.)**

Figure 31. **Josephine Scripps sub-leased the mine from Clarence Cole in the late 1950's or early 1960's and worked it for specimens with her partner Gerald Bosely.**

tinued to work the colluvium for specimens until it was exhausted in 1996, and attention was turned back to exploring for veins in place. In the spring of 1997 a new productive area was found downhill from the open pit, containing more vein material and colluvium.[77] This new vein yielded many fine specimens, including distinctive, pale-colored, highly lustrous benitoite crystals unlike those found earlier.

The well publicized activity during the 1980's and 1990's attracted the attention of Kennecott Exploration Company, which hired Brendan M. Laurs to make a thorough geological study of the area in 1995.[78] No action was taken as a result, but another large mining concern, AZCO Mining, Inc. became interested as well. They leased the property and then drilled, sampled and studied the geology of the deposit for its gemstone potential for three years (1997–1999). After expending close to a million dollars in marketing studies and a fruitless search for profitable ground they gave up. However, the first detailed geology of the mine area was revealed in the course of this work. Hundreds of feet of diamond drilling and dozens of test pits did indeed establish the existence of some gemstone reserves. But they were too small-scale to be worthwhile for the big mining company to pay the $1.5 million Gray and Forrest were asking for the property.[79]

Figure 32. **Cluster of exquisitely gemmy and lustrous benitoite crystals, 4.7 cm, found in the 1990's by Buzz Gray and Bill Forrest. Buzz Gray collection; Jeff Scovil photo.**

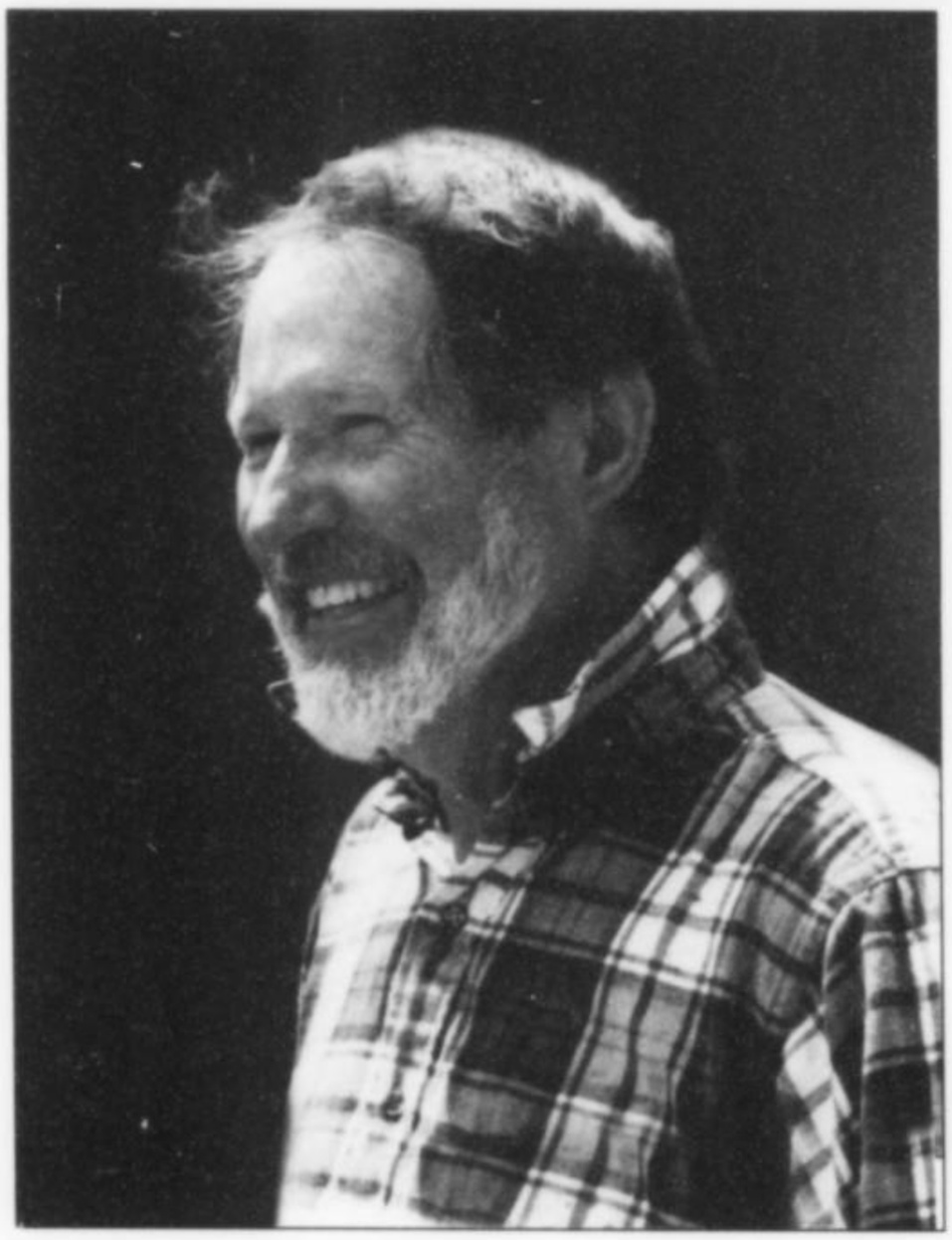


Figure 33. **Elvis "Buzz" Gray, operator of the mine (with William Forrest) from 1967 to 1999.**

Figure 34. **Bill Forrest, operator of the benitoite mine (with Buzz Gray) from 1967 to 1999.**

Figure 35. **Benitoite crystals to 3 cm, on matrix. Originally in the national trophy case of Col. and Mrs. Mullaly; now in the William Larson collection; photo by Wimon Minorotkul.**

2000–2005

In November 2000, the Benitoite Gem mine was purchased from Gray and Forrest by **Bryan Lees**' Benitoite Mining, Inc., headquartered in Golden, Colorado. In March 2001 Lees began mining the eluvial deposits downhill from the veined blue schist body, and approximately 2,000 cubic yards were processed through a jig system. Pay dirt was struck in April 2001, when Lees, on a hunch, decided to dig into an area that had previously been explored by Gray and Forrest. Within hours an unsuspected shelf of blue glauconite schist containing benitoite was encountered.[80]

Geologic mapping continued during the summer, pinpointing target areas for future open pit mining activities. In March 2002 the processing facilities were expanded. Larger screening equipment, water filtration systems, specimen sorting belts and earth-moving equipment were brought in. The water retention ponds were enlarged by digging out about 10,000 cubic yards of previously processed tailings, which were then reprocessed through the new facilities in order to recover previously discarded gem rough. Once all of the new equipment was in place, 100 cubic yards of material (a mix of old mine waste piles and old tailings) were processed per day, ultimately totaling about 5,000 cubic yards that year. A small-scale jig was added to the circuit to capture smaller pieces of gem rough.

In December further work was done to strip remaining undisturbed, in-place eluvial gem-bearing materials and stockpile them for future processing. The plant was increased in size to accommodate an additional 8-foot jig, and processing capacity went up to over 150 cubic yards per day. During the 2002–2003 season, approximately 6,000 cubic yards of rock and rubble were processed, including materials from both the tailings stockpile and old mine waste piles.

Gem concentrates were produced by a new magnetic separation system—the first time magnetic separation technology has been used to separate gems from a concentrate. The technique is over 99% effective because only benitoite, among all the various minerals in the deposit, contains no iron. Broken "ore" transported by conveyor belt was also hand sorted for potential mineral specimens—the enclosing natrolite protecting the fragile benitoite crystals. As a result, commercial quantities of faceted benitoite became available for the first time since the early 1900's, and a new flood of specimen material hit the market as well.

In late 2003, Lees began stripping off overburden in an attempt to uncover the *in situ* source of the eluvial deposits. By June 2004 several thousand cubic yards of rock had been removed to fully expose the benitoite-bearing host rock (blue schist). It turned out that the blue schist unit was broken into blocks roughly 30 × 20 × 15 feet thick. These blocks were arranged in step-wise fashion, separated horizontally and vertically by about 10 to 20 feet. Once exposed, the blocks looked like a giant staircase of 30-foot-wide steps. Unfortunately, all of the mineralized blocks had already been mined out in the early days, as evidenced by old mine tunnels. The few un-worked blocks discovered were all barren of benitoite.

The mine closed between August and December 2004 and started up again in January 2005. The 2005 season brought unusually rainy weather, and the ponds filled to their maximum capacity, aiding in production. With the previous season's addition of the scrubber, the plant was capable of processing over 150 cubic yards per day, with

Figure 36. **The heavily worked hillside which hosts the benitoite veins, as it looks today. (Courtesy *Collector's Edge Minerals.*)**

Figure 37. **Bryan Lees of Collector's Edge Minerals supervising the operation to wash and separate benitoite crystals from the soil in 2004. (Courtesy *Collector's Edge Minerals.*)**

great recovery rates. It was decided to reprocess yet again some materials run in previous years and to complete the processing of all remaining stockpiles. Over 10,000 cubic yards were processed in 2005, including every remaining stockpile, eluvial source and old mine dump. By season's end, the project was considered complete and all the equipment was removed.

In all, Benitoite Mining, Inc. processed approximately 25,000 cubic yards of material, some of it twice. Lees is thoroughly convinced that there are no more benitoite-containing veins left in place, nor are there any commercially viable eluvial deposits left to work (though individual crystals and fragments remaining in the eluvium will probably turn up occasionally for many years to come).

Fortunately, although the remaining productive ground was not as extensive as originally hoped, Lees recovered enough gem rough to finance the mine acquisition and operating costs. Most of the gem rough is yielding stones in the 1-mm to 3-mm size range, or approximately 1 point (0.01 carat) to 10 points (0.10 carat) each. In addition, several hundred pieces of rough were recovered that will cut over 1 carat in size. A beautiful 5.95-carat medium-blue stone was cut about two years ago, and Lees has the rough to produce four or five more stones in the 5 to 6-carat range. One large piece of rough is expected to yield a stone in excess of 10 carats and is being preformed now, and it is very possible that one other stone

Figure 38. **Extraordinary, lustrous pocket crystals of benitoite—unusual in never having been coated by natrolite, and therefore retaining their best luster. This was the best specimen recovered by Bryan Lees' operation. Joseph Ondraka collection; Wendell Wilson photo.**

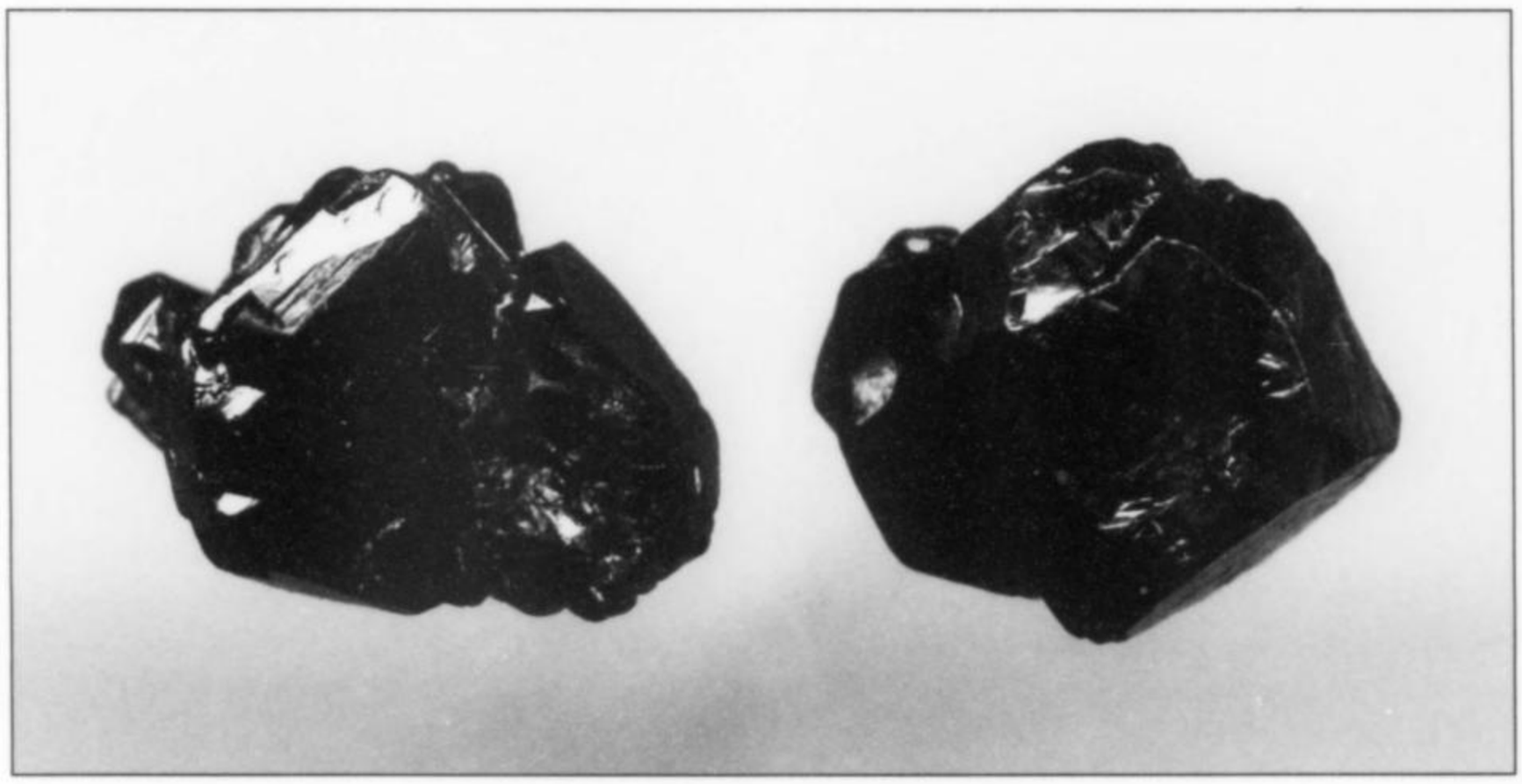


Figure 39. **Two small ilmenite (?) crystals, 7 mm and 5 mm, recovered from the benitoite mining operation by *Collector's Edge Minerals*. (Scanner photo by Wendell Wilson.)**

will also achieve a weight of over 10 carats when cut. Lees estimates that he currently has enough stockpiled gem rough to provide the market with commercial quantities of cut stones and set jewelry for the next ten or so years.

In terms of crystal specimens for collectors, Lees' operation produced a total of about 15 tons of neptunite/benitoite-bearing vein material, only some of which has generated valuable mineral specimens; more than half of the material proved to be of little value and was either discarded or crushed for gemstone liberation. Most of the more promising material was X-rayed to determine mineral specimen potential. Specimens showing crystals of good size, or concentrations of crystals, were sent to the Collector's Edge Minerals, Inc. laboratory for preparation, resulting in hundreds of fine specimens. Each piece was carefully cleaned in a phosphoric acid solution to remove the natrolite coatings, then trimmed and prepared to best show off the benitoite and neptunite crystals. Really good matrix specimens still proved to be rare; less than 10% cleaned up to be specimens worth more than $200. Furthermore, most of the specimen-bearing rock proved to contain neptunite, but not benitoite. Only one benitoite specimen was recovered for every ten neptunite specimens.

A large quantity of bulk specimen rock was sold by the pound to John Veevaert for resale through his website. John's customers etched away the natrolite themselves and found hundreds of nice specimens. One of John's lucky customers found a stone deep inside one rock yielding a cut benitoite gem weighing over 5 carats.

So far, of the hundreds of specimens recovered by Lees between 2001 and 2006, only 20 fall into the category of top-quality collector's items. The best piece discovered is a matrix benitoite specimen now owned by Joe Ondraka, of Fallbrook, California (pictured here). It is miraculous that this specimen survived the excavation process without damage because the protective natrolite coating common to nearly all benitoite specimens was not present on this piece. The piece was cut from a 5-ton boulder taken from a small remaining in-situ portion of the original outcrop.

Although Lees has since sold the mine, Collector's Edge will be acid-processing stockpiled material for at least another five years, during which time they hope to uncover at least 10 more additional top-quality specimens.

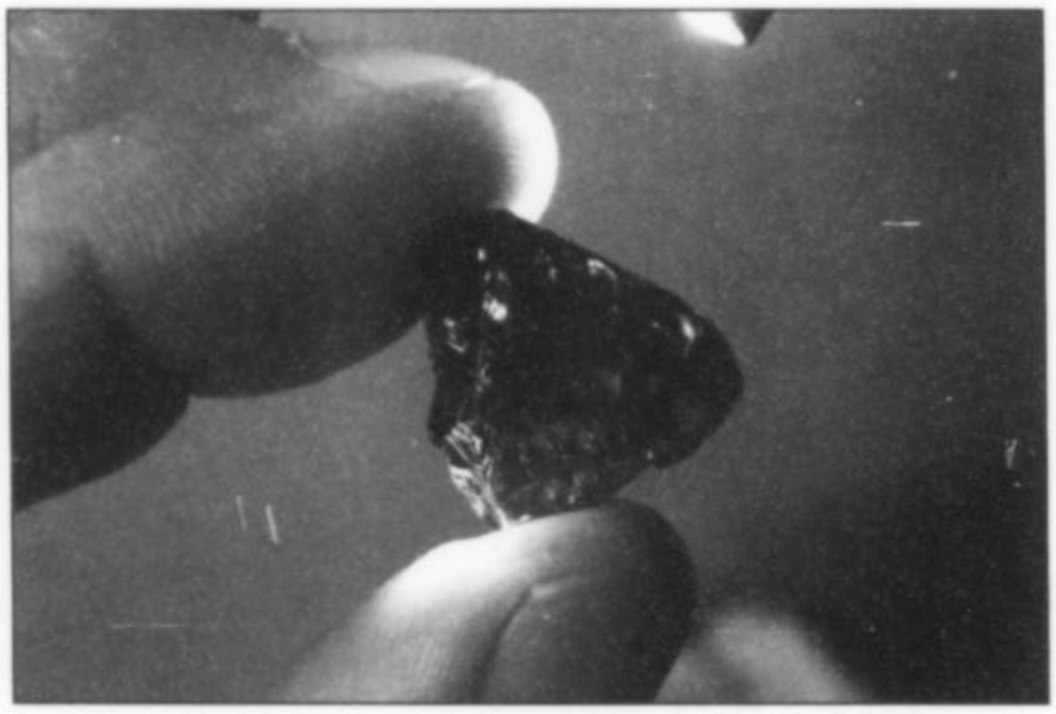


Figure 40. **Rare 34-carat benitoite crystal fragment recovered by David Schreiner in 2005. (Courtesy David Schreiner.)**

2005–Present

In late 2005 the Benitoite Gem mine property was reclaimed and sold to **David Schreiner**, who has renamed it the "California State Gem mine" and has reopened it as a "fee collecting" site.[81] Reservations are required. The mine opens at 8 a.m. and closes at 4 p.m., and the cost per person is $100 per day. Each person is allowed to take home a 5-gallon bucket of material, and Dave claims that almost everyone finds something, including chunks of benitoite-containing natrolite vein material.

Schneiner himself has found many good specimens of natrolite which have yielded benitoite crystals, and has also found a few very fine pieces of gem rough since buying the property—including a 34.4-carat crystal fragment which yielded an 8.06-carat faceted stone, the third largest in the world.

Acknowledgments

I am indebted to Bryan Lees for the loan of the Dallas Mining Company logbook, record books, documents and photos for study, and for information on his operations at the Benitoite Gem mine. My thanks also to Bryan and to Joe Ondraka for loaning specimens to be photographed, to Jeff Scovil, Wimon Minoratkul and Harold and Erica Van Pelt for specimen photography, and to Colleen E. Allen of the U.S. Geological Survey Photographic Library for historical photos. Bryan Lees and David Schreiner provided information on their periods of operation of the mine. Anthony Kampf, Bryan Lees and Thomas Moore kindly reviewed the manuscript.

Footnotes

1. Laurs *et al.* (1997).
2. Laurs *et al.* (1997).
3. Alfors *et al.* (1965).
4. Basciano *et al.* (2001); Alfors *et al.* (1965).
5. Reed and Bailey (1927).
6. Dunning and Cooper (1999).
7. Barwood (1995).
8. Sakai and Akai (1994).
9. Worner and Mitchell (1982).
10. Courteously supplied by Bryan Lees, Collector's Edge Minerals, Inc., Golden, Colorado.
11. **James Marshall Couch** (1857–1943): Louderback and Blasdale (1907), (1909); Couch (1961).
12. U.S. Federal Census (1860) for Bear Creek, Henry County, Georgia.
13. Couch (1961), and Austin *et al.* (1988).
14. Couch (1961).
15. **Roderick William Dallas** (born May 17, 1874; died December 10, 1950): U.S. Federal Census (1910, 1920) for Coalinga, Fresno County, California; California Death Index, 1940–1997 [gives his mother's maiden name as Beaton; his occupation as "oil producer" and "manager oil company"]; the 1930 Census ["Dellas"] shows him [occupation: "broker, oil stock"] and Lyda living in Los Angeles with their daughter, Helen; World War I Draft Registration Card gives his middle name and birth date. Fresno County Death Certificate gives his father as William Dallas (born in Scotland), and his mother as Margaret Beaton (born in Scotland). William Dallas (1847–1919) was the son of William Dallas (b. 1818) and grandson of John Dallas (1794–1866); this refutes the suggestion by Quick (1957) that Roderick Dallas was a descendant of George Mifflin Dallas (1792–1864), U.S. Vice President under James K. Polk, after whom Dallas, Texas was named.
16. U.S. Federal Census (1900) for Mansfield, Tolland County, Connecticut ["Rodrick"].
17. Margaret Dallas is mentioned as visiting the benitoite mine on July 31 through August 22, 1907. The California Death Index

(under her married name of Margaret D. Shaffrath) shows that she was born in New Jersey and gives her mother's maiden name as Beaton, the same as for Roderick Dallas.

18. Roderick William Dallas's World War I Draft Registration Card shows him living at 193 Jefferson Street in Coalinga, California, employed as an "Oil Operator" for "Ind. Oil Pro. Agency, Webb Building, Coalinga, California.

19. **Lyda Evelyn Matthis** (1878–1959): Roderick William Dallas's World War I Draft Registration Card gives his wife's name as Lyda Evelyn Dallas. The 1910 Federal Census for Coalinga shows her ("Lida E. Dallas"), married to Roderick W. Dallas, an "Oil Producer," for the previous three years (i.e. since 1906 or 1907), living with their Chinese cook, Wing Ah (who also served as cook at the mine periodically). A photo in the Dallas Mining Company archives show the one-room schoolhouse in Hernandez, indicating that Lyda Dallas and her sister Ida Matthis taught there, suggesting that Lyda's maiden name was Matthis; this is confirmed by the California Birth Index, which shows Hellen Dallas (daughter of Roderick and Lyda in the census records) born in Los Angeles in 1912, her mother's maiden name Matthis. It also appears from the California Birth Index that Roderick and Lyda had a son born in Fresno County (probably Coalinga) in 1911, but he died before being christened.

20. Max Shaffrath was a "superintendant, Standard Oil" in Coalinga, California, with a wife named Margaret (according to his World War I Draft Registration Card); the 1910 Census shows they were married in 1908. The California Death Index lists "Margaret D[allas] Shaffrath," mother's maiden name Beaton (like her brother, Roderick Dallas). The California Birth Index shows that the maiden name of the mother of their son Max (born in 1917) was Dallas.

21. **Thomas Edwin Sanders:** Couch (1961); Dallas Mining Company logbook; U.S. Federal Census (1880) for San Simeon, San Luis Obispo County, California shows Thomas E. Sanders (born in California in 1869/70, father born in Louisiana and mother born in Missouri) and brother Hal Sanders (born in California in 1876/7) as members of the large family of Martha and David Sanders, farmers. U.S. Federal Census (1900) for Plumora, Yuma County, Arizona Territory, shows Thomas Snders, born November 1875 in California to Missouri-born parents, "partner" with Thomas Bouse, both of them listed as "Miner, Gold." According to the mine logbook, Thomas Sanders sold out his interest in the benitoite mine to C. D. Martin for $2,500 on July 23.

22. This is the account of the discovery as related by James Couch to his son Oscar Couch, and published by Oscar (1961). Although that 10-page booklet, entitled *The Benitoite Story*, contains many inaccuracies and concocted conversations, this portion has the ring of truth and is most consistent with the claim papers filed.

23. **Leland Barnes Hawkins, Sr.** (1838–1920's): U.S. Federal Census (1900) for Los Angeles lists Leland Hawkins, age 62, born February 1838 in Missouri, occupation "mining engineer," living with wife Rhoda and children Pearl (age 23), Irene (age 7), and Leland (Jr.), age 21.

24. **Hal Sanders** (1877–1920's): Marcher (1939); U.S. Federal Census (1910) for Stockton, California shows Hal Sanders, born in California in 1877/8, occupation "watchmaker, own office."

25. Louderback and Blasdale (1907).

26. Couch (1961).

27. Copies of the claim papers are in the Dallas Mining Company files examined by the author.

28. Marcher (1939).

29. **George Godfrey Eacret** (1874–1930's): Marcher (1939); U.S. Federal Census (1900) for San Francisco lists "Godfrey Eacrut," born February 1874 in New Jersey, occupation "diamond expert." The 1910 Census for Sausalito (a suburb of San Francisco) gives his occupation as "diamond expert, jewelry store." World War I Draft Registration Card (1917) lists George Godfrey Eacret, born February 23, 1874, manager of "Shreve Trust Eacret" at 136 Geary Street in San Francisco. The 1930 Census for Hillsborough, San Mateo County, gives his occupation as "Proprietor, Jewelry business."

