THE MINERALOGICAL RECORD

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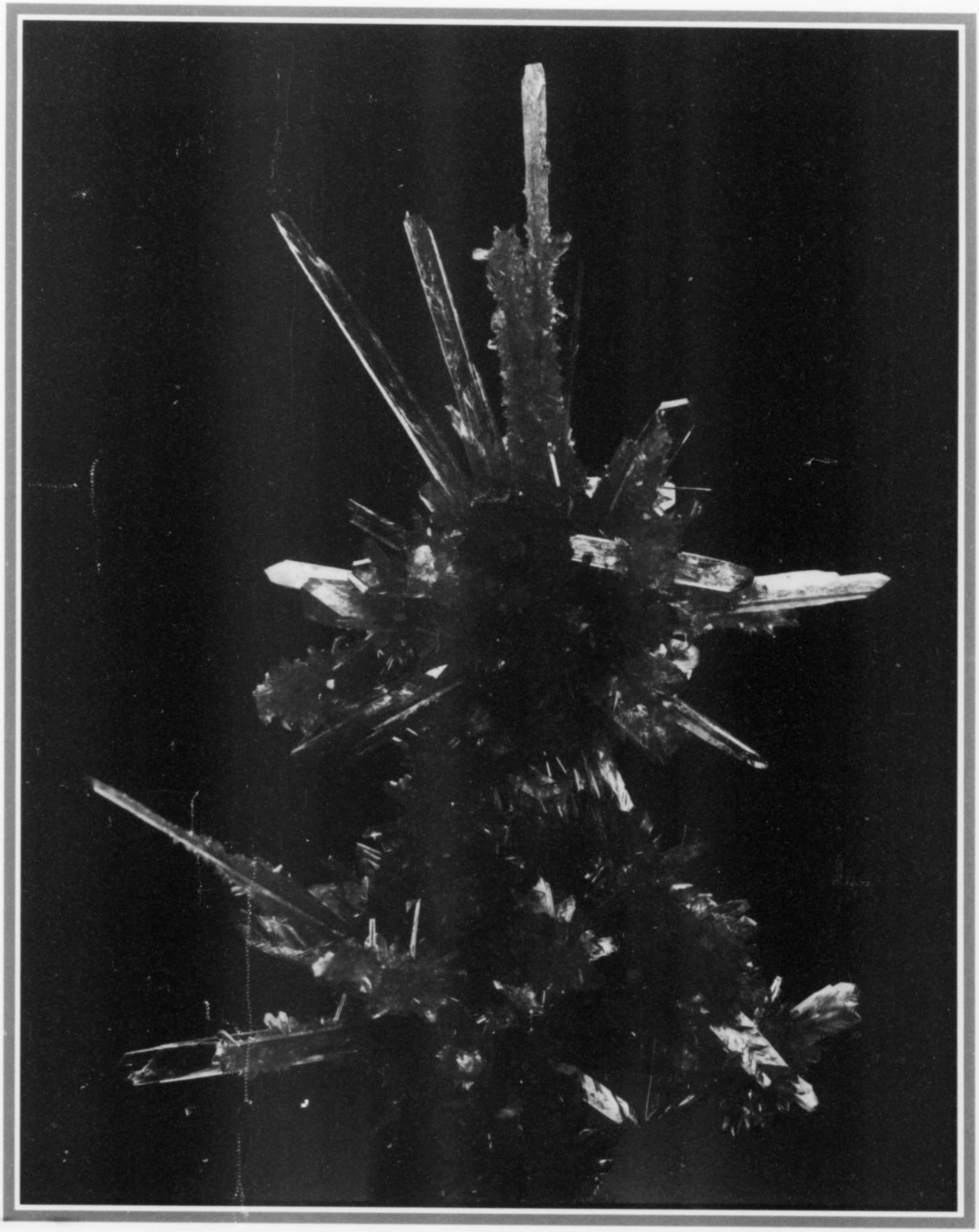

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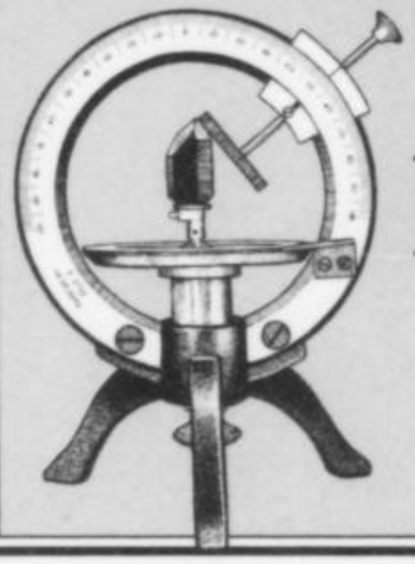

THE MINERALOGICAL RECORD

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COVER: PENTAGONITE crystal cluster, 4 cm, from the Wagholi quarry complex, Ahmadnagar, Poona, Maharashtra, India. Arkenstone/Rob Lavinsky specimen, purchased from K. C. Pandey of Superb Minerals; mined in June 2005. Jeff Scovil photo.