30. **George C. Shreve**, George Bonney and Albert J. Lewis proprietors, located at 106-110 Montgomery Street under the Occidental Hotel in San Francisco. The company was founded some time before 1870 by George C. Shreve, who was born in Massachusetts in 1830 and came to California before 1860. His son, George Rodman Shreve (born in California in 1862), had taken over the business by 1910 (San Francisco Directory 1889–1891; U.S. Federal Census 1910, 1920). In 1911, however, he severed his relationship with Shreve & Company and bought a controlling interest in the jewelry firm of Treat and (Godfrey) Eacret, which then became Shreve, Treat & Eacret. Godfrey Eacret had formerly been diamond expert for Shreve & Company, and had arranged the distribution contract for benitoite with Roderick Dallas.

31. **George Davis Louderback** (1874–1957) was a prominent Professor of Geology and Dean of the College of Letters and Science at the University of California, Berkeley. He was born on April 6, 1874, in San Francisco, the son of Frances Caroline Smith and Davis Louderback. He attended the University of California, receiving his A.B. Degree in 1896 and his PhD in 1899. He married his classmate, Clara Augusta Henry, in 1899.

Louderback served as Assistant in Mineralogy at the University of California (1897–1900), taught at the University of Nevada (1900–1906) and served as Research Assistant at the Carnegie Institution (1903–1905), returning in 1906 to the Berkeley campus as Assistant Professor of Geology. He was promoted to Associate Professor in 1907 and Professor in 1917, and served as Dean of the College of Letters and Science in 1920–1922 and again in 1930–1939.

At the University of Nevada, Louderback began studies of the structure of the Great Basin, and investigated the gypsum deposits of Nevada. Following his return to Berkeley he described and named the new mineral species *benitoite* (1907, 1909) and also the associated new species *joaquinite* (based in part on a crystal given to him by mineral dealer Robert M. Wilke). His 1909 paper is considered to be one of the finest descriptions of a new mineral ever published.

Louderback studied the glaucophane and associated schists of the Coast Ranges and cooperated in a study of the effects of the great San Francisco earthquake of 1906. In 1914–1916 he headed an expedition into China to investigate petroleum resources. During World War I he served as Chairman of the Committee on Geology and Mineral Resources of the State Council of Defense and was in charge of cooperation with the United States Geological Survey, the United States Bureau of Mines, and the State Council of Defense in investigations of strategic metal deposits in California. In the 1920's he resumed his studies of the Basin Range Province in Nevada and published three important papers. Professor Louderback's research was recognized by his election as Faculty Research Lecturer in 1940. He served on many university committees and was a progressive force in academic government. After his retirement in 1944, the degree of Doctor of Laws was conferred upon him in 1946 by the University.

Louderback was a Fellow of the American Association for the Advancement of Science and of the Geological Society of America, and was a member of the Seismological Society of America, the American Institute of Mining and Metallurgical Engineers, the American Association of Petroleum Geologists, the Society of Economic Geologists, the California Academy of Sciences, the

Washington Academy of Sciences, the Mineralogical Society of America, the American Geophysical Union, the American Geographical Society, and the American Society of Limnology and Oceanography. He was from 1935 the editor of the *Bulletin of the Seismological Society of America*.

Professor Louderback died in Berkeley on January 27, 1957. He is remembered as one of the founders of the scientific tradition of the University of California (see Taliaferro *et al.*, 1959).

32. This description of events up to this point is largely that of Marcher (1939), who was a close friend of Eacret and heard him tell the story.

33. Marcher (1939), however, did not correctly recall that after being turned away by Hawkins, Louderback's party visited the site that same day anyway, with Thomas Sanders as their guide; the mining company logbook fills in that detail and supplies the date of the visit.

34. Marcher (1939) says that the telegram from Tiffany's was sent to "some one of those we have mentioned." Whether he was just being coy or honestly couldn't remember what Eacret had said is not known, but Roderick Dallas seemed to have taken charge and so the telegram was probably forwarded to him one way or another.

35. Louderback and Blasdale (1907) . . . just six pages, giving a rough chemical analysis and some physical properties and morphology, enough to establish priority until the full version of the description could be completed.

36. "Soon after the mine was visited satisfactory material was obtained and its identity with neptunite recognized" (Louderback and Blasdale, 1909).

37. Flink (1893).

38. Agreement made with Shreve & Company on September 30, 1907 and ratified at the Board of Directors Meeting of the Dallas Mining Company, December 8, 1907.

39. The agreement was terminated at the September 15, 1908 meeting of the Board of Directors.

40. The **Dallas Mining Company**: The first meeting of the Board of Directors of the Dallas Mining Company was held February 20, 1907; the first official stockholders' meeting was five days later; and the claims were officially transferred to the corporation on March 14, 1907.

41. Couch (1961) says it was a $5,000 share, but the company record books show that it was $2,500.

42. **Curtis D. Martin** (1835–1920's): "C. D. Martin" is referred to repeatedly in the company records and as a miner at the mine. His initials are never identified, and for a while his identity was something of a mystery; however, because of his absence at the stockholders' meeting on September 1, 1907, he was represented by Erwin Martin. Presuming Erwin to be a family member, this allows us to identify "C. D. Martin" with Curtis D[ewey?] Martin (age 64, born in New York in 1835), who appears on the U.S. Federal Census (1900) for Los Angeles with his son, Erwin (spelled "Irwin" on the 1930 census) E. Martin (age 24, born in Nebraska in 1875). This would make Curtis Martin 74 years old in 1908, which seems rather old to do much mining work, but it must be him because all of his family members correlate with Dallas Mining Company stockholders, one of which was I. E. Martin. Curtis D. Martin's wife, Juliette N. Martin, could have been stockholder "J. N. Martin." Curtis's daughter Luella Martin Dowling could have been the wife of stockholder Louis L. Dowling. Curtis's daughter Nettie (unmarried in 1900) later married Frank Jackson and therefore correlates with stockholder Nettie M. Jackson on the 1912 stockholders' list. And Curtis's daughter Bertha Martin Curry (in 1900) could have been remarried by 1912 as stockholder Bertha M. Daily. The family appears earlier on the 1880 Census for Lincoln, Nebraska. Taken together the coincidences are conclusive.

43. **Henry H. Welsh** (1857–1920's): appears on the U.S. Federal Census (1910) for Fresno, California. He was born in 1856 in Marysville, California, the son of James Welsh, an Irish miner and saloon-keeper, and listed his occupation in 1910 as "Lawyer, General Partner." By 1920 he had retired to run his own vineyard in Fresno.

44. These included (in addition to Hawkins, Couch, and the Dallases) miner A. L. Klock and his wife Rinnie and son Ralph, Curtis Martin and his family members, miner Frank Smith, Mrs. M. J. Patt. L. C. Becker, Oscar E. Slater, Augustus Walker, Earnest Chase, Ester F. Lewis, Laura J. Lewis and Noble Lewis.

45. Dallas Mining Company logbook.

46. **Leland Barnes Hawkins, Jr.** (1879–1951): U.S. Federal Census (1900) for Los Angeles lists Leland Hawkins, age 62, living with wife Rhoda and children Pearl (age 23), Irene (age 7), and Leland (Jr.), age 21, born February 1879 in California, occupation "Barber." The 1910 Census for Los Angeles shows the same family, Leland B. Hawkins, age 72, mining engineer, wife Rhoda, daughter Irene (age 17), and Leland B. Hawkins Jr., age 31, occupation "Commercial Handler, Jewelry." Leland Jr. apparently acted as intermediary between the mine and their Los Angeles gemstone distributor, Gertrude McMullen.

47. **Gertrude Sarah Reynolds McMullen** (1872–1950): U.S. Federal Census (1910) for Los Angeles, California, shows Gertrude McMullen, born in Wisconsin in 1872/3, and husband Robert A. McMullen, born in Wisconsin in 1869/70, occupation for both: "jewelry store." On the 1920 Census Robert gave his occupation as "Merchant, Jewelry Store," and Gertrude gave hers as "gem expert, gems and jewelry." The California Death Index gives her birth date as August 23, 1872, and her death date as August 4, 1950.

48. **Arthur Leslie Klock** (1862–1936): The U.S. Federal Census (1900) for Neponset, Illinois shows Arthur L. Klock, born in New York in September 1862 (occupation: "General Merchant"), with his wife Rennie or Rena Lewis, born January 1870 in Illinois, and son Ralph L. Klock, born March 1888 in New York. The 1910 Census shows the family in Los Angeles (Arthur Sr. is a realtor). By 1920 (still in Los Angeles) Arthur is working as a "house mover" and his wife is acting as sales agent for a patent medicine. His wife may have been related to Dallas Mining Company stockholders Ester F. Lewis, Noble Lewis and his wife Laura J. Lewis.

49. Bancroft (1984).

50. Online Archive of California; Perry (1961).

51. **Ralph Lewis Klock** (1888–1960): The U.S. Federal Census (1900) for Neponset, Illinois shows Arthur L. Klock, born in Jamestown, New York in September 1862 (occupation: "General Merchant"), with his wife Rennie or Rena Lewis, born January 1870 in Illinois, and son Ralph L. Klock, born March 1888 in New York. California Death Index shows Ralph Klock, born in New York on March 4, 1888, died in Riverside County, California on September 8, 1960. His World War I Draft Registration Card shows his middle name and birthplace.

52.. **Robert Max Wilke** (1862–1946) was born in Germany on July 30, 1862; he and his wife Elizabeth were married in Germany in 1888, and emigrated to America with their four children in 1904. Wilke had first visited America in 1884, perhaps examining the possibilities for someday making a new life in California.

The family settled near Mayfield in Santa Clara County, California and took up fruit farming. Wilke was an ardent gem and mineral collector, and had worked as a mining engineer in Germany; he took every opportunity to visit the working pegmatite mines in southern California to collect specimens. He began advertising "beautiful California minerals" (including tourmaline, beryl, kunzite and others) for sale in *The Mineral Collector* in 1906, giving his address as 2627 Piedmont Avenue, Berkeley, California. In March

1907 his ad offered "very fine Tourmalines of various colors, Kunzites, Beryls, Topazes, Gold Quartz, elegant crystallized Native Copper from Arizona," giving his address as Box 312, Palo Alto, California.

In November 1907 Wilke offered fine specimens of benitoite and neptunite obtained as specimen sales agent for Roderick Dallas. In 1909 he visited the Tourmaline King mine and purchased some of the largest and finest matrix tourmaline specimens ever found there; some of these he kept for his personal collection and some he sold to major museums. On the 1910 Palo Alto census he is listed as a "farmer and mineral collector."

In 1914 Wilke purchased the famous Tourmaline King mine in San Diego County and carried out a very thorough exploration for more tourmaline, but unfortunately found very little. Nevertheless, Wilke had by this time become well known as a reputable mineral dealer in San Diego County. He continued to advertise periodically, in *Rocks & Minerals* as late as 1932. Sometime in the 1930's or early 40's he closed out his business and sold off his remaining stock of minerals. *Western Mineral Exchange* of Seattle announced in August 1944: "We have purchased . . . the last eleven hundred pounds of the stock of Mr. R. M. Wilke, of Palo Alto, and his collection of duplicates. Mr. Wilke was famed for the excellence of his material and the preciseness and accuracy of his identification." He died on September 16, 1946 (California Death Index).

In recognition of his efforts to save California pegmatite specimens, the new mineral *wilkeite* was described and named by Eakle and Rogers in 1914, but in 1982 was unfortunately discredited as P-rich fluorellestadite.

53. Perhaps this was part of the "order of thirty thousand dollars worth of gems sent to France" that Oscar Couch (1961) remembers his father James Couch mentioning. Records of income from gemstone sales have not survived for confirmation.

54. **Thomas Hayes** (1852–1925): U.S. Federal Census (1900) for Tulare, California: Thomas Hayes, born Pennsylvania in March 1852 of Irish-born parents, occupation carpenter; wife Harrie (called Carrie on the 1910 Census) (born in California in September 1865; died before 1920) and daughter Leslie (born in California in September 1894) and son Leland (born in California in October 1896). Thomas and Carrie were married in California in 1891. The family appears on the 1910 Census for Coalinga, California; Thomas is listed as an "Oil man, Manipulator"; Leslie is erroneously listed as a son instead of daughter. On the 1920 Oakland Census, the widowed Thomas is living with his married daughter Leslie L. Abbott, a public school teacher; Thomas listed himself as a "civil engineer."

55. **Douglas Bovard Sterrett** (1882–1969): Social Security Death Index: born April 3, 1882, and died in Charlottesville, Virginia in February 1969. His 1918 World War I Draft Registration Card gives his middle name (Bovard) and his wife's name: Annie Bruce Carr Sterrett; at the time he was employed "mining and prospecting" for the Quebec Asbestos and Chrome Company in St. Cyr, Quebec, though he registered in Washington, DC. He was born in Pennsylvania, the son of Adlumnia Dent and Methodist Rev. James McBride Sterrett (Minnesota Territorial Census 1885; 1910 Census for Washington, DC; Vital Records of Pottertown, Pennsylvania, 1876;). Sterrett was one of the country's most prominent geologists and mineralogists for more than 50 years. He graduated from Yale, having studied mineralogy under Edward Salisbury Dana, and joined the U.S. Geological Survey in 1906. He wrote the "Production of Precious Stones" report for the USGS annually from 1906 to 1914, and also engaged occasionally in commercial mining ventures in the U.S. and Canada. He even wrote an article for *Rocks & Minerals* in 1958, on the "Old Plantation" emerald mine in North Carolina, which he had visited with George L. English in 1912 (vol. 33, no. 7–8, p. 302–307).

56. This was probably in June 1909, when an assessment of 10 cents per share was levied. The assessment notice published in the Coalinga newspaper stated that "Any stock upon which this assessment shall remain unpaid on the second day of August 1909 will be delinquent and advertised for sale at public auction." It appears that most of the stockholders (excluding the Dallases and Welsh) declined to pay that assessment and forfeited their shares. James Couch had 12,750 shares, and all were bought back by the Dallas Mining Company for $1000 (not enough to cover the $1275 assessment).

57. Incident recounted in Couch (1961).

58. On May 28, 1912 the Board of Directors was reorganized; Couch and Martin did not attend the meeting and were removed from the Board by the other three Directors, Roderick and Lyda Dallas and Henry Welsh. Roderick Dallas was then elected President and given powers of attorney.

59. **Reuben Carlton Baker** (1872–1957) was probably one of Roderick Dallas's oil business friends. He came to the Coalinga oil field in 1899 as an oil well drilling contractor, and founded the Coalinga Oil Company in 1903. He helped organize the First National Bank of Coalinga in 1908, and in 1918 he established the Baker Oil Tools Company, selling drilling tools and many pieces of equipment of his own invention (Winchell, 1933). The R. C. Baker Memorial Museum was created by his heirs in 1958 to preserve the history of the Coalinga area (rcbakermuseum.com website). See footnotes 20 regarding Margaret Dallas Shaffrath.

60. **Robert Van Vleck Anderson** (1884–1949) was born in Galesburg, Illinois on April 18, 1884 (World War II Draft Registration), the youngest son of Charlena van Vleck and Melville Best Anderson. He received an early part of his education in Germany, and attended Standard University, graduating as a geologist. He was interested in natural history and archeology, and traveled in Asia for a time with his brother, Malcolm, then went to North Africa as a petroleum geologist, and later worked as a geologist for the U.S. Geological Survey. He married Gracella Rountree in 1923. His library and letters have been preserved at Stanford. The mollusc *Pecten vanvlecki* was named in his honor in 1908.

61. **Edmund B. Walters** (1850–1920's), born in Missouri in 1950, and came to California before 1870, when he appears on the U.S. Federal Census for Yolo County, California. He also appears on the 1920 census for Lemon Cove, Tulare County, California with his wife Matilda Ann Fisher (born 1852/3 in Missouri) and son **Thornton Craig Walters** (born July 22, 1887 in California, died July 18, 1959), running a fruit farm. California Death Index; World War I Draft Registration.

62. The minutes of this meeting are not among the surviving documents, but what happened is obvious from Edmund Walter's notes in the company logbook, as well as the fact that he knew it was coming. Around October 1 he wrote: "Went into Fresno, remained there until the day of the stockholders meeting. Returned to mine, gathering my glad rags together preparatory to leaving for other parts. Remained in Coalinga waiting to hear from Mr. Welsh as to other parties coming to the mine as keepers."

63. Mr. and Mrs. Richardson ("S. R. Richardson" in the ledger) arrived at the mine on October 18, and began their entries in the logbook.

64. Totalled from entries in the Dallas Mining Company ledger.

65. See the website www.MeasuringWorth.com for online calculators utilizing (1) the Consumer Price Index, (2) the Gross Domestic Product Deflator, (3) value of the "consumer bundle," (4) average unskilled wage, (5) the nominal Gross Domestic Product per capita and (6) relative share of Gross Domestic Product. Those six methods

indicate that by 2005 the value of a dollar in 1908 had increased to about $22, $16, $49, $96, $123 or $410 respectively.

66. **Benjaman Casner Suit** (1877–?), U.S. Federal Census (1920) for Hollister, California; age 43, widowed, born in Maryland, employed as "journalist, newspaper." According to his World War I Draft Registration he was born February 29, 1876 and was working as a mechanic for a Wyoming sugar company in 1918. He listed his nearest relative as his son, Philp Ray Suit of Philadelphia.

67. **Otis Dunn:** An anonymous story in the *Mansfield News* (Mansfield, Ohio), dated Hollister, California May 26, 1933, announces "Find Rare Gem in California," and states that the benitoite mine "has been under lease to Otis Dunn, Santa Paula, California, for several years." Couch (1961) states that "Mr. Dunn of Fresno leased [the mine] and took out many beautiful gems. He donated some very nice specimens. Several went to the Los Angeles Museum and a couple to the State Mine Bureau of Los Angeles and several at other public mineral displays."

68. No specimens donated by Dunn have been found at the Natural History Museum of Los Angeles County (Anthony Kampf, personal communication, 2007).

69. **Peter Bancroft** was born May 5, 1916 in Tucson, Arizona, the son of Lillian and Roy Bancroft, a draftsman and architect. His family moved to Glendale, California in 1920, and it was there around 1930 that he met another young local collector, Edward Swoboda (see below). They teamed up to work a number of central California localities for mineral specimens, and on vacations to the Rincon pegmatite district in San Diego County he and Swoboda explored for minerals and made many interesting discoveries. They also spent seven vacation trips from 1935 to 1939 digging benitoite and neptunite at the Dallas mine in San Benito County, taking out many hundreds of pounds of specimens.

Bancroft graduated from the University of California at Santa Barbara (then called California State Teachers' College) in 1941 with a degree in Education, and studied geology and mineralogy under C. D. Woodhouse. He went on to attend graduate school in geology at the University of Southern California, the University of California at Santa Barbara, and at Stanford University. His doctorate, in Education Administration, was awarded by Northern Colorado University at Greeley in 1957. During his long professional career he served as teacher, principal, and superintendent of schools in California; as a White House consultant on education; as a professional photographer; as a gemstone buyer; as Curator of Mineralogy at the Santa Barbara Museum of Natural History; and as Director of Collections for the San Diego Gem and Mineral Society. He also worked for William Larson in the early 1970's as Marketing Director of Pala International.

Beginning in the 1950's Bancroft concentrated his personal collecting activities on acquiring world-class cabinet specimens, and assembled one of the world's finest private collections. He was arguably the first person in the modern era to publicly display a private collection of dazzling, high-quality mineral specimens, inspiring a new generation of connoisseur collectors.

Pete Bancroft is best known in the collector community today as the author of two extraordinary, beautifully illustrated books on fine minerals and their localities: *The World's Finest Minerals and Crystals* (1973), and *Gem & Crystal Treasures* (co-published by the Mineralogical Record in 1984). He has also written for many publications in Europe, Australia and the United States, and is a well-known lecturer on mines, minerals and gemstones. In 1984 he was selected as an Honorary Awardee for the American Federation of Mineral Societies' Scholarship Foundation. He is currently (at age 91) collaborating with his friend Ed Swoboda's son Brian on a new edition of *Gem & Crystal Treasures*.

70. **Edward Roy Swoboda** became one of America's most prominent and successful field collectors. He was born November 30, 1917 in Oakland, California, the son of Wilma Kindblad and Henry Swoboda, a storekeeper and telephone engineer for the Central Oil Company. By the age of eight he was already pestering his father to take him on mineralogical field trips. Around 1930 Swoboda teamed up with another local collector, Peter Bancroft (see above), and they worked a number of central California localities for specimens. On vacations to the Rincon pegmatite district in San Diego County Swoboda also explored for minerals, and was soon joined by Pete Bancroft; they made many interesting discoveries. Swoboda and Bancroft spent two weeks of every summer vacation from 1935 to 1939 digging benitoite and neptunite at the Dallas mine in San Benito County.

Ed Swoboda took classes at Long Beach Junior College (now Long Beach State College) for two years but dropped out in 1937 to earn money for more far-flung collecting excursions. By 1939 he had saved enough to take a long-anticipated trip to Brazil, where he signed on as a hoist operator at a gold mine, then moved on to prospecting on his own. He was still in Brazil when America entered the war in 1941. Reporting for what he thought would be military duty at the U.S. Embassy in Rio de Janeiro, he was instead assigned to accompany an expedition of U.S. geologists under the leadership of William Pecora, exploring for strategic minerals. Still in Brazil in 1945, he continued visiting important mineral localities, finding a wealth of gem species including fabulous brazilianite crystals (still the world's best) at the type locality of Corrego Frio. He eventually established his own business buying and selling mineral specimens and gem rough.

The years 1948–1949 found Swoboda in Mexico mining mineral specimens and gemstones. He moved on to French Equatorial Africa where he mined dioptase, then northern Rhodesia, Madagascar, Mozambique, Namibia, Kenya and South Africa. He went on to work at mines in Australia, Bolivia, Burma, Chile, Colombia, Japan, Peru, Turkey, Uruguay and Venezuela.

Back in California, Swoboda purchased the Stewart, Tourmaline Queen and Pala Chief pegmatite mines in San Diego County, then transferred ownership to the Pala Properties International company which he formed in 1968 with partner William Larson. Swoboda and Larson worked the deposits for tourmaline and other minerals. In 1972, at the Tourmaline Queen mine, they made the greatest tourmaline discovery in California history, the now-famous "blue-cap" tourmalines.

In 1973 Swoboda returned to Mexico and spent three years mining for boleite and cumengite at the Amelia mine, Boleo, Baja California. He had sold his interest in Pala Properties to William Larson in 1979, but purchased the mines back from the company, and eventually sold the Stewart mine to Blue Shepard. Swoboda is still the owner of the Tourmaline Queen mine. He then moved on to other projects, the most successful of which were the 1982 discovery of purple adamite at the Ojuela mine in Mexico, and the 1989 find of wulfenite and mimetite at the San Francisco mine in Mexico.

Ed Swoboda accumulated several fabulous collections of minerals over the years. He sold his first collection in the mid-1960's to John Jago Trelawney (much of it later went to the Smithsonian Institution). Acquiring several superb specimens from the collection of science fiction writer Arch Oboler in the mid-1970's, Swoboda started a second more sophisticated collection which, by 1982, numbered 245 exquisite cabinet-size specimens, plus many smaller miniatures and thumbnails. In that year he sold it all to Texas oilman Perkins Sams, whose collection ultimately went to the Houston Museum of Natural Science in 1984. Swoboda then began collecting

pseudomorphs, building up a large and superb collection which he sold to a private collector in the late 1990's. He is still energetic and enthusiastic about minerals today, at age 90, wheeling and dealing at every opportunity (Wilson, 1997).

71. The California Death Index.

72. The California Death Index.

73. **Miller F. Hotchkiss** (1910–1968): California Death Index shows Miller F. Hotchkiss born in California on November 27, 1910 (mother's maiden name Cruces), died in Medera County on February 27, 1968. The 1920 Census for Oakley, California shows him with his parents, Helena B. and Marius William Hotchkiss (1884–1974), farmers and ranchers, all of them born in California.

74. **Clarence L. Cole** (1879–1967) was born in Illinois on January 24, 1879 and died in Mariposa County, California on June 30, 1967 (California Death Index). In 1920 he worked at the Mansard Theater in Los Angeles. He appears on the 1930 Oakland Census, with his wife Dorcas and two children, working as a salesman for an electric sign company.

75. **Josephine Louise Scripps** (1910–1992): See WILSON, W. E. (2007) Josephine Louise Scripps. *Mineralogical Record Biographical Archive*, at www.MineralogicalRecord.com.

76. An August 1961 newspaper clipping reads "Benitoite Mine Will Be Opened for Weekend. Coalinga—The famous benitoite mine, in San Benito County, the only place in the world where this exquisite blue gem is found, will be opened to visitors on the Labor Day weekend, Saturday through Monday, for the first time this year. The mine dumps have been smoothed over, and it is reasoned, can still be found. Visitors, for a charge of $2 a day, will be permitted to keep the specimens they find. It is said that more than 500 rockhounds already have made application to search for the gem in the three days. . . . For the past eight or nine years, C. L. Cole of Oakland has had the mine leased under an arrangement with Mrs. R. W. Dallas. Unlike other persons, who at various times have leased the mine, Cole uses it only for the rockhound and collector trade."

77. Laurs *et al.* (1997).

78. Private mining company report drawn on by Laurs *et al.* (1997).

79. AZCO Mining, Inc., U.S. Securities and Exchange Commission Annual Report Form 10-K for June 30, 1998.

80. Woods (2001).

81. Dave Schreiner's website, for more information, is www.calstategemmine.com. His e-mail address is dave@calstategemmine.com.

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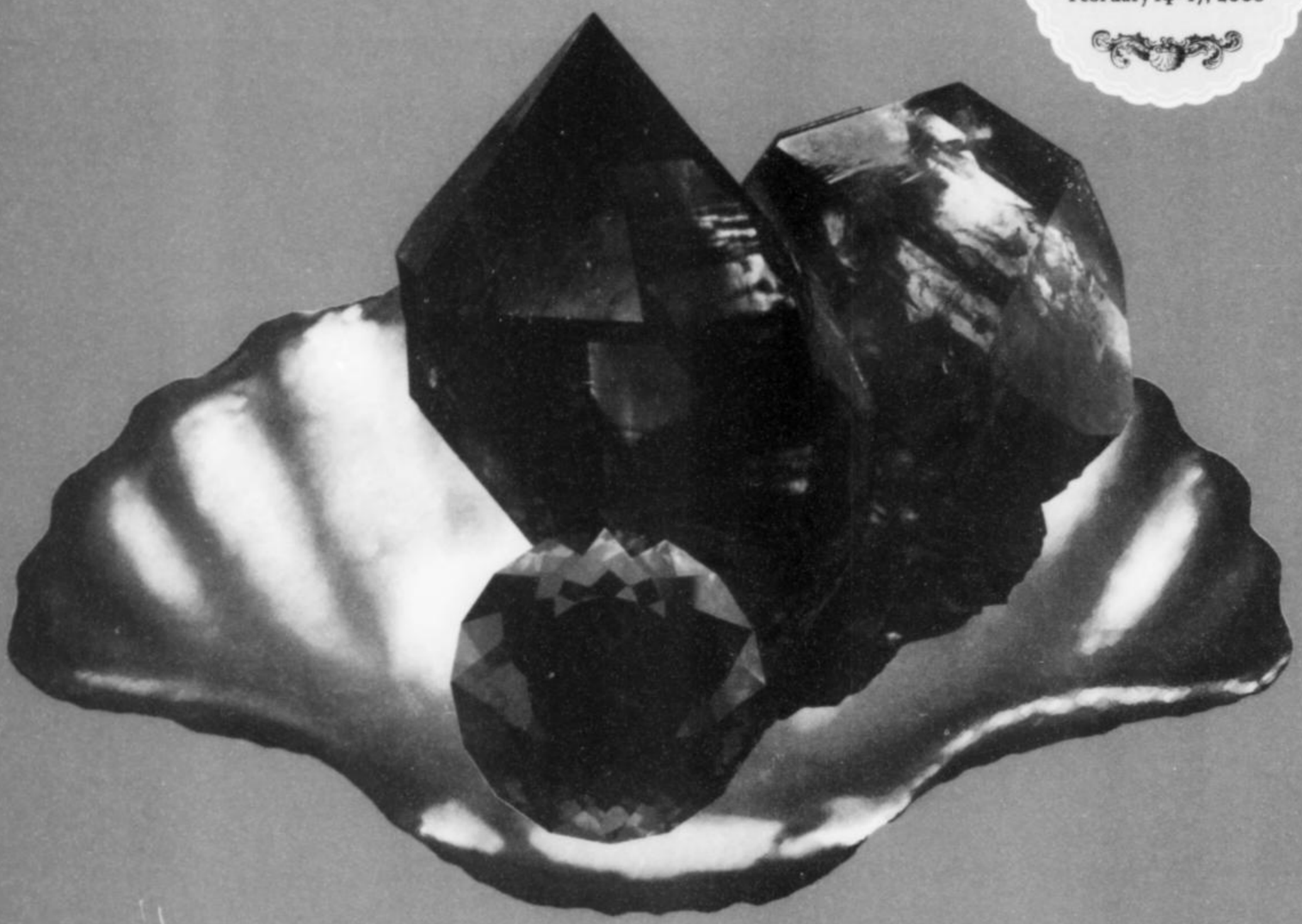

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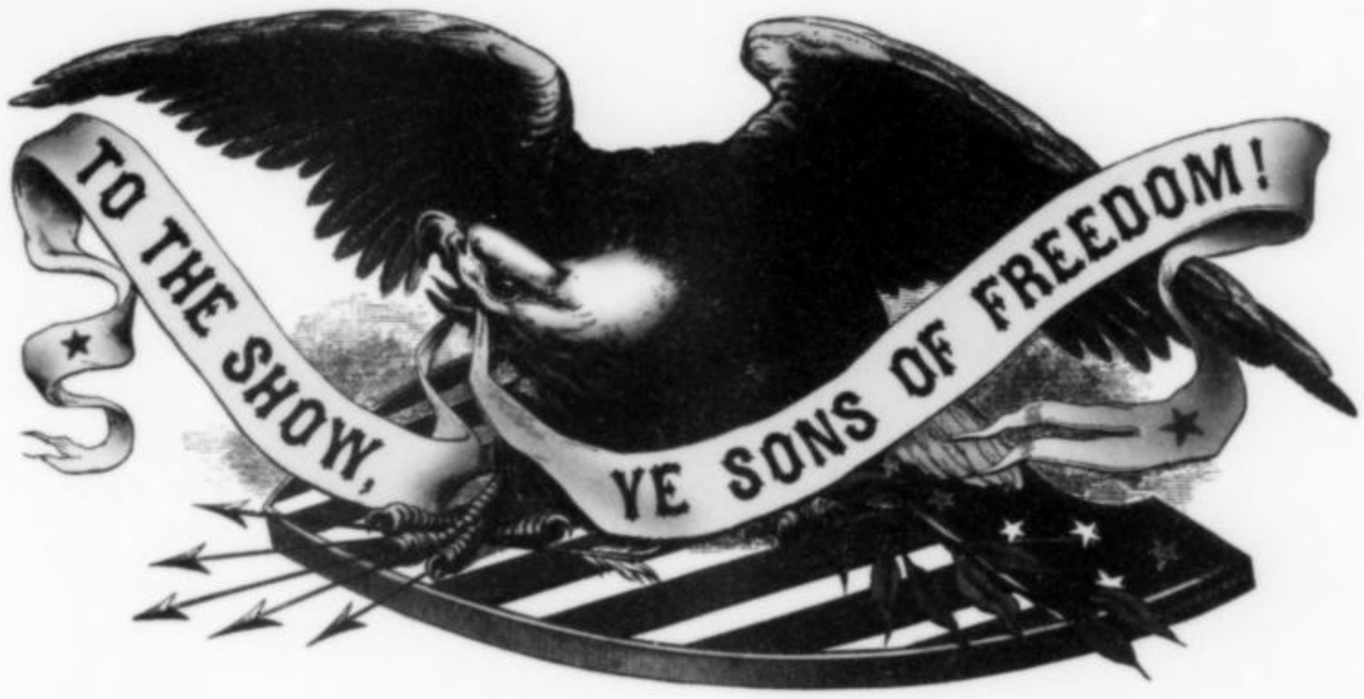
Locality #30 photo credits: Quartz var. Amethyst, gemstone 5.9 cm, Jackson Crossroads, Wilkes County, GA. Terry Ledford Collection, Jeff Scovil photo.
Quartz var. Amethyst, 5.9 cm, Jackson Crossroads, Wilkes County, GA. Terry Ledford Collection, Jeff Scovil photo.



The 29th Annual
FM-MSA-TGMS
TUCSON MINERALOGICAL SYMPOSIUM
CLASSIC MINERAL LOCALITIES
OF THE
UNITED STATES

CHAIRMEN:

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INTRODUCTION

The 29th Annual Tucson Mineralogical Symposium sponsored by the Mineralogical Society of America, Friends of Mineralogy, and the Tucson Gem and Mineral Society will be held on Saturday, February 16, 2008, at the Tucson Convention Center. Admission is free and everyone is welcome. The theme of both the Show and the Symposium is *Classic Mineral Localities of the United States.* The popularity of this theme has resulted in a record number of symposium talks, as the following pages of abstracts certainly attest.

It is difficult to define a "classic" mineral locality and derive a list of such localities from the definition. Only one book has come close to successfully doing so: *Gem and Crystal Treasures* by Peter Bancroft (1984), written almost 25 years ago. Of the 100 worldwide localities described in that book, only 24 are within the United States. Most could have been anticipated, although his list included a few surprises, such as the Yogo Gulch, Montana sapphire locality and the Virgin Valley, Nevada precious opal locality. Three other localities in this very short list were California gem pegmatite occurrences. What must be considered in such a list, particularly if it is to reflect only occurrences in one quite large and mineral-rich country—which, in the case the 2008 Tucson Gem and Mineral Show, is the United

States of America? Should the "classic" occurrence be of great historical significance, such as those mentioned or described early in our mineralogical history by Archibald Bruce (1814) or Samuel Robinson (1825), even though few if any localities of this kind are important to today's collector? Should the location have produced an exceptionally wide array of rare and unusual minerals, as have the mines of Franklin and Sterling Hill, New Jersey, many species from which, although not of great attractiveness, are nevertheless of immense interest? Should the locality have produced incomparably beautiful, widely distributed specimens of an important species, such as Red Cloud mine wulfenite or Sweet Home mine rhodochrosite? Must the locality be a single mine or prospect, or can similar occurrences forming a district be considered? Or should the locality have been the source of an overwhelming volume of good specimens of a common mineral such that the occurrence is known far and wide, even to non-collectors, e.g. Hot Springs, Arkansas quartz? Perhaps any, some, or all of the above criteria, and more, must be considered. This was the conundrum facing the group of collectors, curators, and dealers who compiled the master list of classic localities featured at this year's Tucson show. Over the past 24 months exceptional specimens from each locality have been identified and borrowed for display during this single event. Most have been photographed for inclusion in the companion book (*American Mineral Treasures*), published specifically to document this year's show and provide background on each locality. It is, therefore, with great interest and anticipation that we are at last given the opportunity to critique the final group of classic occurrences and see for the first time the assembled great specimens from them, many of which have not been placed on public display before. A number of these localities are described in our symposium and we trust that all attendees will be both enlightened and entertained.

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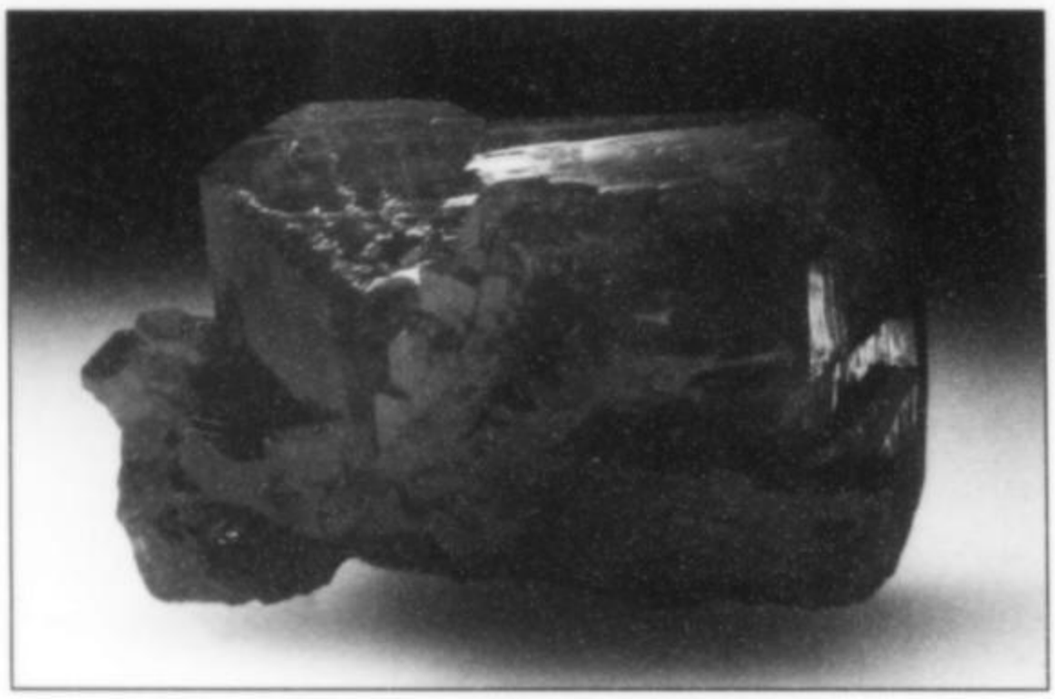
ABSTRACTS



Wulfenite, 5.7 cm, from the Red Cloud mine, La Paz County, Arizona. Harvard Mineralogical Museum collection; Wendell Wilson photo.

Minerals and History of the Red Cloud Mine, Arizona

Garth Bricker
Fallbrook Gem and Mineral Museum
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Aspects of the early history of the Red Cloud mine were revealed when Wayne Thompson began excavating the near-surface zones of the mine in 1996, turning up new evidence that the Red Cloud ores were originally milled right on the edge of the dike starting around 1881. Mining artifacts were discovered in the backfilled portion of the mine's surface workings along the north-south trench. Thompson deepened this trench by 40 to 60 feet, and in the process many old drifts were revealed that had exploited silver-rich galena veins. Printed material and a toy doll found in the deep drifts and inclines indicated that families with children lived at the mine around 1881.

The town of Silent, very close by, had a store and a saloon with an outhouse behind the store. In recent years the outhouse was dug out to see what historical treasures it might contain. A partially filled incline just south of the old Silent townsite, a short distance from the north end of the modern entrance to the Red Cloud mine, yielded an old rawhide ore bag in very good condition. A little farther south, a path led to the Red Cloud mine, and during a very rainy year a previously unknown incline with collapsing timbers was revealed. Mining artifacts were discovered, along with World War II–era papers nailed to the walls, indicating assay values.

A zone was found surrounding an area to the north, near the modern entrance to the Red Cloud mine, containing fluorescent minerals similar to some of those found at Franklin, New Jersey, including red-fluorescing calcite and green-fluorescing willemite. Emplaced in the main dike, of course, was the weathering galena which yielded the lead that produced the famous Red Cloud wulfenites. A rare occurrence of copper minerals was found in the northwest corner of the mine, containing diaboleite pseudomorphs and other copper-containing species.

The area in the vicinity of the Red Cloud mine is very interesting as well, including many mines such as the Black Rock, the Princess and the Hamburg. They were worked in the early 1880's and their silver-lead ore was hauled down to the Colorado River to be milled, then shipped out on paddlewheel boats.

The Gem and Rare-Element Pegmatites of Southern California

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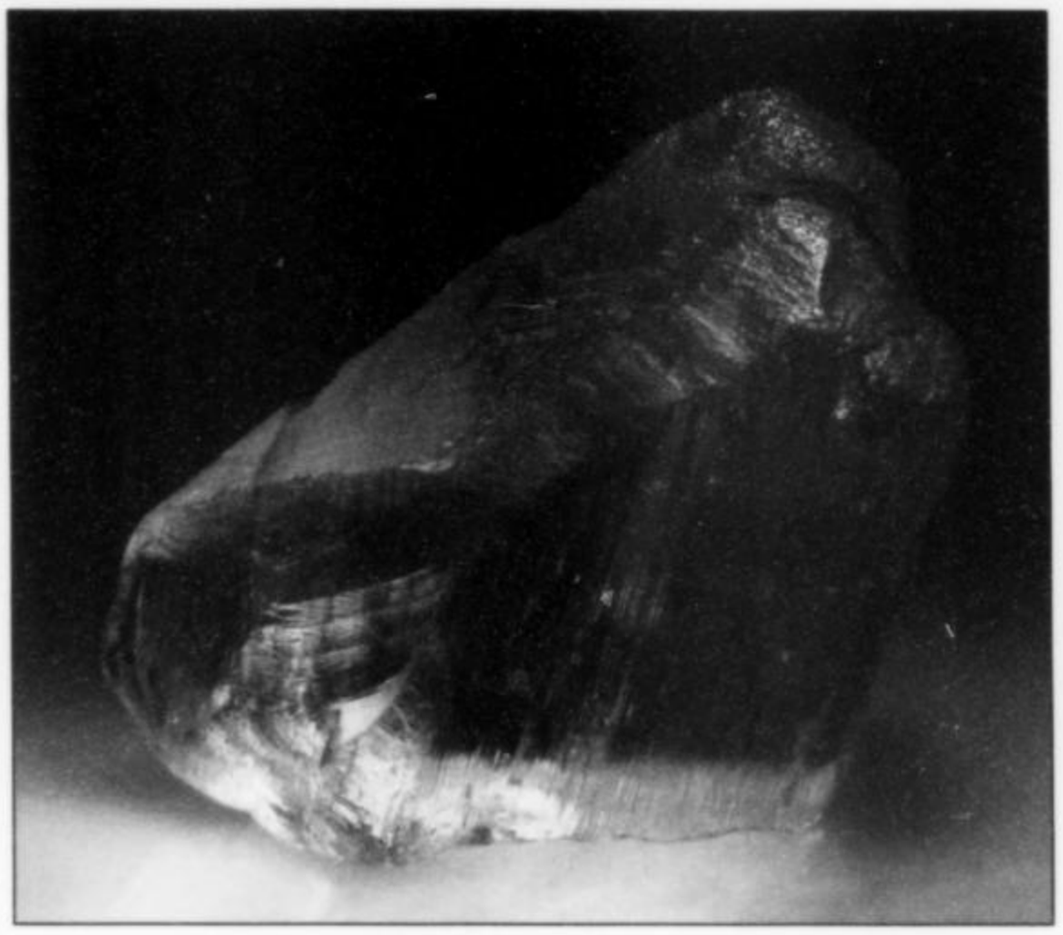
Gem tourmaline was first discovered in Southern California in 1872, on Thomas Mountain in Riverside County. It wasn't until



Spodumene (variety *kunzite*), 7.3 cm, from the Pala Chief mine, San Diego County, California. Western Minerals specimen; Wendell Wilson photo.

1898, however, that a local "gem rush" began with the discovery of the tourmaline-rich deposits in Mesa Grande. Gem-producing pegmatites were soon discovered in Pala, Ramona and other districts throughout the area. Much of the gem mining was supported by a demand for pink carving-grade tourmaline which was fashionable in China. As a result, most tourmaline was originally mined for lapidary uses and relatively few crystal specimens survive from this period. With the overthrow of the Chinese dynasty in 1912, this market dried up, causing the local gem market to crash.

After 1912, pegmatite mining activities were limited in Southern California, but attempts to reopen a number of the more famous mines began in the late 1950's. As a result, spectacular finds have been made at a number of mines, including the Himalaya, Stewart, Tourmaline Queen, White Queen and Little Three, during the latter half of the 20th century.

The Southern California pegmatite province is made up of numerous individual districts, ranging from central Riverside County southward through San Diego County and into the northern portion of the Baja peninsula. The pegmatites are, for the most part, hosted by the Cretaceous-age Peninsular Ranges Batholith, and are believed to be related to its formation around 100 million years ago. Compositionally, most of the southern California pegmatites belong to the LCT (Lithium-enriched, Cesium-enriched, Tantalum > Niobium) category according to the classification proposed by Cerný (1991). Although there are perhaps tens of thousands of granitic pegmatites scattered through the region, few have ever yielded significant gems or specimens, and fewer still have yielded enough to sustain commercial development. The few that have, however, have given up some of the most famous and well-known gem mineral specimens in the world.

The pegmatite districts in Riverside County are scattered and poorly defined compared to those farther south. A few of the pegmatites around Cahuilla Mountain have been the most productive in the area. The Fano mine is known for its occasional production of gem aquamarine crystals and schorl. The Lithia Dike has been the source of small amounts of high-quality pink and bicolored tourmaline in recent years.

Two minor pegmatite districts, Chihuahua Valley and Aguanga Mountain, occur just over the San Diego County line. The best known prospect in the Chihuahua Valley district is the Blue Lady mine, which has yielded numerous dark, indigo-blue tourmaline crystals, along with the occasional aquamarine and morganite specimen. Large, well-formed crystals of microcline have been recovered as well. Two mines on Aguanga Mountain—the Maple Lode and the Ware mine (also known as the Mountain Lily or the Emeralite mine) have periodically produced small amounts of colorless to blue topaz, and small crystals of bright blue and blue-pink bicolored tourmaline.

The best known and most productive districts occur in north-central San Diego County. The Pala district, near a village of the same name, consists of numerous pegmatites centered on three hills. The westernmost, Queen Mountain, is host to a number of well-known mines including the Stewart, Tourmaline Queen and Tourmaline King, which have been the source of numerous spectacular specimens of pink and bicolored tourmaline. Chief Mountain, in the center of the district, is home to the Pala Chief mine (known for producing high-quality specimens of both colored tourmaline and kunzite) as well as the Elizabeth R, source of some very good morganite in recent years. To the east, Hiriart Mountain hosts numerous pegmatites, including the Katerina, Vandenberg and White Queen, which have yielded fine specimens of kunzite and morganite. Kunzite, the lilac-colored gem variety of spodumene, was first identified from the pegmatites of Hiriart Mountain.

About 25 miles east of Pala, near Henshaw Reservoir, is the Mesa Grande district. Though numerous pegmatites in the district have produced small amounts of gem and specimen materials, its fame rests largely on the Himalaya mine, which during the course of the past century has been one of the most productive gem pegmatites in North America, if not the world. Aside from yielding literally tons of colored tourmaline, the Himalaya mine has been the source of numerous specimens of other minerals, including fluorapatite, hambergite, stibiotantalite, stilbite, quartz, lepidolite and feldspars. Other mines in the district include the San Diego, Esmeralda, Cota, Payne and Green Ledge.

The Rincon district is located between Pala and Mesa Grande, and has been the source of minor amounts of colored tourmaline and gem aquamarine in the past. The best known mines in the district are the Clark, Mack and Victor. Most of the district is on private or tribal lands, and very little material has been mined from these pegmatites in recent years.

The Ramona district is located in central San Diego County near the town of the same name. The most famous and productive pegmatite in the district has been the Little Three mine. The mine actually exploits two adjacent pegmatites of markedly different character. The Main Little Three dike has been the occasional source of some spectacular specimens of blue topaz, which rival those found in the Alabashka area of the Ural Mountains, Russia in form and color. The dike has also produced numerous well-formed crystals of dark green tourmaline, commonly associated with smoky quartz and feldspars. The nearby Hercules-Spessartine dike has been the source of some of the finest near-end-member spessartine garnet found anywhere. The material is typically rather corroded and is more suitable for lapidary use, but some spectacular specimens have occasionally been found.

The Jacumba district is a remote and poorly prospected region near the Mexican border. A major find of gem spodumene was made there in 1975 at a prospect known as the Beebe Hole. This claim has since been merged with the neighboring Pack Rat mine and, while no more finds of spodumene have been made, the mine did produce some gem aquamarine, spessartine, fluorapatite and rare phosphate minerals during the 1990's.

Although most pegmatite mines in southern California have once again fallen into inactivity, occasional finds continue to be made. Most important has been the remarkable finds of pink tourmaline and beryl at the previously unimportant Cryo-Genie mine in 2001–2003.

The Stewart, Elizabeth R and Pala Chief mines also continue to be worked, producing the occasional find.

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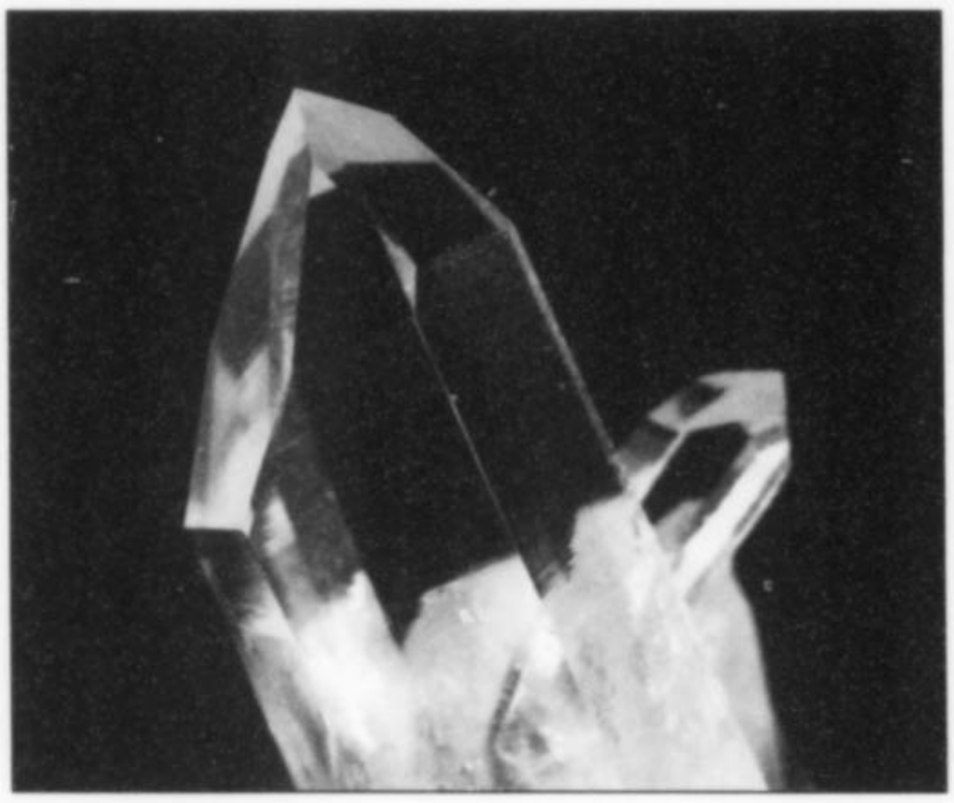

**Quartz crystal, 5 cm, from Hot Springs, Arkansas.
Carolyn Wilson collection; Wendell Wilson photo.**

Arkansas Quartz Crystals—The Leitmotif of Quartz Morphology for Collectors

Si Frazier
6331 Fairmount #306
El Cerrito, CA 94530

The Hot Springs, Arkansas area is world famous for its sharp, clear, lustrous, exquisitely well-formed quartz crystals. They are abundant over a considerable area and were well-known and even exploited by the Indians before Spanish explorers penetrated the area. President Jefferson was curious about the area and sent an expedition to investigate it.

The hot springs elicited interest and attracted tourists early in the 19th century. As transportation improved, more tourists were attracted. Locals quickly realized that tourists, then as now, constituted a great market for the quartz crystals, which were dug up by the wagonload to supply this demand and were eventually distributed all around the U.S. and Europe. Clear crystals were even cut and polished and offered under the unfortunate misnomer of "Arkansas Diamonds."

The crystal morphology of Arkansas quartz crystals is relatively simple. It is easy to acquire good examples of most of the crystal forms and growth habits of quartz on a visit to the area. A dedicated collector can spend many happy hours or days picking through the abundant offerings of the locals or digging at the many fee-digging areas.

The quartz crystals occur in steeply dipping cracks or fissures in sedimentary rocks, especially sandstone formations. The veins are surprisingly close to monomineralic from a collector's point of view, especially in the sandstones. Often there has been movement in the veins during crystal formation, causing crystals to break and be regrown. This often produces unusual, highly collectible habits, sometimes bordering on the bizarre. There will be some discussion of the factors which determine the various crystal habits shown by Hot Spring quartz crystals, especially those which are most interesting and desirable. What is most treasured by collectors and museums, however, is the large, clear, sharply formed classic "rock crystal" quartz.

**Azurite crystal, 5.8 cm, from Bisbee, Arizona.
Western Minerals specimen; Wendell Wilson photo.**

Bisbee, Arizona
The "Classic" American Mineral Locality

Richard W. Graeme
158 Miroquesdada #2100
San, Isidro, Lima 27
Perú

The wonderfully rich copper deposits at what is now Bisbee, Arizona were discovered and exploited at a most opportune time for mineral appreciation and preservation. Late in the 19th century there was a period of great public curiosity concerning all things natural, and minerals were no exception, particularly the strikingly beautiful copper carbonates (azurite and malachite) that began to appear from the remote deserts of southeastern Arizona. Museums and private collectors alike were anxious to acquire samples of what were, at the time, the finest known examples of these colorful species.

Fortunately, the mines at Bisbee were owned and operated by men of vision who possessed a true sense of responsibility for the

recovery and preservation of these natural wonders; thus many thousands of fine minerals were saved for our continued enjoyment today. This is an overview of that combination of fortuitous events which gave Bisbee the legacy of its great minerals and true claim to the title of "America's classic mineral locality."

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Diamond crystal, 8 mm, from Crater of Diamonds State Park near Murfreesboro, Arkansas. Jim Houran collection; Jeff Scovil photo.

Crater of Diamonds State Park, Arkansas—An Overlooked Treasure

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The year 2006 was the celebration of the 100th anniversary of the discovery of diamonds in the Prairie Creek diatreme near Murfreesboro, Arkansas by John Huddleston, a local pig farmer. Thanks to poor financing and, by modern standards, even poorer security measures, the pipe never proved commercially viable. Some even claimed that the DeBeers syndicate was behind the failures, but much of that early history is now lost in time and memory—overshadowed by the thousands of tourists and many local diggers who visit the pipe every year. It is known that tens of thousands of diamonds were recovered by both commercial and non-commercial efforts in the many years before the area became state property in 1972. And since then 25,000 more crystals have been documented. Modern facilities now greet the visitor, whether they are seasoned collectors or first-time hopefuls.

I will discuss some of the early history of discovery and the people involved in it, and will present some information about the early mining efforts. Also the park's improvements since 1972 will be discussed, as will new statistical information of interest, including a prediction of how long the park will continue to be a source of diamonds for collectors and visitors. Of particular interest will be some images of several of the larger diamonds discovered during 2006. Each day that passes, the soil gives up another couple of diamonds to eager hunters. Experience often gives way to beginner's luck when finders-keepers is played at this most unusual park!

Beryl (variety *aquamarine*) crystals to 7.3 cm, from Mt. Antero, Colorado. Denver Museum of Nature and Science collection; Wendell Wilson photo.

The Mount Antero Mineral Locality, Chaffee County, Colorado: A Collecting History

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The blue beryl ("aquamarine") crystals from Mount Antero in Colorado were first introduced to the mineralogical community by "Nels" Nelson Daniel Wanemaker via a letter from Roselle T. Cross to George F. Kunz in 1885. The discovery of aquamarine was soon followed by the recognition of phenakite, bertrandite, fluorite and topaz from the Mount Antero and Mount White areas. During the early years, from 1885 to 1893, Wanemaker sold specimens to all of the leading mineralogists and collectors in the U.S. These minerals were collected from miarolitic pegmatites, hydrothermal veins and greisens associated with the upper portions and first-crystallized parts of the peraluminous Mount Antero Granite, especially within the leucocratic variant of the granite.

After Wanemaker had moved on to other ventures, several other miners tried their hand on Mount Antero, of whom only John D. Endicott from Canon City documented his success. From 1928 to 1949, Ed Over, in association with Arthur Montgomery, collected numerous specimens which were sold to leading museums and private collectors. With the rise in price of beryllium and its subsidy by the U.S. Federal government in 1952, John King of Salida, Colorado and Grady Cardwell of Texas both saw opportunity on Mount Antero for mining beryl and producing aquamarine gemstones as

a by-product. This led to the first dirt road up Mount Antero and Mount White in 1956, and the reopening of the California molybdenite mine adit in 1960.

By 1962, all the business entities on Mount Antero had gone bankrupt and the claims had lapsed. Mining the Mount Antero granites for disseminated beryl had been an economic failure. In May 1969, Grady Cardwell formed a new company, North American Beryllium Corporation (NABC), reclaiming the entire south knob of Mount Antero. This company focused on trying to mine beryllium ore rather than gemstones. They were not concerned with fine crystals, and did not seriously interfere with collectors digging by hand for mineral specimens.

With the road open to amateur diggers, numerous discoveries of gem pockets were made across Mount Antero and Mount White by many collectors from the 1970's through the 1990's. Collectors such as Chuck Barnes, Eldon Bright, Bill Chirnside, Bob and Doris Drisgill, Jim Grika, Pete McCrery, John Melby, "Rosy" Horace O'Donnell, Curtis Abbott, Cliff Nicholson, Andrew Taylor, George Fisher and George Robertson made notable discoveries.

The situation changed radically in 2001 when the Cardwell family decided to focus on mining aquamarine gemstones. Accordingly, under the active supervision of fourth-generation miner Craig Cardwell, mineral collecting on the south knob of Mount Antero was restricted. These claims are still legally valid. This has forced a new generation of collectors to move their collecting activities to areas that have not been prospected since 1956, when the first road up the mountain was opened. Steve Brancato after 2001 recovered the finest matrix aquamarine specimens ever known, as well as topaz and smoky quartz. Jeff Self and associates recovered large quantities of smoky quartz and associated minerals. Bryan Lees' sublease on the Cardwell claims resulted in the 2005 discovery of the finest helvite crystals known from the locality. The 2000–2007 prospecting activity has been more intensive and surprisingly more successful than ever before, proving that the locality is far from exhausted. This activity has not been without cost and strife involving the claim holders, casual collectors, environmental activists and U.S. government employees.

The Benitoite Gem Mine: Past, Present and Future

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The Benitoite Gem mine, one of America's classic mineral localities, was discovered in 1907. Since that discovery, its history has consisted of a series of owners and lessees trying to find what the previous owners and lessees missed. Abandoned and sold at different times, the mine seems to keep shouting back, "I'm not quite dead yet!"

We have the early miners to thank for the continued life of this locality. Dynamite and punch presses were used to separate benitoite from the host rock. Although it was soon learned that hydrochloric acid could remove the natrolite that almost always covered the crystals and matrix, the acid treatment was found to take too long, so the miners continued to employ the crude but fast techniques, ruining countless thousands of specimens and gemstones while spreading small crystal fragments all over the area.

After the mine was closed in 1913 by Roderick Dallas, it was briefly reopened in 1933, then closed again, then leased in the 1940's to a Mr. Hotchkiss. From 1952 to 1967, Mr. Cole leased the mine

Benitoite crystal, 1.8 cm, on natrolite, from the Dallas Gem mine, San Benito County, California. Smithsonian collection; Wendell Wilson photo.

and put ads in *Rock and Gem* magazine inviting the public to come and collect all they wanted for under $1 per pound! In 1967, the mine was leased to William Forrest and Elvis "Buzz" Gray, who worked the dumps until 2000. In 1987 they purchased the mine from the Dallas family. In 2000 the mine was sold to Bryan Lees' company, Benitoite Mining, Inc., in Golden, Colorado. In June of 2005, it was announced that the mine was closed, supposedly marking the end of yet another great American locality.

But that is not the end of the story. In the summer of 2005, the mine was sold to David Schreiner of Coalinga, who has recently reopened the mine to the public on a fee-digging basis. In February of 2006, Dave's brother Terry found a piece of rough that cut the world's third largest clean faceted benitoite (8 carats). Not bad for a "dead" locality!

What does the future hold for the Benitoite Gem mine? If the past is any guide, more people will write it off as dead just before something else amazing is discovered there.

Iridescent and Other Fluorites from the Findlay Arch, Ohio

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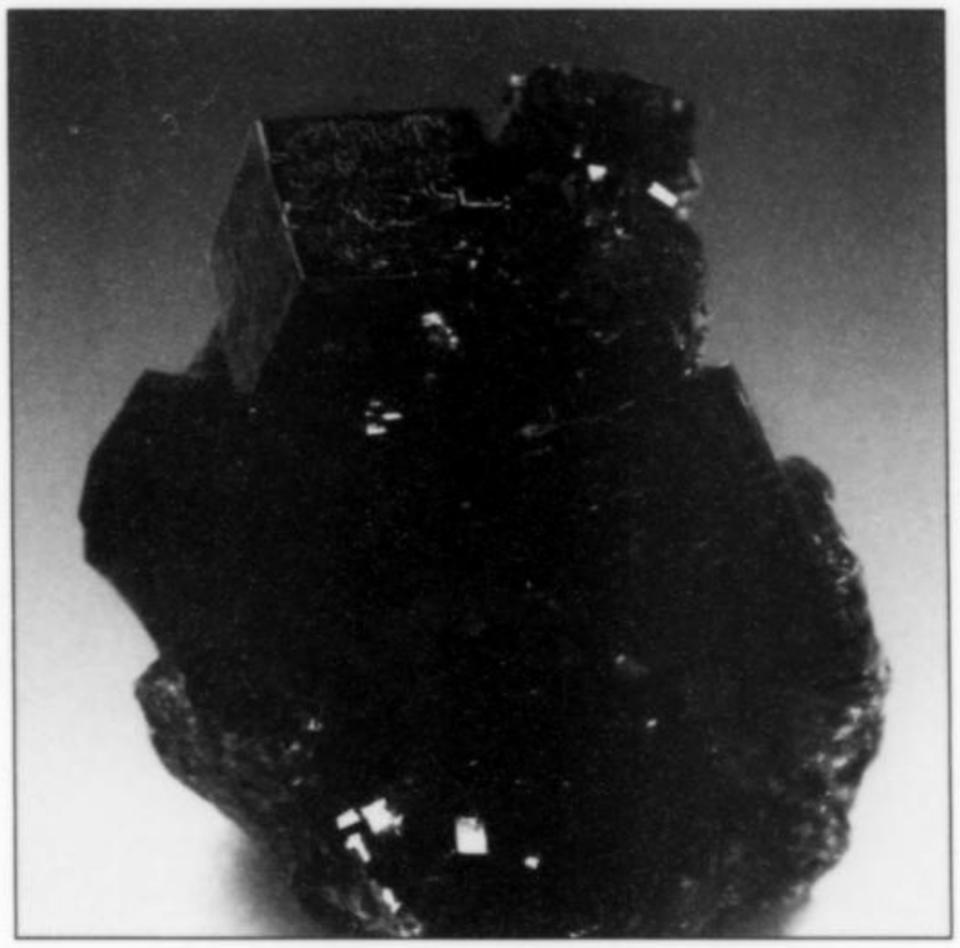
Ohio has produced some of the most beautiful and unique fluorite specimens in North America. These have all come from the Findlay Arch mineral district, located in northwestern Ohio and extending into Allen and Adams counties in Indiana and Monroe County in Michigan. The Findlay Arch is a large north-south-trending, subsurface geological structure (basin divide) made up of sedimentary rocks ranging in age from mid-Silurian to mid-Devonian. Nearly 100 minor mineral occurrences define this district, and the minerals of the district are chiefly found in the open spaces provided by fossil molds, gypsum molds, vugs, caves, and fractures within



Fluorite (purple on iridescent brown crystals), 2.6 cm, from the Auglaize quarry, Paulding County, Ohio. Wendell Wilson collection and photo.

dolostones. Prominent locations include Bellevue/Flat Rock, Bluffton, Junction, Delphos, Clay Center, Genoa, Custar, Woodville, Gibsonburg, Maumee, Lime City and Lima in Ohio, Newport in Michigan and Fort Wayne in Indiana. Fluorite crystals range in size from sub-millimeter to 10 or more centimeters. One of the most notable features of some specimens is surface iridescence—usually gold or brown, but also showing blue, green, violet and orange-red colors. This effect was recently shown to be due to a thin film of hydrocarbons on the fluorite surfaces. A noteworthy characteristic of these specimens is that the iridescent film inhibits the fluorescence of the fluorite beneath.

Attractive non-iridescent fluorite is also found among the Findlay Arch deposits. Most commonly the crystals are lustrous yellow to dark brown, and fluoresce strongly under longwave ultraviolet light. Other collectible specimens include color-zoned crystals, such as those from the Auglaize and Delphos quarries that have deep purple cores overgrown by a later generation of colorless fluorite. Such a specimen has won the awards for best miniature at the Tucson and Denver shows. A particularly aesthetic combination common at the Auglaize quarry is the sparse overgrowth of lustrous, transparent, deep purple or pale violet fluorite crystals on a druse of iridescent brown fluorite.

Crystal morphologies are typically simple and are dominated by the cube. However, dodecahedral, hexoctahedral, tetrahexahedral and other modifications of the cube have been found, and at Delphos and Lima unusual botryoidal-appearing clusters of cubic crystals and needles have been found in the same geologic layer.

What is the "Most Important" Mineral Locality in the U.S.?

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Many different criteria could be used to assess the "best" or most important mineral locality in the U.S. or the world. These might include the number of mineral species found, the quality and abundance of its specimens, and the area's contributions to the scientific literature. Some of the most noteworthy U.S. localities would certainly include the pegmatite districts of the Pikes Peak batholith in Colorado, San Diego County in California, and various localities in Maine, North Carolina, and Virginia. Non-pegmatite deposits would include Bisbee, Arizona; Butte, Montana; and the mid-continent lead-zinc-fluorite districts. Some localities might merit consideration for their spectacular abundance of one mineral, such as the wulfenite from the Red Cloud mine in Arizona.

A good case could be made for Franklin and Sterling Hill, New Jersey, as the nation's premier mineral localities. Reasons would include their large (340+) number of species, number of type species and number of unique species, as well as their wide familiarity to collectors and their abundant representation in museums and in the scientific literature—not to mention the area's unique abundance of spectacular fluorescent minerals.

How does the rest of the world compare? Some contenders for value, quality and abundance of specimens could be the pegmatite districts of Minas Gerais, Brazil, and of Madagascar, Pakistan, and China; Tsumeb, Namibia; Broken Hill, New South Wales; and the Poona, India zeolite region. Localities prominent for their number of mineral species would include Mont Saint-Hilaire, Quebec; Långban, Sweden; and the alkaline igneous complexes of Ilimaussaq, Greenland, and Khibiny and Lovozero in the Kola Peninsula, Russia.

Calcite, 14 cm, from the Elmwood mine, Tennessee. Smithsonian collection; Wendell Wilson photo.

The Elmwood Zinc Mine, Carthage Tennessee

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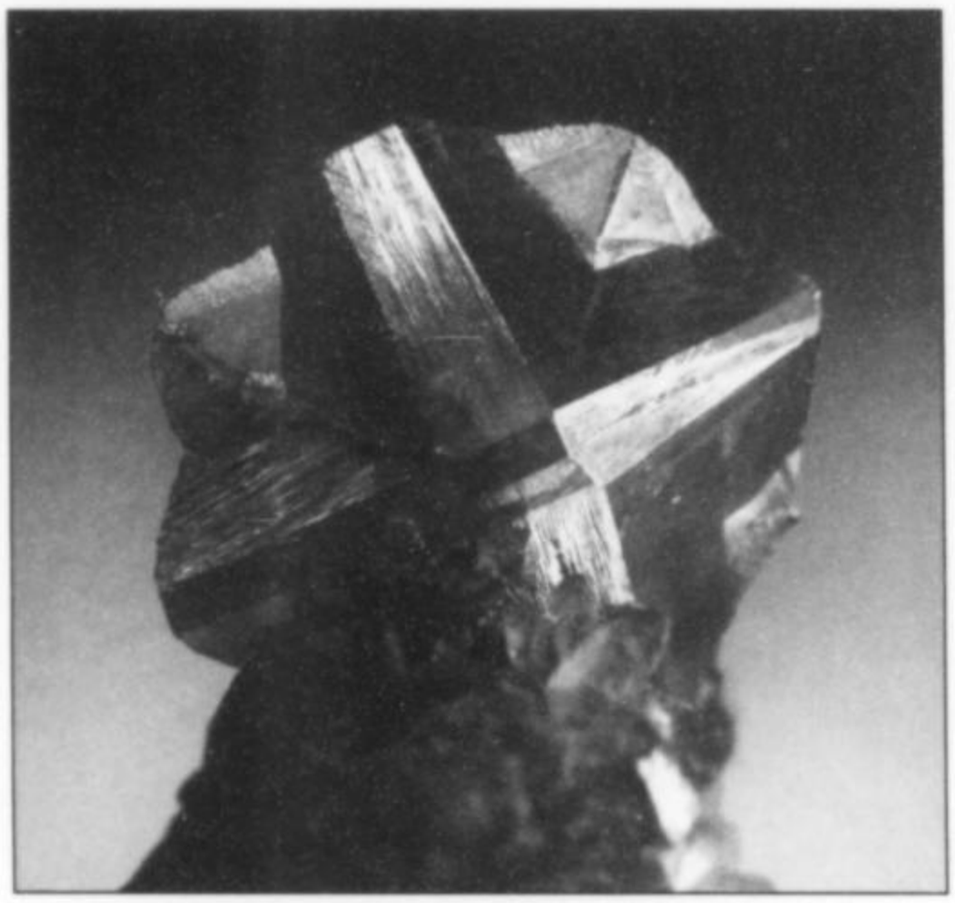
The Elmwood Zinc mine is located in central Tennessee near the town of Carthage in Smith County. The orebodies—classic examples

of Mississippi Valley-type hydrothermal deposits—are found within brecciated areas, caves and solution cavities of Ordovician-age carbonates, both limestone and dolomite. Miners have reported drilling into some of these caves that were so large that they had to wait hours (and even, in several cases, days) for the water to drain out of the ore pockets.

Great specimens will be the focus of this talk; I will show specimens from the Elmwood mine and recount some very interesting stories associated with these pieces. The calcites and fluorites are of world-class quality and size, and are universally recognized as some of the best crystal specimens that these species can produce.

Last December, Strategic Resources Acquisition (SRA) Corporation purchased the Elmwood properties, including drills, loaders, sealers and other equipment, for $16.3 million. This group plans to have the mines in full production by early 2008, bypassing feasibility studies and moving forward with the de-watering of the mine complex. Several new shafts are contemplated in this venture. There are currently three shafts: one at Elmwood, one at Gordonsville, and one at Cumberland. There are plans for possible additional shafts in the Stonewall area. SRA has hired Dynatec to restore production at these mines. They plan to sell zinc, germanium, gallium and limestone rock for agricultural use, and they feel that the profits from these sales will help offset their operating costs. Arrangements for the commercial collecting and sale of mineral specimens are still in negotiation, with several groups actively pursuing this contract. All we can hope for is to see a rejuvenated flow of great specimens from these mines in the future.



Eight-cornered wulfenite crystal, 1.5 cm, from the Mammoth-St. Anthony mine, Tiger, Arizona. Smithsonian collection; Wendell Wilson photo.

The Mammoth-St. Anthony Mine, Tiger, Arizona

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The Mammoth-St. Anthony mine at Tiger, Arizona has recorded 90 mineral species, ranging from the common to the very rare. Fine examples of cerussite, dioptase, malachite, azurite, wulfenite, smithsonite and vanadinite have been collected there, as well as some of the finest known examples of a number of rarer species such as boléite, diaboléite, caledonite, hydrocerussite, linarite, matlockite and leadhillite.

"Mammoth-St. Anthony mine" is the correct name to use when labeling specimens, especially those collected between 1939 and 1953. The mine lies about 80 kilometers north-northeast of Tucson.

From 1879 to 1914, mining efforts focused solely on gold recovery. The mines were worked for wulfenite as a source of molybdenum during World War I, but shut down shortly after the war ended. After a few false starts, mining resumed in 1935 and then shut down for good in 1953.

Scientists became interested in Tiger following the 1938 publication of Nels Peterson's *Geology and Ore Deposits of the Mammoth Mining Area, Pinal County, Arizona*. Richard (Dick) Bideaux performed the first comprehensive study of these deposits while doing graduate work at Harvard University.

Two miners, George Griffith and his brother Archie, collected and sold specimens for the mining company, and even the mine manager J. J. Strutzel maintained a personal collection. Starting in 1968, Magma Copper Company (the owner of the Mammoth-St. Anthony mine) allowed organized mineral club collecting on the dumps and in an open pit at Tiger, but this came to an end in 2005.

Today, small but superb suites of Tiger minerals can be seen in three Arizona museums: the University of Arizona, the Arizona-Sonora Desert Museum, and the Arizona Mining and Mineral Museum. Private collections containing excellent examples include those of Rock Currier, Evan Jones, Les and Paula Presmyk and Tony Potucek.

Amethyst Scepters from Ashaway Village, Hopkinton, Rhode Island

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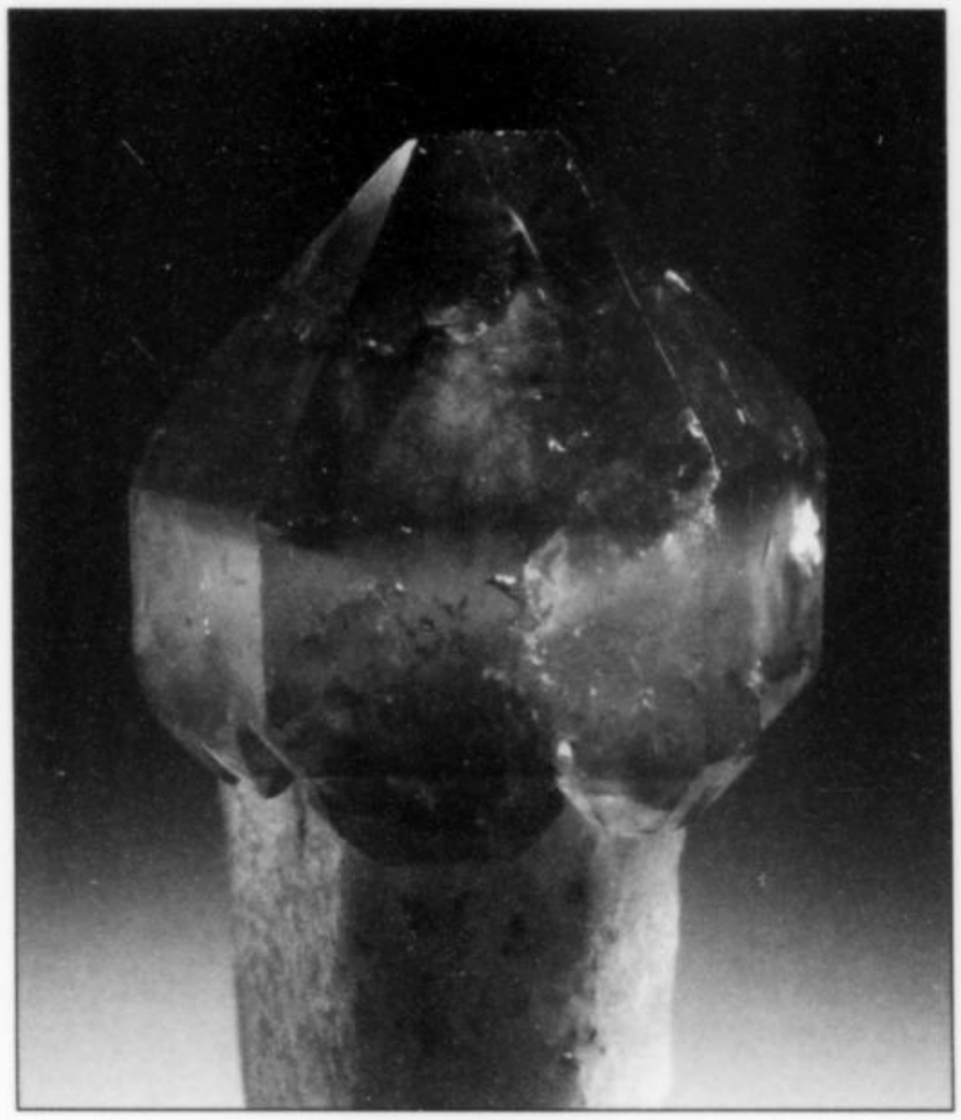
The eastern United States is well known for its many occurrences of amethyst. In the spring of 1981, amethyst scepter overgrowths on milky quartz crystals were discovered in Ashaway Village, Hopkinton, Rhode Island (Metropolis *et al.,* 1986). This deposit has produced some of the most beautiful amethyst specimens found in the United States. Fine examples are on display in museums worldwide. The amethystine color ranges from faint violet to a deep purple, and the contrast of gemmy amethyst caps on opaque, porcelain-white stems is particularly aesthetic.

The amethyst specimens occur in collapsed and segmented quartz veins embedded in a thick clay unit. No surface exposure of these quartz veins has been found, and they have only been accessible where small temporary pits have been dug. Since 1985 the authors have dug at the site each year for one day only. Although the majority of good specimens were found between 1981 and 1985, important specimens have turned up during subsequent digs. Examples include fine single scepters and matrix scepters of deep purple amethyst caps on white stems; large single milky quartz crystals (up to 35 cm) with violet amethyst overgrowths that cover the termination and often extend over a significant length of one or two prism faces; and scepters with hoppered amethyst overgrowths. One exceptional



Quartz (amethyst scepter on milky quartz), 6.8 cm, from Hopkinton, Rhode Island. Russell Behnke specimen; Wendell Wilson photo.

specimen is a doubly terminated scepter measuring roughly 17 cm long and 7 cm wide. Most specimens found at the site, however, are milky quartz crystals with no associated amethyst. Rarely, colorless, transparent quartz crystals have been encountered.

Fluid inclusion data have been determined for the quartz crystallization, including temperatures of homogenization (94.5° to 149.7° C; mean = 124.6° C for amethyst overgrowths, and 125.5° to 186.9° C; mean = 156.4° C in the milky stems), salinity (0.2 to 15.7 eq. weight % NaCl; mean value 7.8), and oxygen and hydrogen isotopic compositions ($\delta^{18}O = -3.5$ to -2.2 ± 0.2 ‰ for the milky quartz and from -6.0 to -3.1 ± 0.2 ‰ for the amethyst overgrowths). These data indicate that, contrary to initial speculations of an igneous origin, the quartz precipitated from low-temperature, hydrothermal meteoric waters, along with the surrounding clays, during several stages of precipitation (Rakovan *et al.*, 1995).

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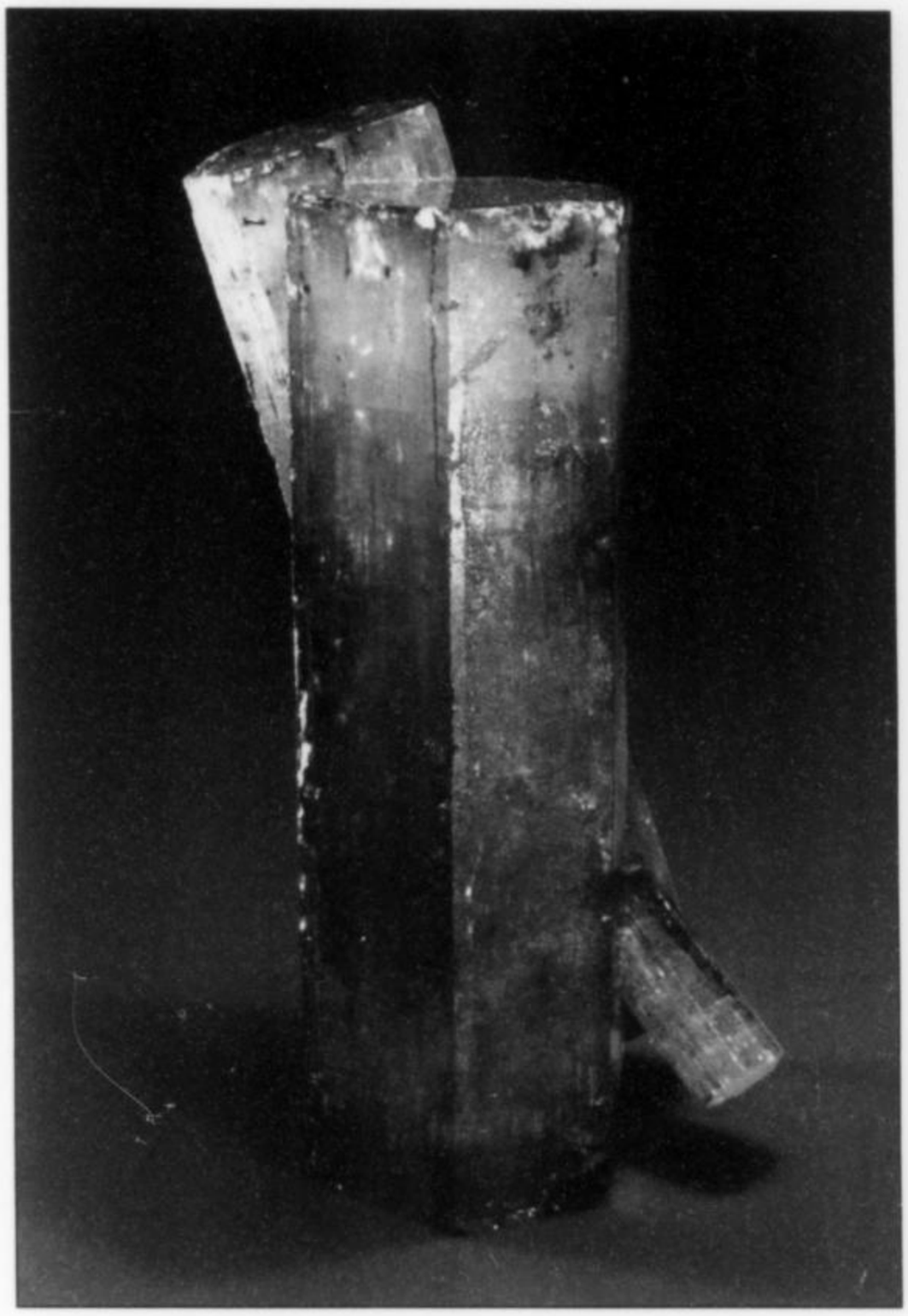

Beryl (variety *emerald*), 11.4 cm, from near Stony Point, Alexander County, North Carolina. Smithsonian collection; Wendell Wilson photo.

Emerald Crystal Pockets of the Hiddenite District, Alexander County, North Carolina

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Since the late 1870's the Hiddenite district has produced North America's largest emeralds. The current record is a 1,869-carat crystal found in 2003 on the North American Emerald Mines (NAEM) property, located on the northeast side of the 1.5 × 5-km district. Approximately 70% of the district's estimated 50,000 carats of emerald production have come from this property, including 15 of the continent's 20 largest emeralds.

Emeralds are hosted by late-metamorphic Alpine-type lensoidal quartz veins cutting Cambrian-age metasedimentary rocks of the plate-tectonic Piedmont terrane. This 160 × 1,120-km crustal block has a long deformational history involving multiple continental collisions throughout the Paleozoic. Quartz veins cut most metamorphic textures and appear to have originated as fillings of tensional fractures in the Early Mesozoic. The host rocks, originally a sequence of siliceous deltaic sediments, underwent three periods of major folding, reached mid-amphibolite grade metamorphism and are mapped as layered biotite gneiss.

Half of the veins have crystal pockets and half of the pockets contain emeralds. Crystal pockets are typically three-fourths filled with crystal breccia. Pocket minerals include quartz, muscovite, carbonates, albite, rutile, clay, beryl, sulfides and rare hiddenite and graphite. Emerald values vary widely, with collector specimens up to $500/ct and cut gemstones up to $60,000/ct. Remarkably, emerald crystals average over 50 carats each and crystals over 1,000 carats account for 8% of the total production. Pockets containing over 3,000 carats have been documented.

The typical emerald vein contains 80 cm^3 of white cryptocrystalline quartz overlying a 20 cm^3 open crystal pocket. The largest documented vein contained 17 m^3 of quartz overlying a 7 m^3 pocket filled with 7 tonnes of crystal breccia. Narrow wall-rock alteration halos are common peripheral to veins and crystal pockets.

Spodumene (variety *hiddenite*) crystal, 1 cm wide, from Hiddenite, North Carolina. Terry Ledford specimen; Wendell Wilson photo.

Mineralogy of the Gem-Bearing Alpine-Type Quartz Veins from Hiddenite, North Carolina

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Emeralds in North Carolina were first discovered from the Hiddenite area as early as 1913, when local farmers began finding crystals in plowed fields. Shortly thereafter, a new chromium-green gem variety of spodumene, later named *hiddenite,* was uncovered, and the region became of great scientific and gemological interest. Today, the Hiddenite area constitutes the most significant emerald-producing district in North America and is the world's only confirmed locality for hiddenite.

Emerald and hiddenite both occur in cavities within steeply dipping Alpine-type fissure quartz veins that cut across highly deformed migmatitic schists and quartz-biotite gneiss of the Inner Piedmont Belt. Accompanying the gem minerals is a suite of minerals which, together with the emerald and hiddenite, indicate low temperature-low pressure crystallization conditions. Typical minerals of the quartz veins and their cavities include albite, fluorapatite, calcite, chabazite, clinochlore, dolomite, goethite, graphite, kaolinite, muscovite, molybdenite, pyrite, pyrrhotite, quartz, rutile, siderite and tourmaline.

The mineralogy of the cavities is dominated largely by quartz, muscovite and calcite. Multiple generations of quartz (fine-grained, doubly terminated crystals, to large, transparent or milky crystals, to late amethystine scepters) and calcite (rhombohedrons, scalenohedrons, platy and hexagonal prisms) are common in most cavities. Colorless, white and gray calcite is the most abundant carbonate mineral present, whereas dolomite and siderite are less common and are generally absent in cavities that do not host emerald mineralization. White, gray and pale yellow rhombohedrons of dolomite are typically the first of the three carbonates to form, being found not only in the massive quartz portion of the vein, but also within the cavity itself. Honey-colored rhombohedrons of siderite are restricted to the emerald-bearing cavities. Dark brown pseudomorphs of goethite after siderite are common in emerald-bearing assemblages that have been subjected to weathering. Muscovite occurs as tan-colored crystals, sometimes with greenish rims. Rutile tends to form stubby, thin, elongated black to red crystals with quartz, albite or calcite. Reticulated twins of rutile frequently occur with the emerald-bearing assemblage.

Sulfides generally crystallize during the last stage of mineralization in the cavities, along with graphite and zeolite minerals, and occur in two separate vein assemblages: (1) beryl-bearing fissure veins that carry accessory pyrite, pyrrhotite, sphalerite, chalcopyrite and trace amounts of galena, and (2) spodumene-bearing veins that host pyrite, pyrrhotite, molybdenite and trace amounts of gersdorffite. Pyrite is the dominant sulfide mineral present, forming 1-mm cubes and octahedrons. Hexagonal crystals of graphite 1 mm in diameter occur included in and on the surfaces of calcite, pyrite, muscovite and chabazite. Schorl, monazite and zircon have been rarely observed in some hiddenite-bearing cavities. Chabazite-Ca is found as a late-precipitating phase in spodumene-bearing veins, but is apparently absent in emerald-bearing veins. Chabazite-Ca occurs as simple, water-clear penetration twins of pseudocubic rhombohedra and as yellow, complexly twinned, lens-shaped crystals. Clays are represented by white kaolinite and a pale green clinochlore-like mineral.

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What's New in Minerals

Munich Show 2007

by Thomas Moore

[November 2–4]

I will only mention in passing (and hereafter refrain from whining about) the present abysmal dollar-to-Euro exchange rate; on the day I left it took about $1.41 to buy a Euro. Nor will I dwell on how the long flight to Munich from anywhere in the western U.S. can make one feel that one's lower body has run away to seek therapy. Never mind: autumnal Munich this year was achingly clear and fine, in russet and orange, and each morning came the delight of so simple a thing as my walk from the Hotel Seibel to the U-Bahn station—passing clusters of trees, half-denuded of leaves but still game, which lined the edge of the *Theresienwiese* fairgrounds, and St. Paul's cathedral, which seemed to creak in its ancient grayness, still stuck (after all these centuries) in its cul-de-sac *Platz*. The mineral show lay just beyond the U-Bahn's end-of-the-line stop at *Messestadt Ost*, and the ride took about half an hour. For accounts of the site, refer to earlier descriptions, here and elsewhere, of the huge concrete-and-glass complex, with show activities gathered in the hangar-like Halls A4, A5 and A6. Beyond question, this is the largest concentrated assemblage of earth-science commerce, education and entertainment at any one spot, for any one three-day period, on earth. There are those who prefer the Munich Show, tightly packed as it is in time and space, even to the Tucson Experience, with its inherent requirements for a rental car and at least two weeks' worth of stamina, devotion, and assorted overhead costs.

Besides, not even in Tucson does one find anything resembling the circus-like atmosphere of diverse goings-on created in Munich every year by impresario Johannes Keilmann, increasingly now with his son Christian's help. This year showgoers enjoyed the "Paradise Garden," where the pathway wound among open, person-high, Brazilian amethyst geodes. There was also "Wellness Island," where, after catching a lecture, one could catch a massage involving the rolling of onyx spheres over one's face, or ingest "precious stone water," or benefit from applications of "precious stone oils" or something whose brand name is "Lapis Vitalis."

Special features of other persuasions, of course, were many. Enthusiastic youth groups (composed of "general" collectors as well as budding Alpine *Strahlers*) had several popular stands and display areas where collectors old, young and in-between met and talked convivially: a kind of cross-generational action most gratifying to see. One partition wall was graced by many superb mineral-specimen paintings by Hilde Könighofer of Graz, Austria (see her biography and a selection of her paintings in the "Art Museum" section of the *Mineralogical Record* website). The fossil-display alcoves crept and crawled with horseshoe crabs, sauroids, great platter-like bony fish, solemn ferns, and other complex biota, most notably from the fine-grained limestone of Monte Bolca, Italy. The show catalog acknowledged these with a playful page full of limericks, by Kurt Heissig, concerning fossil collecting. In the Trentino display alcove (see below), fat Trentino salamis hung thickly from overhead beams in a *faux* delicatessen, and slices cut from at least a dozen salami

Figure 1. **One of the cavernous show halls occupied by the Munich Show, A5. Tom Moore photo.**

Figure 2. **An exhibit devoted to the mines and minerals of Freiberg, Saxony. Tom Moore photo.**

species were handed out free to passersby, the tastes and aromas redolent of slanting meadows and brown log huts, gray ridges and snowy cirques in the middle distance.

The show theme was "Schätze aus den Bergen" ("Treasures from the Mountains"), with two quite different display areas devoted respectively to the Alps and the Himalayas. In Hall 4, an alcove organized by the natural history museums of Bozen (Bolzano) and Padua concerned itself with the minerals of the Trentino-Alto Adige Province of Italy, which has the Dolomite Mountains for backbone. In this space the centerpiece was a towering, twin-peaked, papier-maché construction topped by two stuffed but alert-looking mountain goats; at this artifact's base reposed the Trentino salami station.

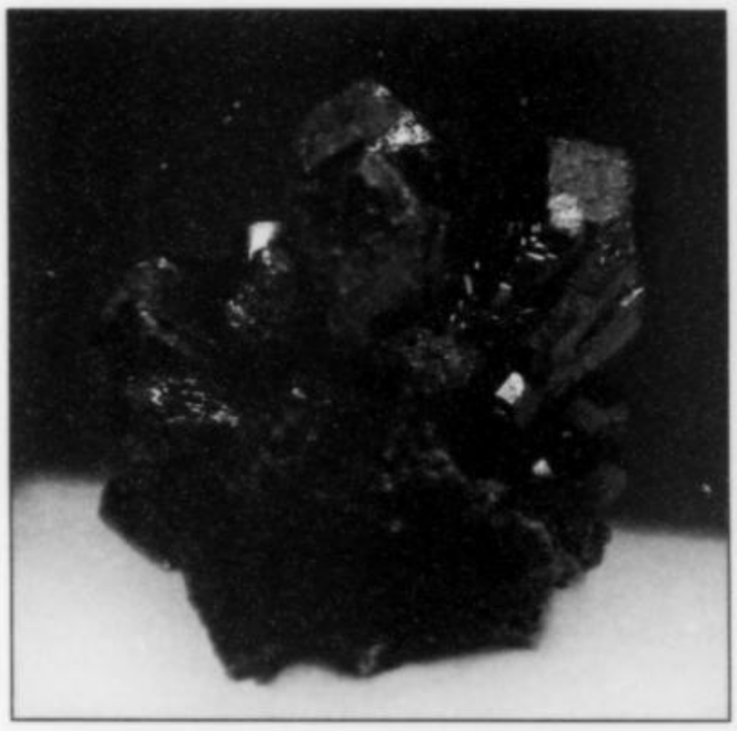
Around the alcove's perimeter, many display cases showed off fine mineral specimens, mostly from the numerous small ore veins and contact-metamorphic occurrences of the Trentino. Here for instance were 25-cm clusters of transparent golden barite crystals from the Vignola mine; large cabinet-size specimens of the famous red heulandite on black carbonaceous shale, from Val di Fassa; and, from the same rich valley, surprising specimens on which sharp, bright, pinkish orange crystals of anorthite to 1.5 cm are strewn over matrix. Others of the cases held clusters of milky white to colorless, cubic fluorite crystals to 7 cm on edge, from the Tingherla mine; bright green spheres of pyromorphite to more than 1 cm scattered on pieces of matrix, from the Cinquivalli mine; large cabinet-size specimens from a terrific 2003 find of calcite during road construction near Mezzolombardo, and so on.

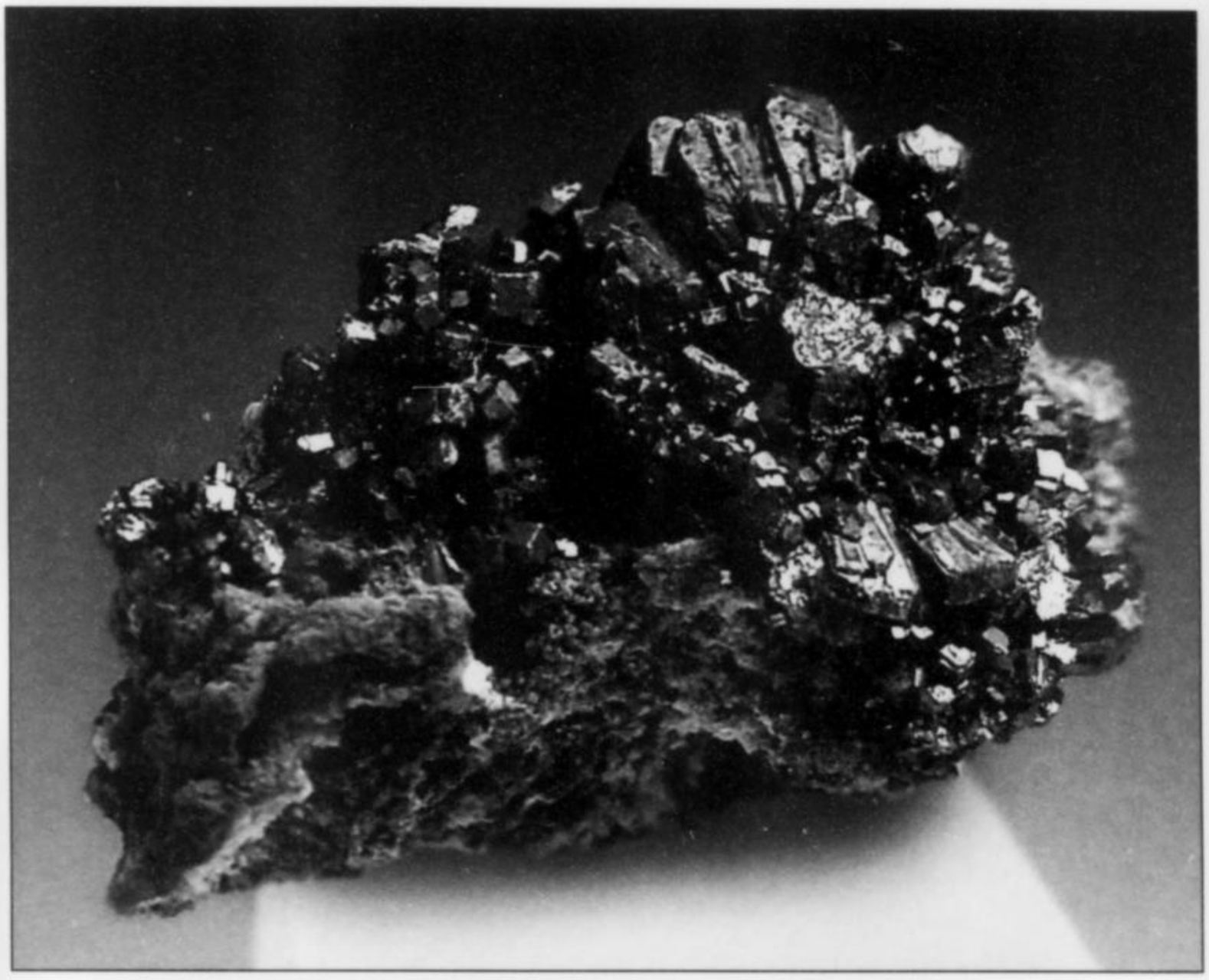
In Hall 6 one came on the lavish display alcove called "Edel Steine vom Dach der Welt" ("Precious Stones from the Roof of the World"), celebrating the fabulous products of pegmatites and Alpine-type clefts in Pakistan, Afghanistan and Nepal. Ample, brilliantly lighted display cases of different configurations showed off aquamarine, spessartine, elbaite and kunzite gem crystals, mostly enormous, as well as exotica such as the world's biggest crystal of viitaniemiite (17 cm long, and quite sharp), and monster crystals and crystal clusters of rarities like pollucite, beryllonite, and chevkinite. The reigning monarch was a breathtaking, translucent pink, compound crystal of elbaite, 35 cm tall, called the "Rose of Asia," from Paprok, Afghanistan—this piece belongs to a private collector but was brought to Munich courtesy of the *Museo di Storia Naturale*, Milano. Noted dealers in and/or collectors of Himalayan minerals such as Dudley Blauwet, Andreas Weerth, the brothers Gobin, and Bill and Carol Smith all had specimens "in," but the star of the show was Herb Obodda, who contributed *four* cases of specimens from his private collection, including the selfsame case of incredible thumbnails that was seen at the 2007 Tucson Show.

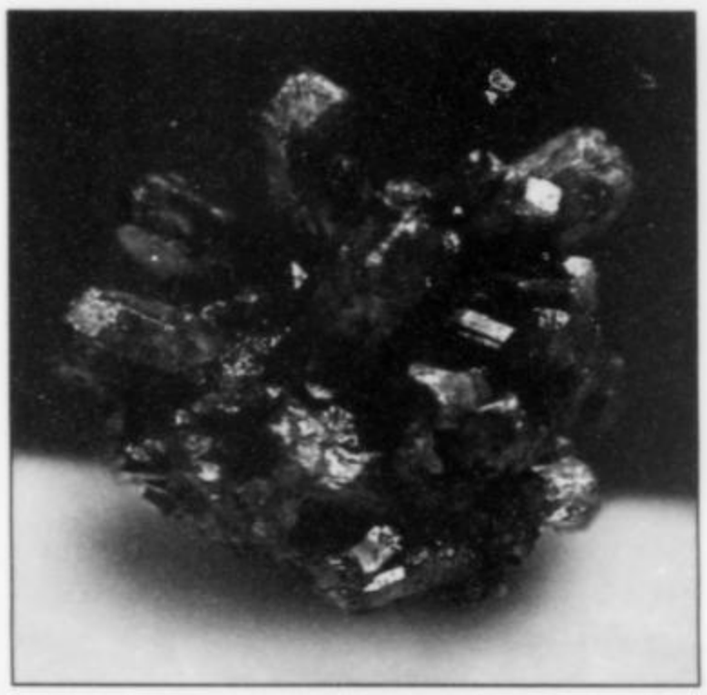
To honor Herb as the first Western pioneer of specimen-salvaging in the Himalayas, the show catalog offered two long articles, one (in German translation) by John White, about Herb's life, and another, by Andreas Weerth, about how Herb got started in the 1980's—and has persisted, all these years—in finding and exporting gorgeous *Edel Steine vom Dach der Welt*. One case of Herb's minerals was backdropped by an enlarged photo of two bearded men in white robes, squatting before a cave opening: one of the men, of course, was Herb himself, and his companion was none other than Munich show manager Johannes Keilmann.

Naturally, plenty of interesting what's-new items were to be seen in Munich this year. Of the specimen offerings described below, all but one, as it happens, hail from the Eastern hemisphere (there's one Brazilian afterthought at the end), and so it is fitting that we begin the tour close to "home," in the Alps.

Two back-to-back articles in the October 2007 issue of *Lapis* provide thorough collecting-history and scientific details regarding a find of excellent **zircon** specimens in, surprisingly, Switzerland. I hadn't yet seen that issue, and thus was unprepared for the spread of about 25 specimens offered by *Kristalldruse München* (lapis@lapis.de—this is the dealership long run by *Lapis* publisher Christian Weise). Dr. Stefan Weiss, one of the chief developers of the occurrence, was on hand to tell me that the zircon crystals are found in an unusual nepheline pegmatite exposed in two places on the north flank of the Gridone Massif near Centovalli, about 25 km northwest of Lugano, Canton Ticino, southernmost Switzerland. The crystals are partially embedded in a dense black-and-white banded mixture of albite, nepheline and biotite; the matrix pieces on hand at Munich ranged from thumbnail size to 20 cm across, and a few loose floater crystals (the article said) exist as well. The zircon crystals are lozenge-shaped and face-rich, showing up to three prism and three pyramid forms; they are pale tan to red-brown with hints of lavender, sharp and smooth-faced, and range between 1 and 9 cm long. Nearly all of the crystals are brightly fluorescent orange-yellow in shortwave ultraviolet light, and a very few are







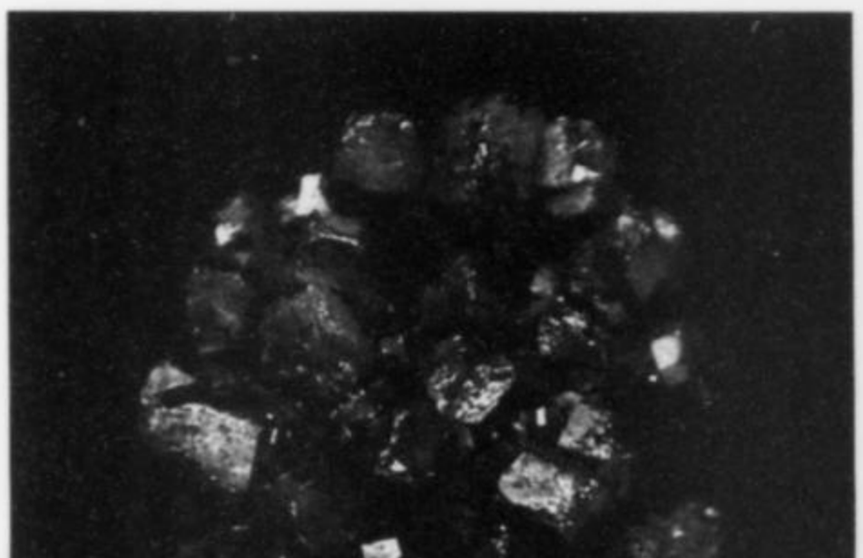


Figure 3. **Gratonite specimens collected in 1938 from the famous 5 × 12-meter cavern at the Excelsior mine, Cerro de Pasco, Peru (see the *Peru Issue*, July–August 1997). Good gratonite from this find is seen only very rarely today. A remarkable lot of two dozen specimens, from an old German estate being liquidated, was purchased at the Munich Show by John Veevaert of Trinity Minerals. John Veevaert photos. Clockwise from top-left: 1 cm, 4.2 cm, 2.5 cm, 1.8 cm, 1 cm.**

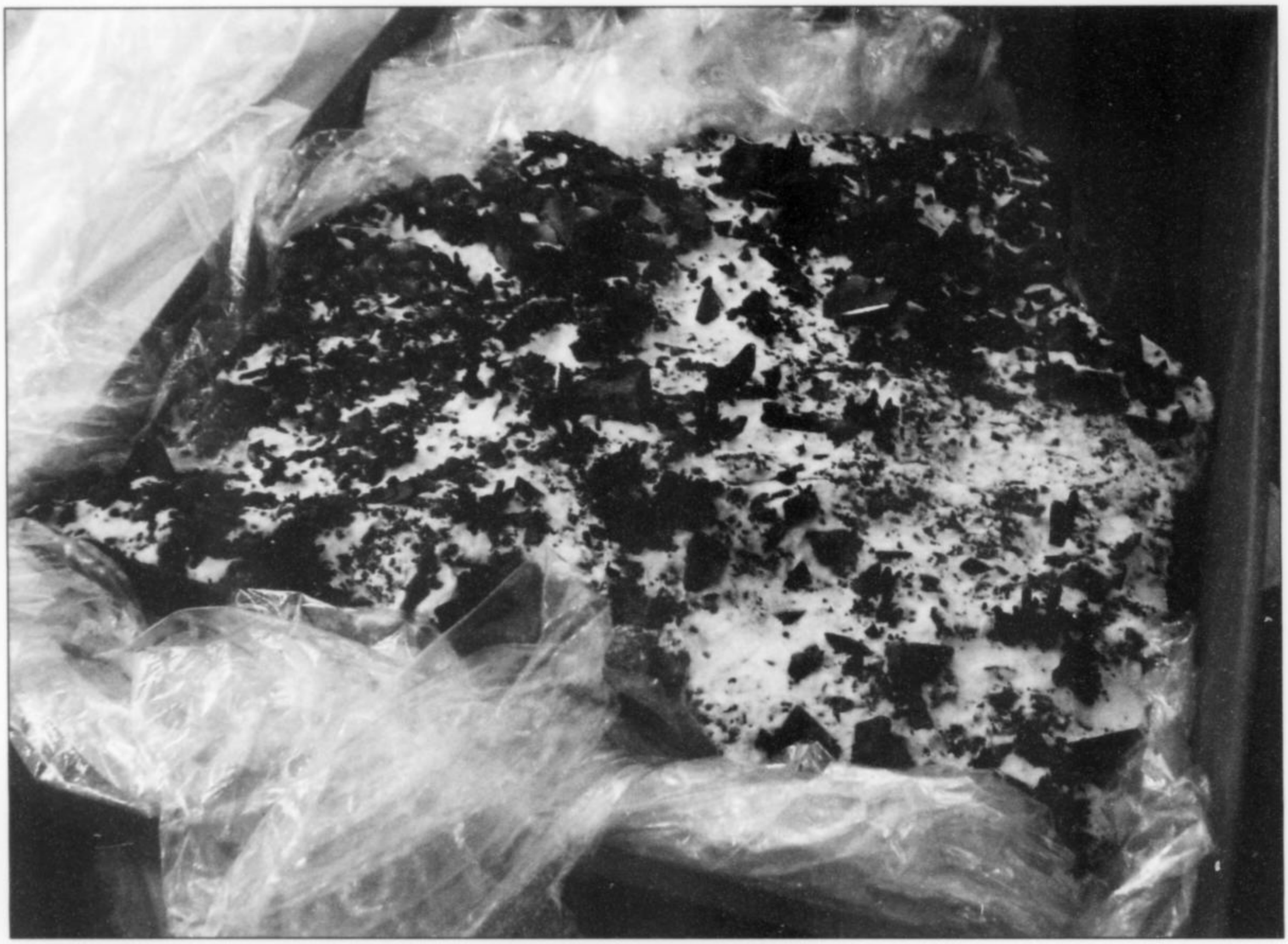


Figure 4. **A huge 45-cm plate of gorgeous benitoite and neptunite being unpacked by Rob Lavinsky. John Veevaert photo.**

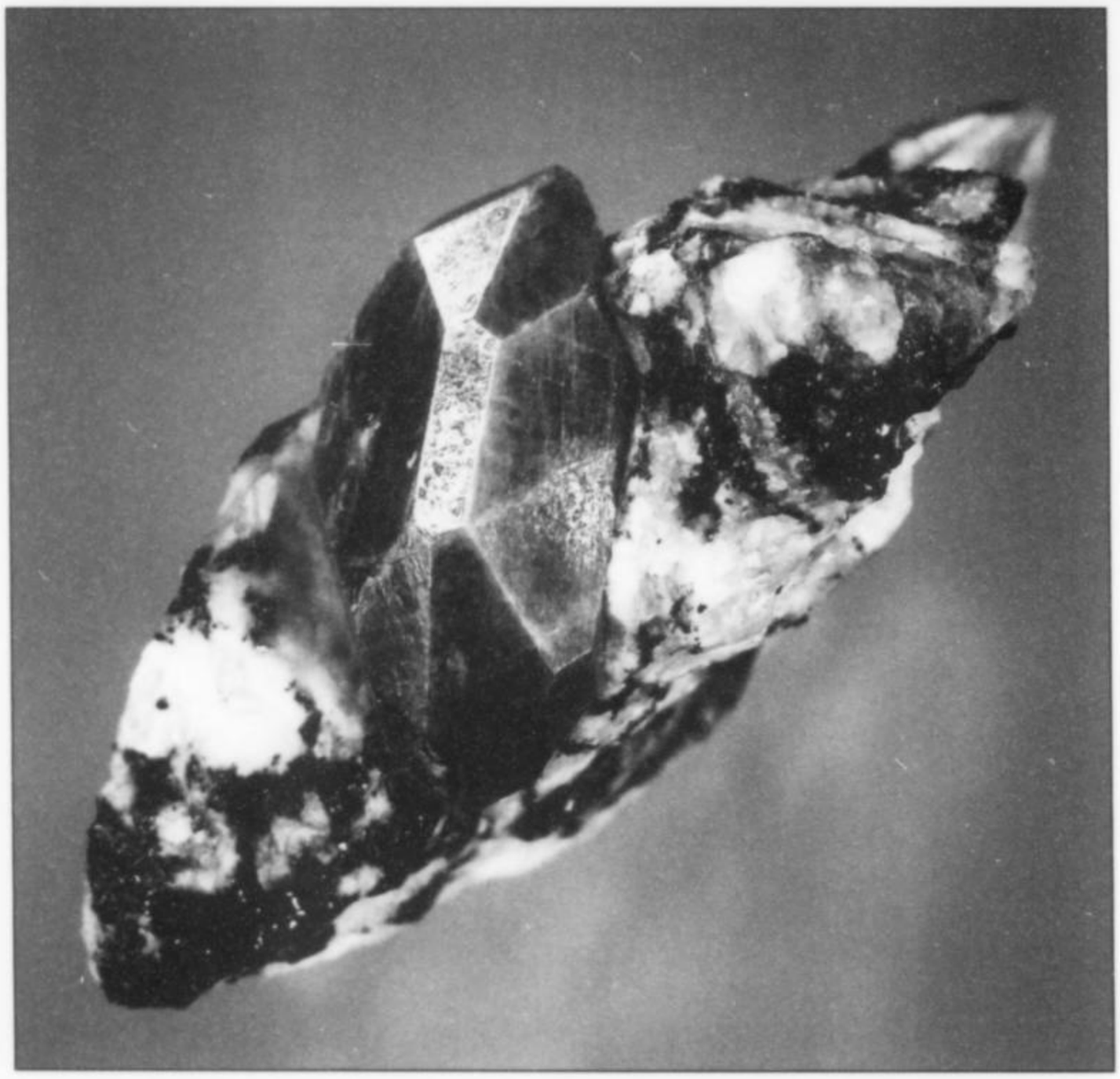


Figure 5. **Large zircon crystal on matrix from the north flank of the Gridone Massif near Centovalli, Ticino, Switzerland. Lapis specimen; Stefan Weiss photo.**

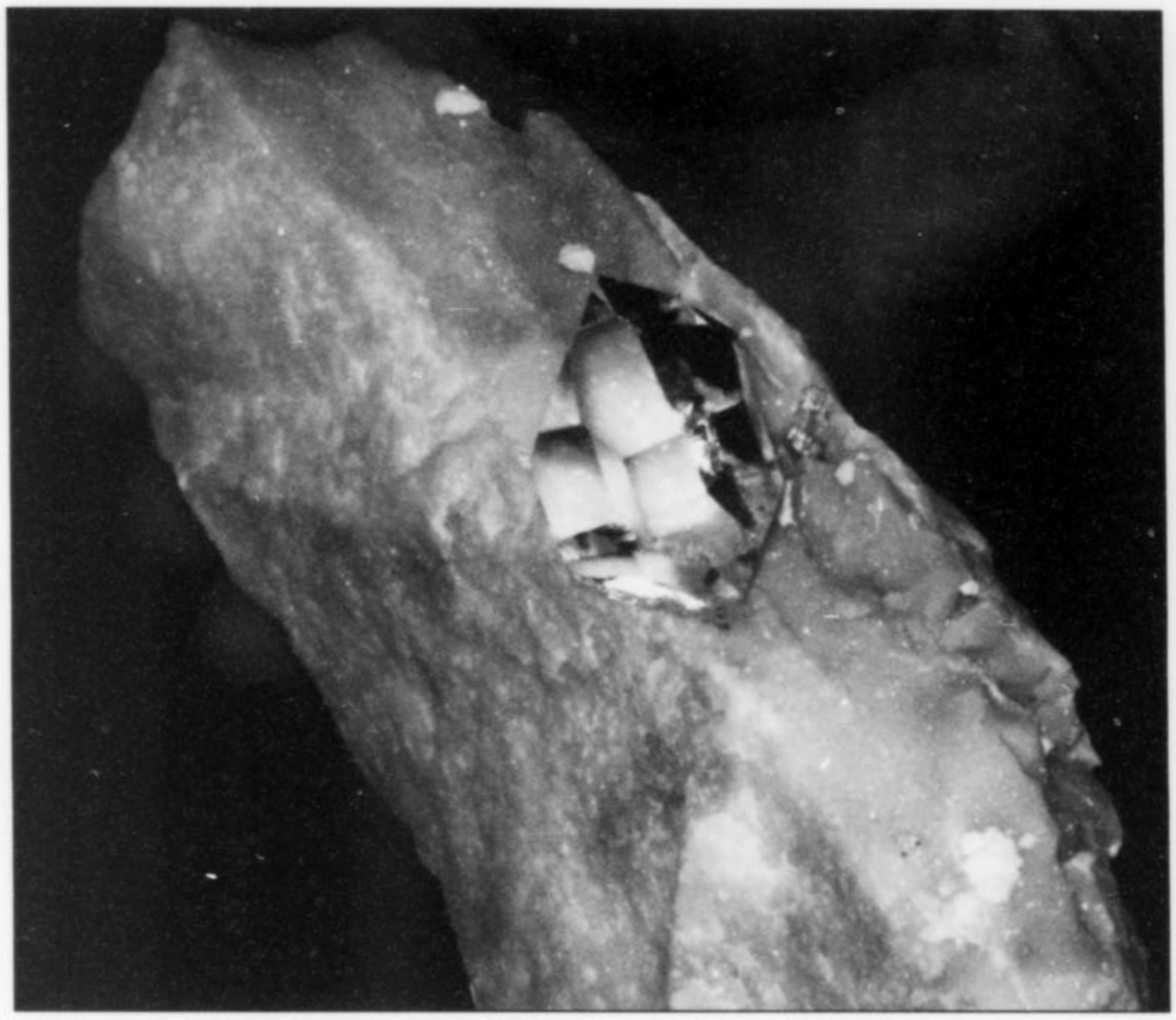


Figure 6. **Quartz crystal, 3 cm, on marble, from the Carrara quarry in Tuscany, Italy. Stefano Magnanelli specimen; Tom Moore photo.**

actually gemmy in part. This is, in short, a fairly major occurrence of zircon, and the specimens at the *Lapis* stand were popular items, moving fast, the more so since excellent thumbnails could be had for around €25.

From another new find in Switzerland, by contrast, only three or four crystals are known to exist, one of which was being held (for someone who'd already bought it) by Brian and Brett Kosnar—and I hereby thank Bill Larson for putting me on to it. The crystal is **anhydrite**, and the pocket occurrence from which it has recently come is called the Neat Tunnel at Amsteg, in Canton Uri. Extremely sharp, measuring about 2.5 × 2.5 × 3 cm, and irreproachably gemmy in delicate pale lilac, this crystal is a peer of all but the finest of the revered pinkish purple anhydrites found during construction of the Simplon Tunnel in 1902–1903 and 1913–1921.

Swiss and Austrian dealer-*Strahlers* were out in force, mostly with small, self-collected stocks, in many cases unlabeled, and it was fun to roll one's eyes over the scatterings on these tables, in search of sleepers. At the stand of *Steiner Mineralien & Schmuck* of Bramberg, Austria (www.mineralien-steiner.at) there were about ten nice thumbnail and miniature clusters of **epidote** from the classic Knappenwand, Untersulzbachtal occurrence, and a few more epidotes, just as fine, dug recently at a lesser-known site two valleys over called Söllenkar, Krimmler Achental, Salzburg. Of the many other collector-mountaineers and their treasures I'll mention here only Anton Watzl (anton.watzl@gmx.net) and the superb little **hematite** "iron roses," to 4 cm, both on and off matrix, which he recently dug at Mörchnerkar, Zillertal, Tyrol. One of these specimens is a thin, pristine, bright black rosette, measuring 2 × 2 cm, for which I paid just €30.

Readers may recall that in 1995 Riccardo Prato and others collected some specimens showing bright, well crystallized **gold** in quartz from an ancient prospect called Brusson, Aosta, Italy. The star piece was a 4 × 8-cm quartz matrix with one surface about half covered by rising arborescent formations of gold microcrystals (see the 1997 Tucson Show report in May–June 1997). This old mine closed in the 1920's, but Italian field collectors still find good specimens at the place, and last winter about 50 pieces were taken out and prepared for market. Highly lustrous gold microcrystal groups to 1.5 cm protrude from where the massive white quartz has been etched away. The best pieces in Munich, mostly miniature-size, were with Lino Caserini (Via Don Giuseppe del Corno 1, I-20132 Milano); more nice ones were offered by German *Strahlers* Peter and Janet Wittur (www.schmuckwelten.de), and still more were dispersed, mostly as one-of-a-kinders, around the show.

Dr. Stefano Magnanelli (stefano.magnanelli@libero.it) regularly goes collecting in the famous Carrara marble quarries in Tuscany. This is to say that he mostly brings back microcrystals of the rare sulfides and sulfosalts which nestle in tiny vugs in the marble (see the exhaustive article on Carrara in July–August 1987), but once in a while he also comes upon brilliant, totally colorless and transparent, textbook-sharp crystals of **quartz** of the "Herkimer diamond" type but vastly rarer and more highly prized than anything from New York. In September 2007, after a collecting drought lasting years, Magnanelli was able in three weeks of work to take out about 300 specimens showing quartz crystals from a few millimeters to 1.5 cm, perching in shallow vugs and solution channels in the white marble. Best of all, he took out one specimen—on hand at Munich—which he has dubbed the "Star of Carrara," with a fat crystal measuring 3 cm on sugared-snow matrix, as gorgeous as any quartz specimen can be. This was a rare chance for classic-locality quartz fanciers to score a fine Carrara example: most are matrix pieces of miniature to small-cabinet size, with isolated, pellucid crystals resting on top.

Four more discoveries in Europe beg brief mention before we move on to Africa. First, Pierre Clavel (minepro@wanadoo.fr) had good **bournonite** miniatures from the Mine des Malines, Gard, France. This is a long-established locality for bournonite, but the new specimens first saw daylight only a month before the show, when collectors entered an old shaft of the old (closed) mine and dug about 30 crystal groups. The metallic gray, tabular bournonite crystals are dull-lustered but very well-formed, reach 5 cm, and compose tightly intergrown clusters, some with little white spots of cerussite.

Over in the *Arkenstone* (www.irocks.com) booth, Rob Lavinsky

Figure 7. **Siderite crystal cluster with quartz, about 25 cm, from the Iouriren gold mine near Tata, Tiznit province, Morocco. Pierre Clavel specimen; Tom Moore photo.**

had just three specimens (respectively 6, 10 and 12 cm across) representing Michael Merry's April 2007 find of **botallackite** at Cligga Head, Perranzabuloe, Cornwall, England. These specimens show brilliant blue-green sprays of acicular 5-mm crystals of the rare copper hydroxyl chloride crossing shallow vugs in buff-colored matrix. Next, from a large pocket struck in mid-2000 in the Tharsis iron mine at Huelva, Spain, Jordi Fabre (www.fabreminerals.com) had about 100 specimens of iridescent **goethite**, as loose stalactiform shapes and parallel groups, black inside but with bubbly surfaces gleaming in red/orange/purple oil-slick colors, the largest pieces reaching 20 cm. And Dr. Alexander Dikov of *Intergeoresource Ltd* (www.intergeoresource.com) would have us know that very good specimens of **barite** with inclusions of sulfides are beginning now to emerge from the Androvo mine, Irma Reka village, Zlatograd, Bulgaria—a first pocket having been breached in August 2007. Translucent, very pale yellow to very pale blue (some color-zoned) simple-tabular barite crystals to 5 cm form clusters to small-cabinet size; nearly all of the specimens on hand at Munich show damage, but Dikov expects to have cleaner pieces for Tucson.

At Pierre Clavel's stand, the French bournonites (just mentioned), though nice enough, were upstaged by about 200 specimens of very sharp, lustrous, chocolate-brown to yellow-brown rhombohedral crystals of **siderite** to 10 cm, associated with thin-prismatic, transparent and colorless, crystals of quartz of similar size. These beautiful things, in small-miniature to large-cabinet size, very closely resemble the classic siderite/quartz specimens of Allevard, Isère, France, but in fact they come from the Iouriren (Irouren) gold mine near Tata, Tiznit province, Morocco. Pierre has had similar lots before (see the 2006 Ste.-Marie-aux-Mines Show report in September–October 2006), but this latest discovery, made late in the summer of 2007, is still significant news, as it is the best to date, and as the Iouriren mine reportedly will be closing soon. According to Pierre, there is one reliable sign that these superb siderite crystals are *not* from the old Allevard, France locality: all of the Moroccan crystals so far seen have a triangular $\{10\bar{1}1\}$ face beveling an edge-intersection on the large rhombohedron, and no siderite crystal from Allevard shows that modification.

To cruise around this Munich Show was to get the impression that very good collecting times indeed have arrived at Mt. Malosa, Zomba district, Malawi. This alkaline pegmatite occurrence was known well before the appearance of Petersen and Grossmann's article in the January–February 1994 *Mineralogical Record*, and between that time and this there have been at least steady trickles of well crystallized rare species—not to mention the world's finest aegirine and arfvedsonite—from Mt. Malosa. Yes, but extraordinary, *amazing* specimens of the very rare **niobophyllite** have lately shown up from the locality (see the picture in the October installment of my "what's new in the mineral world" on this magazine's website), and at Munich there were newly collected, superlative cabinet specimens of **arfvedsonite** kicking around, and Christian Rewitzer (see later) had a sharp, complete, pagoda-shaped crystal of **parisite** measuring 2.5 cm from the locality. Finally, Jordi Fabre had a handful of **eudidymite** and **epididymite** specimens which, he said, were found intermittently this year and last at Mt. Malosa, and these also are record-breakers. Sprays of thin, lustrous, pure white, bladed crystals, with individuals to 3 cm, are mixed with acicular black aegirine crystals in specimens to 5 cm across; or else there are delicate, loose stacks, playing-card-like, of silky white crystals

to 12 cm across. Whether a given crystal is eudidymite or epididymite can only be ascertained by testing, but, either way, these are mind-broadening examples of both rare species.

Fabio Tamagnini and Paolo Rossi of *R & T Minerals* (tamagnini fabio@interfree.it) have lately been financing diggings in Zambia, and were showing some promising results at their stand in Munich. A remote outcrop of unspecified geological kind near the village of Nymba, near the larger town of Chipata, very near the Malawian border in eastern Zambia, has produced about 1,500 specimens showing sleek, striated, green-black crystals of **diopside** to 10 cm long, in jumbled groups on massive diopside, some with a little white calcite. The diopside crystals are well-terminated, and a very few are translucent on thin edges; miniature-size to 20-cm groups bore prices from €4 to €200. The same dealership also offered a few loose, platy crystals of **hematite** (or is it **ilmenite**, as some were saying?) overgrown and/or partially replaced by **rutile**, from yet another mysterious Zambian outcrop, this one near Mwinilunga, in the northwestern part of the country. The hematite plates measure from thumbnail size to 8 cm across (and 1 cm thick). They are dull black, but most are partially coated by interlocking blades of lustrous red-brown, epitactic rutile (of the so-called "sagenite" habit), and a few plates seem to be nearly complete pseudomorphic replacements of hematite by rutile, overgrown, in turn, by a new generation of "sagenite." In Munich the *R & T Minerals* men had only a single flat of these peculiar specimens, and Jordi Fabre had a few more—but better supplies, we are told, may be forthcoming.

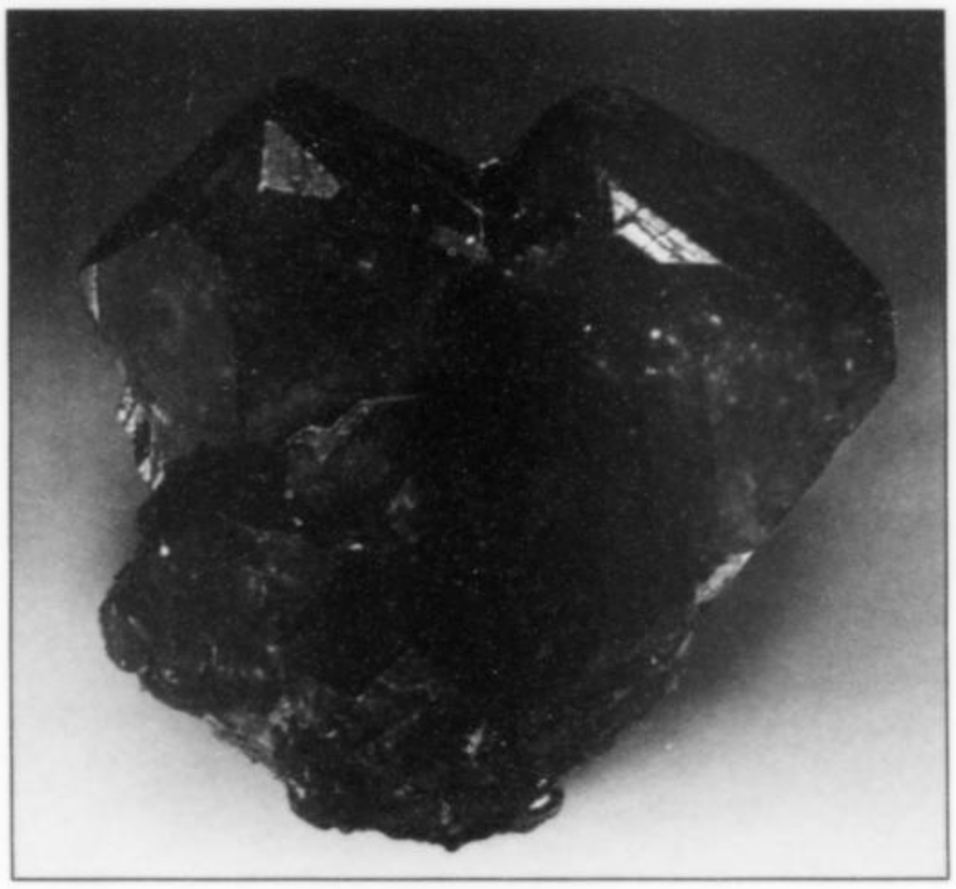


Figure 8. **Tin-rich microlite, 2.1 cm, from the Macoa mine at Alto Ligonha, Mozambique. Frédéric Escaut specimen; John Veevaert photo.**

I come now to one of the major excitements of Munich 2007: about 50 exceptional thumbnails and miniatures from a June 2007 discovery of **microlite** in the Macoa mine, Alto Ligonha, Mozambique. These were prominently—one could say seductively—displayed on several glass shelves in the booth of Frédéric Escaut (Frederic.escaut1@libertysurf.fr), and just in the five days since I've come home from Munich I've seen good selections of the material on John Veevaert's and Dan Weinrich's websites as well. Who knows which *other* alert dealers present at Munich have stocked up on these wonderful (pricey, but wonderful) microlite specimens? According to Frédéric, the Macoa mine is 15 kilometers from the Muiane mine, probably the most specimen-productive mine of the Alto Ligonha pegmatite district. However, the Macao is not mentioned in Dias and Wilson's *Mineralogical Record* article on Alto Ligonha (November–December 2000), and the best Alto Ligonha microlite crystals as described in that article are very different from these new ones: we are talking about a brand-new occurrence. The specimens are groups of sharp, highly lustrous, partially gemmy, brown/orange/red octahedral microlite crystals to 3 cm individually. Some of the octahedrons have small cube faces, or little nests of faces of other forms, truncating the points. Matrix, when present, is massive black cassiterite. These are clearly among the world's best specimens of the species, and they convey Quality in a manner hard to describe—so let me borrow a line from a former student and say that they "reek of class." But perhaps you won't be surprised to hear that one of Frédéric's top thumbnails would run you somewhere between 1,500 and 2,000 Euros.

Mineral-rich Namibia checked in, not only with some new habits of **fluorite** from the Okarusu mine, but with two items more clearly new. Fine fluorite from Okarusu has been known practically since the huge fluorite mine opened in the 1920's, but contemporary workings in what are called A Pit and B Pit are turning out groups of unusually dark purple crystals (almost black-looking, like those from Annaberg, Germany) reaching 3 cm on edge, and possessed of a surface luster so brilliant you'd swear they are oiled (but they're not). Other Okarusu specimens now coming out show lovely transparent green fluorite crystals, also highly lustrous; some of the cubes have octahedral corner truncations with complex stepped surfaces. Many flats of these diverse fluorite specimens came to Munich with the Windhoek dealership of *P.H. Eysselein Minerals CC* (rocky@mweb.com.na).

The Skorpion zinc mine in southern Namibia and its specimens of green **tarbuttite** are described briefly in *Namibia: Minerals and Localities*, the excellent new book by Ludi von Bezing *et al.*, but this Munich Show marked the first time that Skorpion mine tarbuttite has been seen on the international market. Uli and Anka Bahmann (ubahmann@hotmail.com) had about 20 miniature-size pieces, representing a form of the rare zinc phosphate which is wholly new, wholly unlike the old-classic material from the Broken Hill mine in Zambia. In specimens from the Skorpion mine, tarbuttite forms curving, pointed, parallel-growth sheaves, to 1 cm, of bladed crystals. The sheaves in turn form fans and toothy cavity linings in dark matrix. The natural color of this tarbuttite is a pretty, translucent apple-green, but in the Bahmanns' specimens the sheaves are uniformly coated by opaque, chalky white hydrozincite. We now await specimens showing *un*coated tarbuttite, which could be quite beautiful. In just one of the Bahmanns' pieces, a shallow 4 × 5-cm open vug is lined by subhedral, pale green tarbuttite crystals over which is a coating of sparkling white microcrystals of the new species **skorpionite**.

A new Namibian mine was opened six months ago with the promising name "Tsumeb West" (for yes, it is just west of Tsumeb). It has thus far produced a very small number of attractive **calcite/mottramite** specimens which look just like certain old ones from the Tsumeb mine proper. White to colorless, translucent to transparent, flattened rhombohedral crystals of calcite to 3 cm form floater groups heavily coated and/or included by bright yellow-green, fern-like growths of mottramite crystals. I learned of these specimens from calcite collector Terry Huizing, who learned of them from Herbert Naegele, who says that more of the calcite/mottramites may reasonably be expected, though none really are available now. The single piece which Terry had in Munich measures about 4 cm across; cabinet-size specimens reportedly also exist.

Laurent Thomas of *Polychrom Minerals* (www.polychromfrance.com) is Mister Madagascar these days, and as such he has recently performed an important part of his duty: he opened a new pocket of superb gemmy crystals of **liddicoatite**. Only half a dozen or so loose, singly terminated crystals have emerged so far, ranging

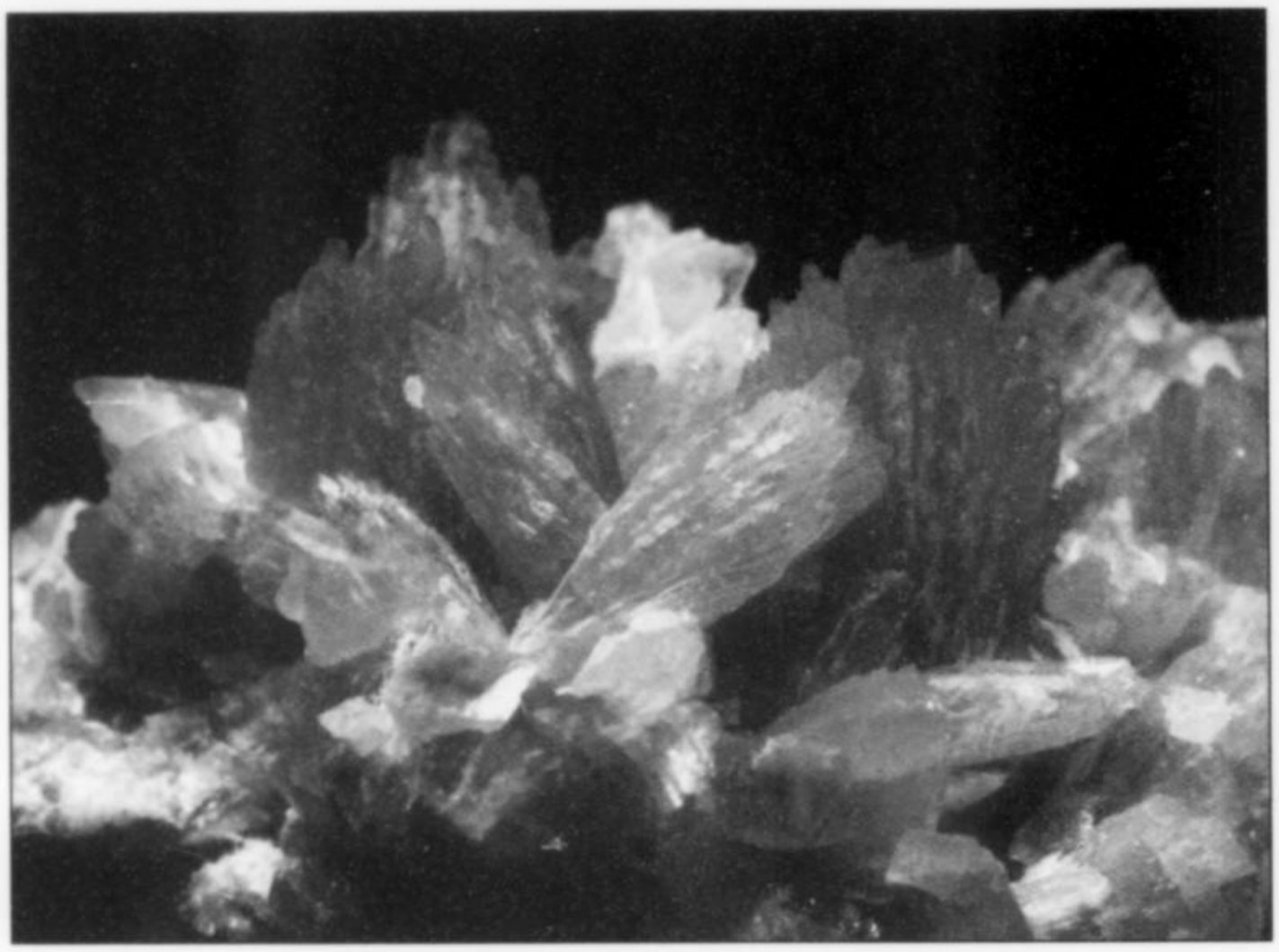


Figure 9. **Tarbuttite crystal cluster, 9 cm, from the Skorpion mine, Namibia. Uli and Anka Bahmann specimen; Jeff Scovil photo.**

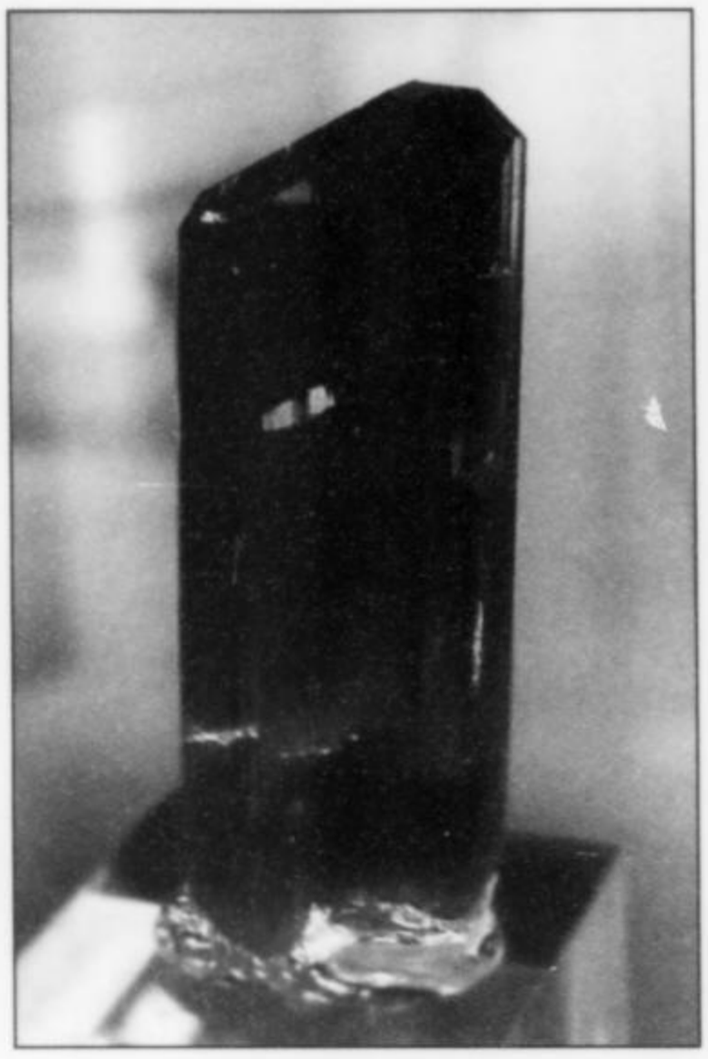


Figure 10. **Liddicoatite crystal, 3.5 cm, from the Bevaondrano mine, Ikalamavony district, Madagascar. Laurent Thomas specimen; John Veevaert photo.**

from 2 to 9 cm long, but work is now proceeding at the project, a surface digging called the Bevaondrano mine, Ikalamavony, Fianarantsoa. What's both unusual and impressive about these crystals is that they are a deep, rich, uniform green. Furthermore they are totally gemmy and highly lustrous, with sharp terminations and, in short, plenty of that reek-of-class invoked a few paragraphs back. Naturally, Laurent hopes to have more of the gemmy green liddicoatites by Tucson time.

Phlogopite deposits at several sites in the vast Aldan Shield, south of the Lena River in northeastern Siberia, Russia, have produced sharp, medium-lustrous, black **spinel** crystals to many centimeters across, in some cases embedded in tan-white calcite and associated with green diopside crystals; a locality called Gonovskoye, 100 km southeast of the town of Aldan, is especially generous, producing sharp, complex, black spinel crystals, to 25 cm, which display several isometric forms. At just about the time of the demise of the Soviet Union, Siberian spinel began to reach Western markets (see the 1989 Munich Show report: March–April 1990), but it has been largely absent since then. At *this* Munich Show, Rob Lavinsky had five very fine, complex and rounded, smooth-faced, black spinel crystals which he'd been told were from "Aldan," and a few lesser specimens were to be seen with a couple of Russian dealers as well. Of Rob's spinels, two are 4 cm in diameter, two are 5 cm, and one remarkable crystal is 10 × 10 × 10 cm.

Then there are the pegmatites of the Pamir Mountains of Tajikistan, full of gem-juice and getting more interesting by the season. Here the KARP dealership (www.karp.cz) has been dominating the trade, and in their Munich booth this year friendly Ivo Szegeny expounded on some very pretty **elbaite/lepidolite** thumbnails from Mika, near Murgab, Gornobadakhshan Autonomous Territory, eastern Pamirs. Loose, gemmy, pale pink elbaite crystals with trigonal terminations reach 5 cm; they either are barefaced or have more than half their surfaces covered by sharp hexagonal plates of pale violet lepidolite, with individuals to 1 cm, attached edgewise in neat parallel rows. A few larger and heftier specimens consist of mottled green-pink-blackish elbaite crystals to 4 × 4 × 5 cm with 2-cm lepidolite "books" and smoky quartz crystals attached.

Figure 11. **Spinel crystal, about 10 cm, from Gonovskoye, 100 km southeast of Aldan, in Siberia, Russia, on the Lena River. Rob Lavinsky specimen; Tom Moore photo.**

Fairly serious space needs to be devoted to Pakistani minerals this time; let us begin with some cabinet-size wonders which were to be found in the opulent booths of Riccardo Prato's *Pregi Gemme* (pregigemme@iol.it) and Brice and Christophe Gobin's *Mineralsweb* (www.mineralsweb.com). Perhaps you will recall that last year Riccardo dazzled the Munich showgoers with five monumental specimens of transparent pink fluorite on muscovite that had just emerged from Chumar Bakhoor (see the article by Roberto Appiani in the March–April 2007 issue). Well, in October 2007 a new strike in the same area produced a few giant specimens showing fist-size, highly lustrous, transparent, compound-octahedral crystals

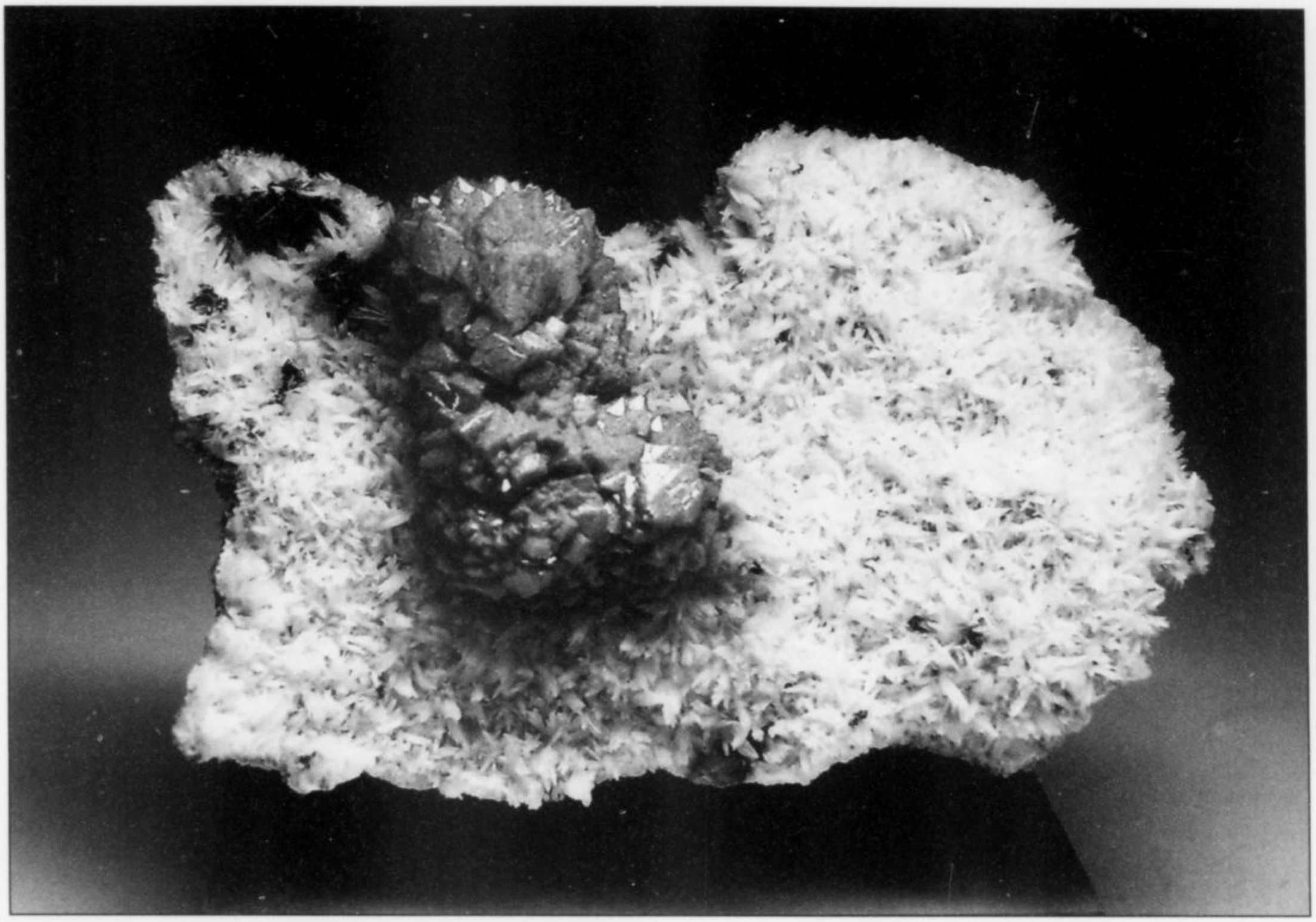


Figure 12. **Crystal clusters of olmiite (the recently described Mn-dominant analog of poldervaartite, on drusy celestite, 5.5 cm, from the N'Chwaning II mine, northern Cape Province, South Africa. Kalahari Mineral Ventures specimen; John Veevaert photo.**

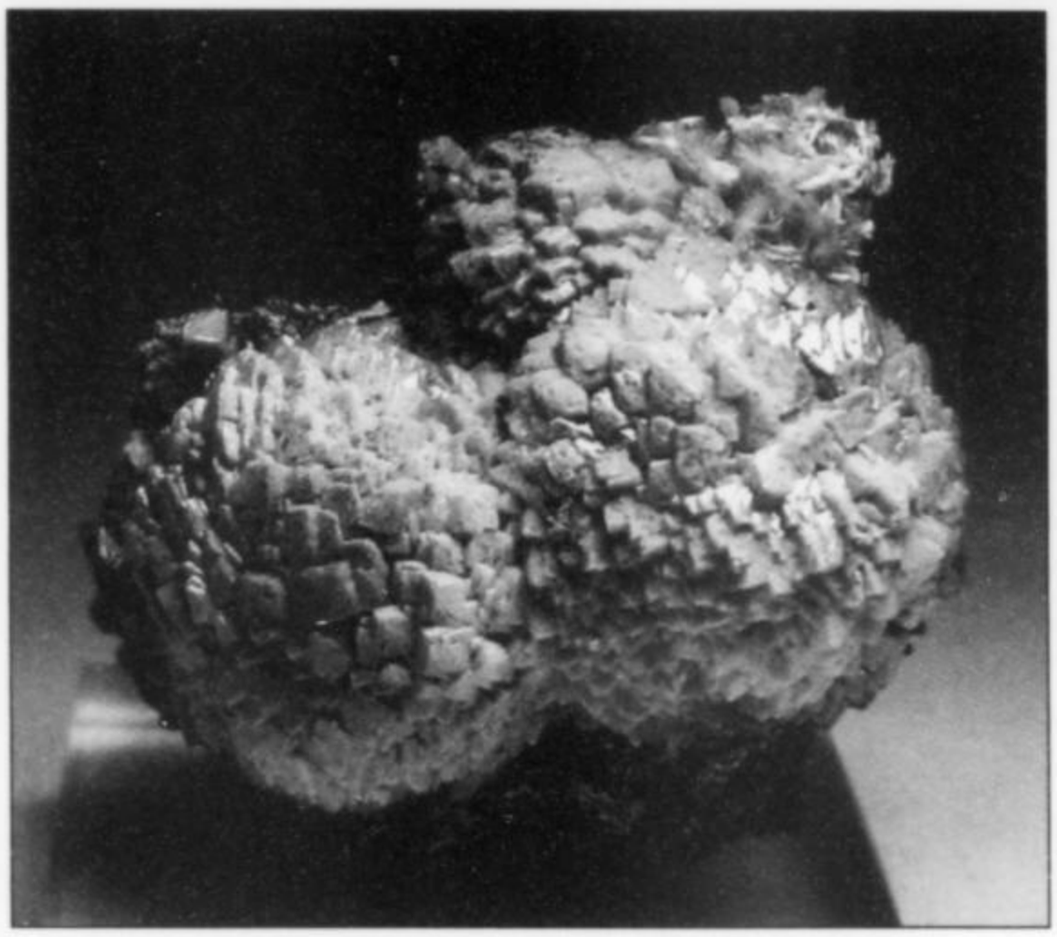


Figure 13. **Olmiite crystal clusters, 5.1 cm, with acicular white bultfonteinite, from the N'Chwaning II mine, northern Cape Province, South Africa. Kalahari Mineral Ventures specimen; John Veevaert photo.**

of **fluorite** with green cores and pink outer zones: these are utterly unlike the earlier giants except that they also rest on blankets of very sharp muscovite crystals. A special display case at Riccardo's booth held a specimen measuring about 30 × 60 cm, with a magnificent, gleaming clump of color-zoned fluorite cuboctahedrons on muscovite/albite matrix. Meanwhile, the brothers Gobin had just two specimens (one was hidden away in their booth, the other was on display in the Asian alcove in Hall 6), each showing a luminous green/pink fluorite crystal of around 8 cm resting on a prism face of a gemmy aquamarine beryl crystal. Also the Gobins showed me a specimen with a transparent green, 4-cm spinel-twinned fluorite crystal rising from matrix, this also from a new pocket strike at Chumar Bakhoor.

We are not yet finished at Riccardo Prato's booth. In autumn 2007, somewhere near the village of Chamachhu, Skardu district, Northern Areas, Pakistan, an Alpine-type pocket yielded about 20 outstanding **hematite** "iron rose" specimens, with muscovite, adularian orthoclase, and rarely epitactic rutile. The most spectacular specimen (already sold, but still on view at *Pregi Gemme*) is a flat, lustrous, 90% complete-all-around rose measuring 10 × 15 cm; others include single hematite plates or rosette-aggregates on matrix, single loose rosettes, and jumbles of subparallel plates, one of the jumbles measuring 15 × 15 cm. Next, from near Bulochi in the same area come white matrix pieces of solid albite bedecked with extremely sharp single crystals and V-twins of **manganotantalite** to 4 cm. The crystals are medium-lustrous and dark brown, with red internal highlights. And from a find at Bulochi in early 2007 come nice small-cabinet specimens showing sharp, short-prismatic, pale

Figure 14. **Extraordinary specimen of octahedral green and pink fluorite crystal, abut 8 cm, on an aquamarine crystal, from Chumar Bakhoor, Northern Areas, Pakistan. Brice and Christoph Gobin specimen; John Veevaert photo.**

pink **fluorapatite** crystals, all between 3 and 4 cm, resting lightly on albite, with pale brown muscovite "books" to 3 cm.

Trusty *Dach der Welt* specialist François Lietard (francois.lietard@wanadoo.fr) had a swarm of very small but very bright green specimens showing gemmy **andradite** dodecahedrons not exceeding 1 cm individually. The vivid little green garnets perch on bits of dull greenish brown, weathered matrix material; about 50 small thumbnails have lately emerged, François says, from a place called Bajawar, Northwest Frontier Province, Pakistan. Almost next door to François' booth was that of Andreas Weerth (Hochfeldstr. 37, 8180 Tegernsee, Germany), another roof-of-the-worlder (he wrote a long, helpful survey of present Pakistani mineral sites for the show catalog), and here were some rather exciting **rutilated quartz** specimens from somewhere in the Shigar River Valley. The transparent quartz crystals, reaching 4 cm long, are thickly included with red-brown acicular rutile such that the overall body color is golden brown: these crystals look strikingly like the familiar ones from Novo Horizonte, Bahia, Brazil. Andreas had clusters of rutilated quartz crystals to 12 cm across, and matrix pieces with albite crystals in association, and specimens showing quartz crystals which after all are colorless but have odd, stringy black inclusions of hematite.

I did promise *one* what's-new from the New World, and it comes courtesy of rare-minerals dealer Gunnar Färber (www.minerals-world.com), who, besides all sorts of species you never heard of, mostly as microcrystals, had about 25 very attractive thumbnail-size floater crystals of **titanite** from a place called San Geraldo do Araguaia, in the state of Pará, central Brazil. Actually, Gunnar says, the collecting site is somewhere in the trackless rain forest within a 500-kilometer radius of the village (is it an *outcrop*?), and forest dwellers bring in the crystals, trading them as they can. The crystals, to 3 cm, are sharp, lustrous, loose fishtail twins with prominent re-entrant notches; they are greenish brown, just a little translucent, and really don't look much like the Brazilian titanites—from Capelinha, Minas Gerais—that we are used to seeing.

By way of wrapping up, here is a short list of mineral occurrences which seem prolific right now and which, though not represented by single, large lots with single dealers at Munich, still imparted the impression of being "hot." The eudidymite, epididymite, arfvedsonite etc. specimens from Mt. Malosa, Malawi have already been mentioned. A good number of dealers, especially Italians, had brilliant black clusters of iridescent **hematite** crystals said to have come specifically from the Bacino mine workings on the Isle of Elba. The **fluorapatite** newly found at the Sapo mine in Brazil (see the 2007 Denver Show report, November–December 2007) was very plentiful here, with matrix specimens sporting shining dark green hexagonal-tabular crystals at many tables where you'd not necessarily expect to find them. Some Chinese dealers and a few Westerners offered pieces showing surpassingly large—and sharp, shining, clean—crystals of **babingtonite** from Meigu, Sichuan. The new **rutile** specimens from Kipushi, Congo are outstanding at their best, with brilliant, striated red-brown crystals in elbow and cyclic twins to 3 cm or so. And the **wire silver** from the Imiter mine, Morocco is getting fairly amazing, with thin, bright, metallic

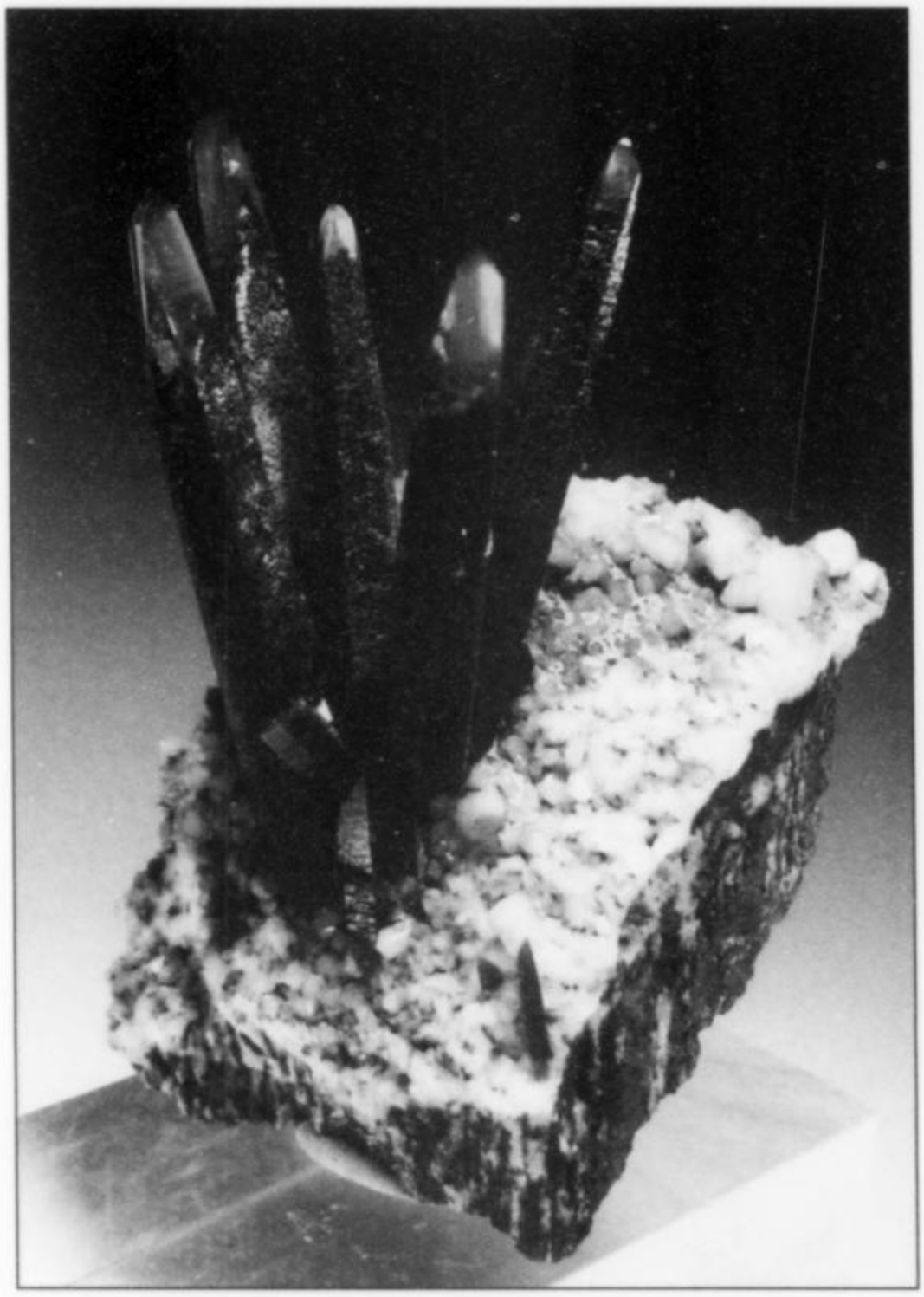


Figure 15. **Chlorite-included quartz crystals on matrix, 5.7 cm, from Ganesh Himal, Nepal. Hari Timsing specimen; John Veevaert photo.**

Figure 16. **Titanite twin (two views), 2.5 cm, from the vicinity of São Geraldo do Araguaia, Pará, Brazil. Gunnar Farber specimen; John Veevaert photo.**

white wires rising in attractive entanglements to many centimeters tall, on a matrix of dull gray massive acanthite. Now, precisely because of the brightness, tin-whiteness, and thinness of these silver wires, and because of the acanthite matrix, some people inevitably have been thinking about the fake silver specimens Don Edwards once made by roasting acanthite in his kitchen. You might want to read again his letter in the January–February 2001 issue, and take another look at the picture of one of his fake silver specimens, which indeed looks a great deal like some of the new material said to come from Imiter. Well, I'm authorized to report here that a good friend of Rob Lavinsky's, vouched for by Rob as totally honest, reports personally being underground recently in the Imiter mine and seeing a pocket as it was opened up—and this pocket (Rob's friend said) gave up some of the best and most typical of the wire silver specimens now on the market.

Of course, most of this report has been about the specimens which the big boys—the major international dealers—bring in, and of course we thank them heartily for their hard work, dedication and financial risk-taking. But one of the things about Munich that one can get most fond of is the abundance of "little" dealers, many of them part-time, many *Strahlers*, many not even sure *what* they are, exactly, in the mineralized scheme of things, who bring in local finds and interesting one-of-a-kinders for our excited discovery. Take for example Christian Rewitzer (C.Rewitzer@web.de), a pharmacist by trade, who cruises Bavaria visiting, field-collecting, buying up older collections, etc., not only to augment his own collection but also to have the fun of setting out a diverse, sophisticated array of inexpensive small pieces, as he did this year in Hall 5. There were hundreds of one-of-a-kind specimens, as many of the thoroughly offbeat as of the conventional kind, and the crowds remained thick around this stand for all three days of the show. Central Europe still boasts a good number of inspired part-timers and love-of-the-hobbyers like Christian, and seeing what they come up with is no small part of the joy of attending this show. In this regard Munich, I think, beats even Tucson for browsing (and learning) pleasure.

With that, *auf Wiedersehen*—though actually *Tschüss* is much the preferred form in most parts of Germany, and it clears the nasal passages better too.

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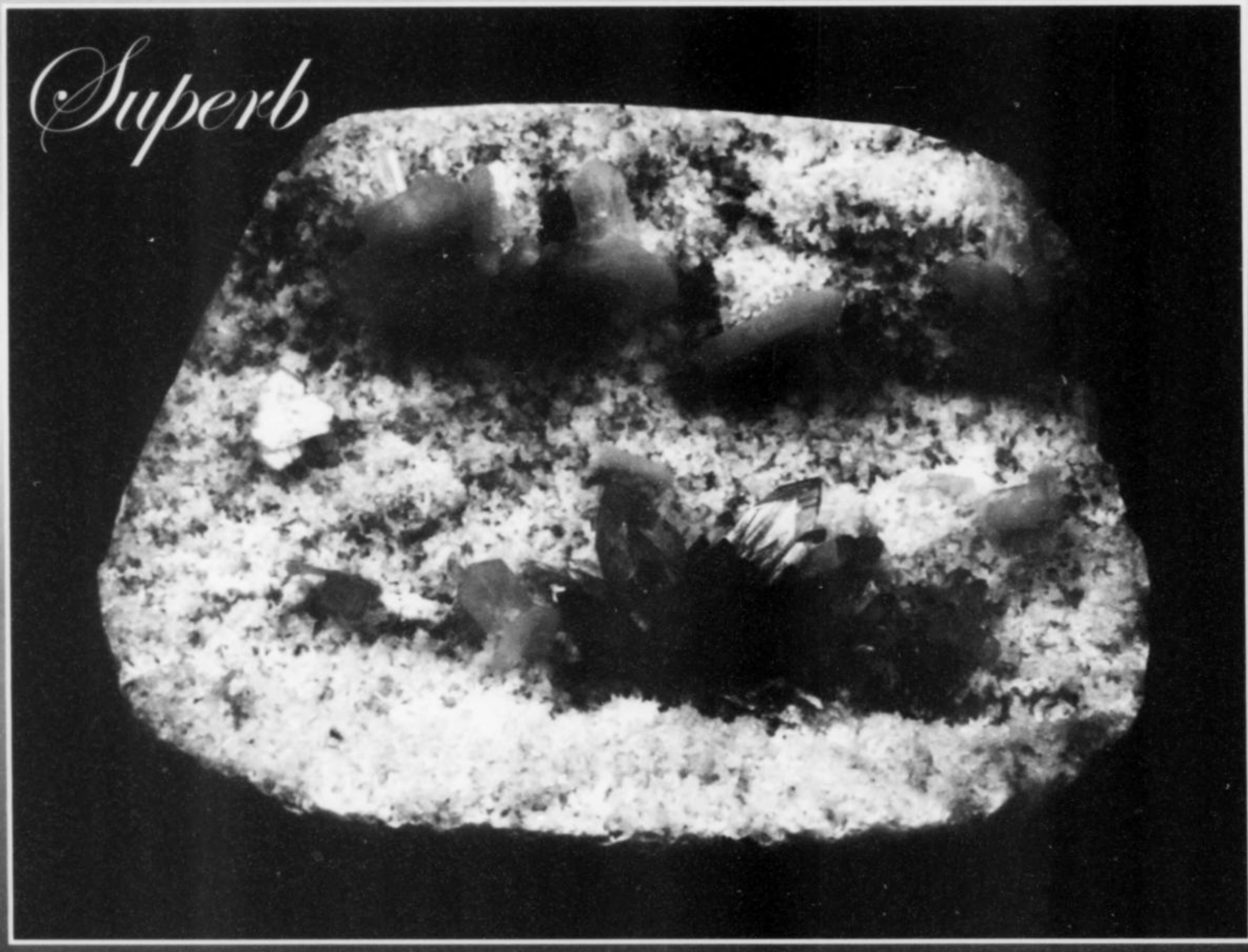

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Email: drambo417@comcast.net. Website:
http://www.geocities.com/sajas.geo/FM/index.htm.

Southeast Chapter: Contact: Anita Westlake,
President, Email: libawc@emory.edu.

Southern California Chapter: Contacts:
Bob Reynolds, President,
Email: jreynold@empirenet.com.
Website:http://www.mineralsocal.org/scfm.

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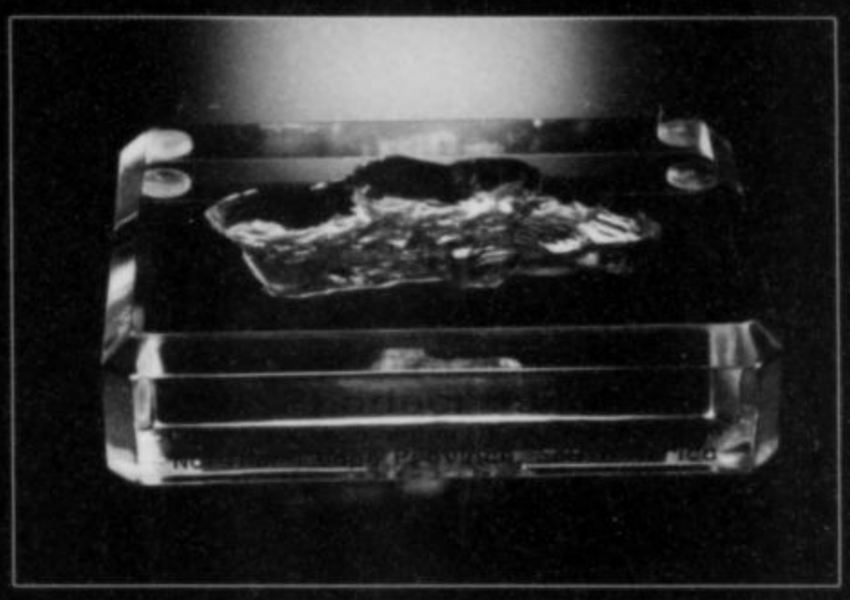

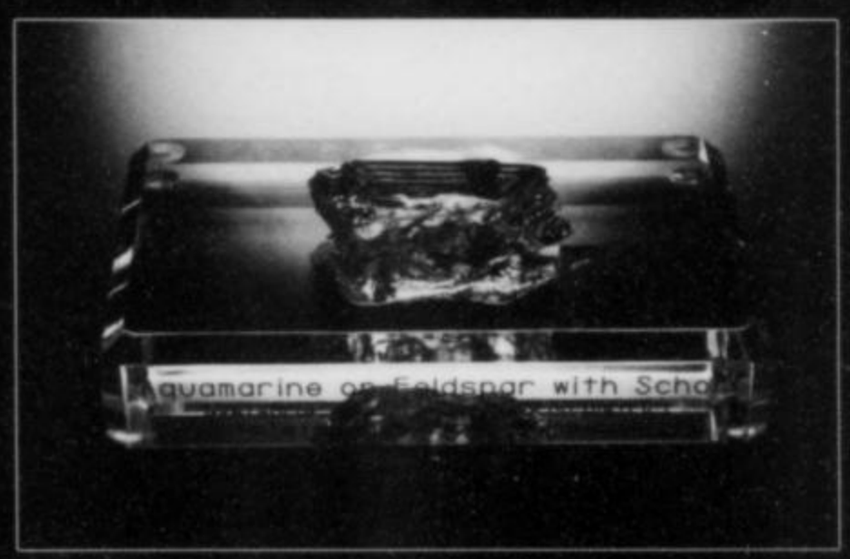

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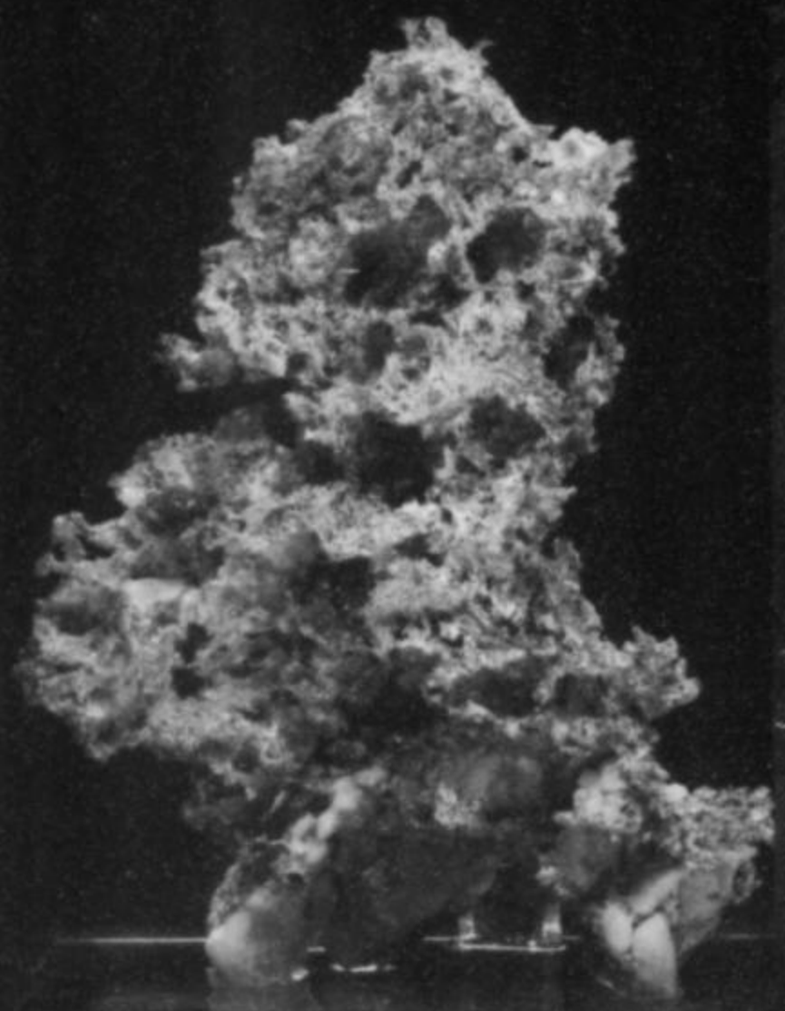


HISTORIC CRYSTALLINE-GOLD – COLORADO
This enormous crystalline gold specimen was discovered in 1948 by Clarence "Clancy" Fleetwood of Ouray, Colorado. At 1.27 Troy Pounds it is arguably the largest surviving example of native gold from Colorado.
Estimate: $135,000 - $150,000

A LARGE LIZARD PERFECTLY PRESERVED IN AMBER
Only a handful of geckos and lizards have been discovered preserved in amber and this specimen is by far the largest and most complete example known, measuring just over 3 inches in length.
Estimate: $120,000 – 140,000

HISTORIC DIAMOND
This 18.70 carat octahedron diamond was de-accessioned from the Smithsonian Institute, Washington, DC.
Estimate: $12,000 - $15,000

NATURAL YELLOW DIAMOND CRYSTAL GROUP
This outstanding diamond crystal weighs 25.24 carats.
Estimate: $12,000 - $15,000

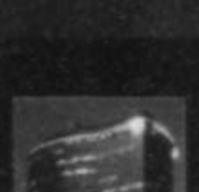
NATIVE WIRE SILVER ON MATRIX
This superb specimen of crystallized wire silver measures 2 inches wide x 2 3/8 inches high.
Estimate: $4,500 - $5,500

This auction marks Heritage's entry into the world of fine mineral collections. Ever since one of our remote ancestors first picked up a brightly colored or shiny rock; there have been mineral collectors. The passion for collecting objects from Nature is surely no less than that for Fine Vintages, Coins or Impressionist Art. It is with this perspective that Heritage presents a select group of objects culled from collections spanning the globe and tapping the collective history of the people who carry on that passionate tradition first sparked so long ago.

Our first Natural History Auction will also feature a wide variety of natural history specimens from around the world and cover a broad range of categories such as Gems; Minerals; Amber; Meteorites; Zoology; Fossils and Dinosauria.

Many of the lots offered are from renowned collections, both public and private. Collections represented here include: The Field Museum, Philadephia Academy of Science, The Smithsonian, The Ed David Collection, The Richard Hauck Collection, The Charles Key Collection, The Gene & Roz Meieran Collection, The Steve & Clara Smale Collection and many others.

In short; Heritage has assembled a cornucopia of geologic rarities that speak to the child within us all; a child with the sophisticated eye and mind of a true collector.



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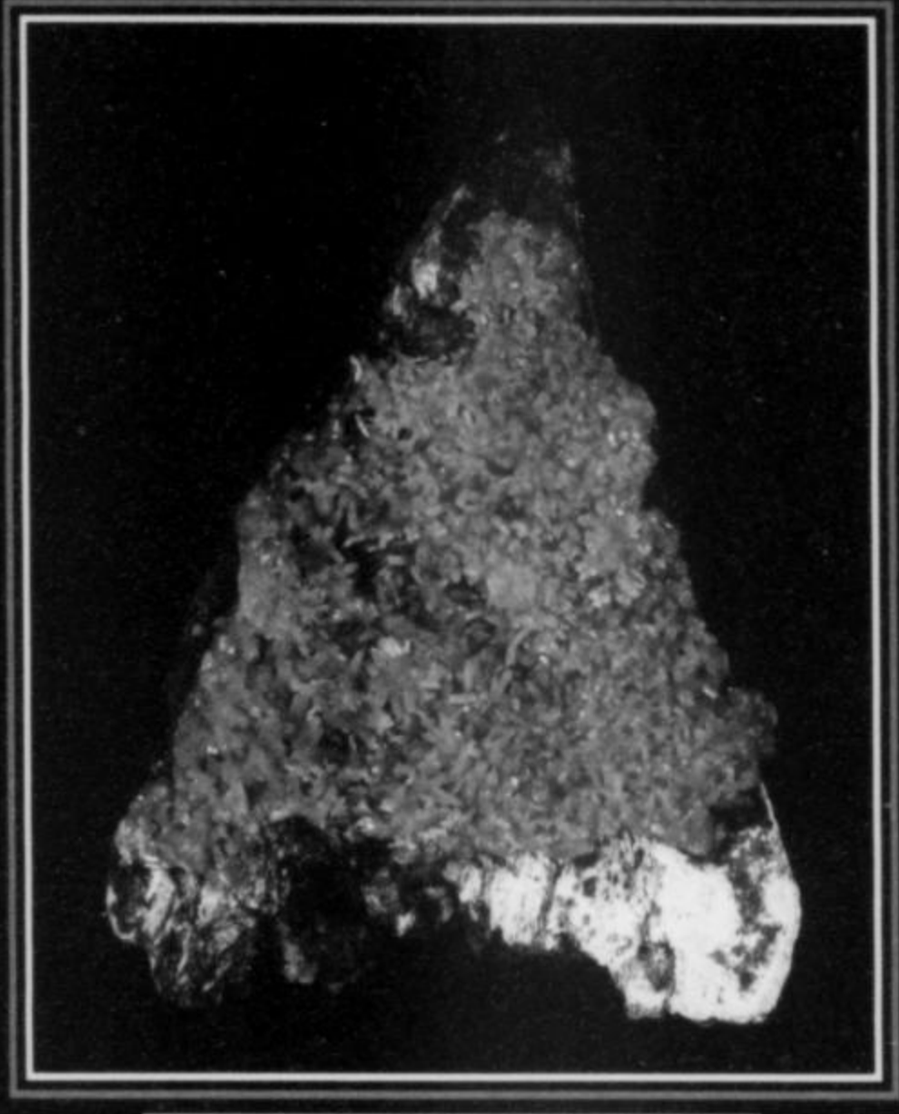

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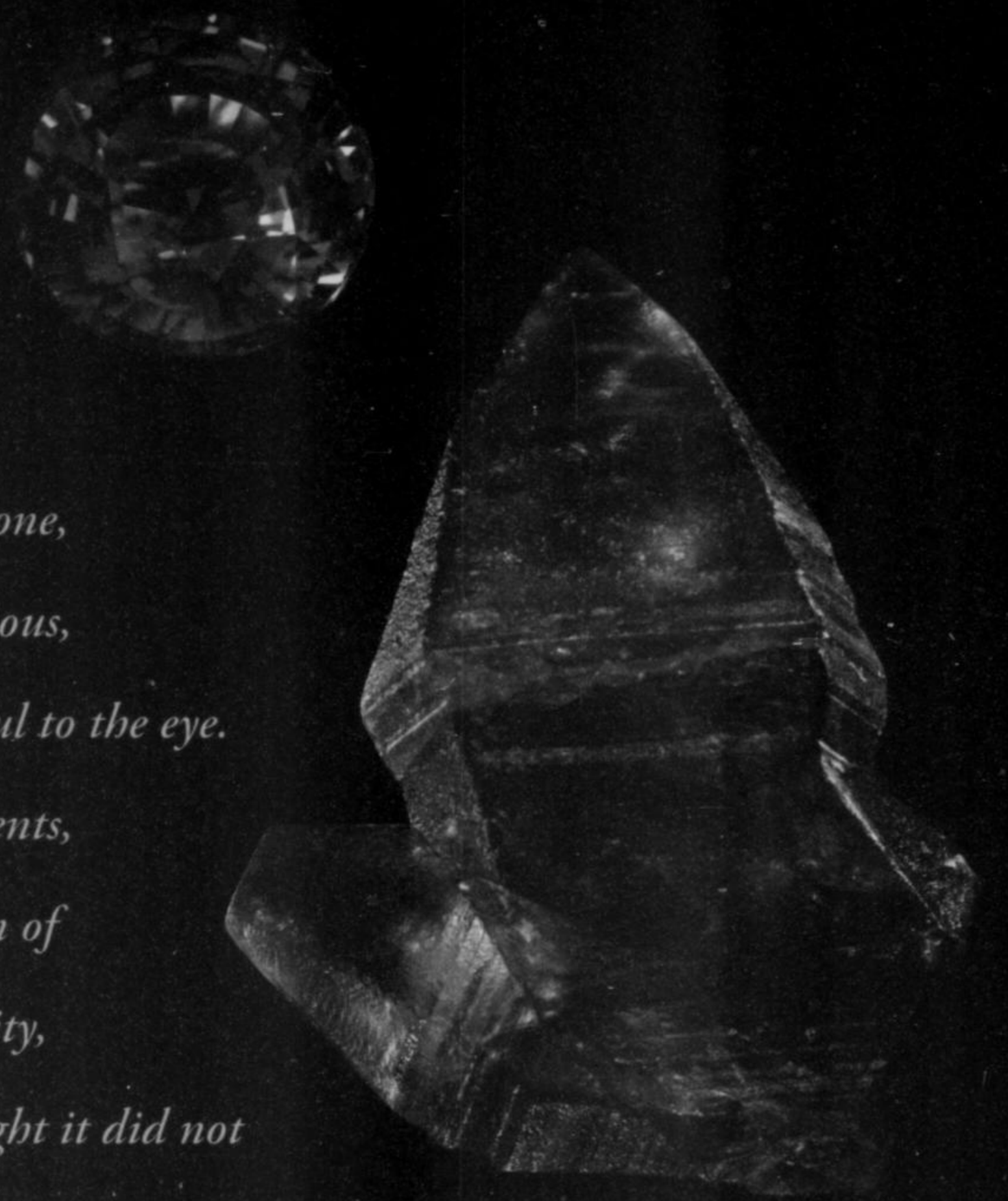

The Sapphire

is a transparent stone,

of sky colour, pretious,

and very wonderful to the eye.

Amongst the Ancients,

this gem hath been of

very great Authority,

because they thought it did not

a little prevail with God.

– Thomas Nicols, 1652
A Lapidary, Or, The History of Pretious Stones

Sapphire – Mogok, Burma

Photo: Harold & Erica Van Pelt