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Editorial:

The Philadelphia Sale

An earthquake is shaking the Mineral World, and its epicenter is a brick-red building on Logan Circle in Philadelphia. The renowned Philadelphia Academy of Natural Sciences, founded nearly 200 years ago, one-time home to the likes of mineralogist Sam Gordon and the exquisite 123-year-old Vaux collection, has sold its entire mineral collection to Colorado mineral dealer Bryan Lees, California dealer Wayne Leicht and British dealer Ian Bruce. The selling price for the 26,000 specimens (including the Vaux collection, sale of which is pending Orphans-Court approval) has not been divulged, but was surely in the millions of dollars; Argentum Auctioneers had previously appraised the collection at $5 million, and that figure was probably low, given the prices that top specimens can bring these days.

The Philadelphia Academy, which had long ago abandoned the earth sciences, had been strapped for cash for decades. There had not been a functioning mineralogy laboratory or a full-time curator of minerals there since the 1950's (a part-time curator, Robert Middleton, was employed briefly from 1976 to 1981 under a grant). The focus of the Academy and its museum had shifted exclusively to the biological sciences, and there was no intention of ever again hiring a mineral curator or displaying the mineral collection. Consequently, the trustees voted to liquidate the mineral collection and use the money to endow the Academy's library.

Originally an auction was considered, but the size of the collection and the local public opposition (which might have made an auction a messy and protracted public relations debacle) may have been a discouragement. The trustees would have preferred to find another institution willing to buy and preserve the entire collection, but these days no mineral museum can command that kind of money, and few would even have the space available for storage. As part of the deal, the dozen or so "type" specimens having special value to science will be donated to another institution for safe-keeping, and selected suites of specimens of local minerals will be offered for resale to museums in Pennsylvania, New Jersey and New York.

It is sad to hear of the break-up of such a huge and richly historical collection, the product of generations of early American mineral enthusiasts in the birthplace of American mineralogy. The specimens in storage are a miraculous lot, a virtual time capsule from a gilded age long past. Crates of specimens shipped back to the museum by Sam Gordon from his expeditions to Tsumeb and Llallagua in the 1920's and 1930's, with specimens still in pristine condition (including one of the finest known Tsumeb azurites), are just one example. Countless old classics from continental Europe, large numbers of Cornish and other British specimens not seen on the market for a hundred years, drawer after drawer full of the best English fluorites, and even many historical American specimens are coming out of hiding—including rare old New England treasures, crates of spectacular old Arizona specimens marked "Bisby," and a wealth of specimens from classic, now-defunct Pennsylvania localities. This is just a hint of what I hear from Tom Gressman, who is in Philadelphia helping to pack up the specimens as I write this in late October.

Of course, that's the cream of the collection. Many of the 19,000 non-Vaux specimens are not particularly valuable, aside from their historical significance; the majority of them are probably worth under $50 each. It will be a monumental chore to distribute the various important suites of such specimens to interested museums. And unfortunately, the years of curatorial neglect have taken their toll. Specimens have been pilfered over the years, and some specimens have not survived. Some have crumbled to dust where they sat, with only their embrittled old labels to indicate what they had once been. The smell of decay was thick in many of the old cabinets that had long stood unopened. Such things are bound to happen when a collection is left ignored and uncurated for over half a century.

It must be said that in the altruistic world of non-profit institutions, it is not good for museum administrators to view their collections as monetary resources that can be tapped during difficult financial times. Such decisions can damage a museum's reputation with potential future donors, and cannot later be reversed when a new administration with different priorities takes over. Decisions to sell a no longer wanted collection to benefit other areas of the museum, rather than transfer it at no charge to other institutions, are morally questionable and must be made with the greatest circumspection. It was clearly the donors' wishes that their specimens be preserved for "the public good" in a museum setting *somewhere*, and not be redistributed to other private collectors. But that is a trust which the Philadelphia Academy largely failed at since the beginning, inasmuch as the vast majority of the collection has always been inaccessible to the public. In any case, many museums today no longer accept gifts with "strings attached," requiring them to maintain possession in perpetuity, never selling or trading the specimens to private parties at some time in the distant future. And one certainly cannot accuse the Philadelphia Academy of acting in haste, since their commitment to mineralogy ended so many decades ago.

The grieving process will run its course, bringing a renewed awareness that nothing lasts forever, even great museums. The cold fact is that a museum, or a city, that can't or won't come up with the money to properly care for a great mineral collection should not hang onto it forever. They have an obligation to find their specimens a better home, and that process is now under way for the Philadelphia Academy collection. Acting President Ian Davison and the Academy Board of Trustees finally took the necessary step, a sad one but long overdue. All that remains now is to rename the institution the Philadelphia Academy of Biological Sciences. Congratulations are definitely in order for Bryan Lees, Wayne Leicht and Ian Bruce for successfully negotiating the deal to rescue this great collection from its ignominious dungeon, where further decay would certainly have taken place otherwise.

Local opposition to the sale was strong. Maria Luisa Crawford, a research professor of geology at Bryn Mawr College, was quoted in the *Philadelphia Inquirer* as saying that it might be reasonable for the Academy to sell the collection, but "the problem," she said, "is that many of the pieces may be bought by individual collectors and disappear from public view." Excuse me, but it was the original acquisition of those specimens *by* the Academy that plunged them into a black hole, *out* of public view, many for over a hundred years. The Philadelphia Academy collection never really did any of us living today much good. It was unavailable for research or study and could not be seen on display (except for a few hundred pieces in a small room in the 1960's and before). To us, the collection might just as well have been re-buried in the ground.

Collectors and museum advocates may mourn the demise of a

historically great mineral museum, but must also be experiencing a feeling that this development has its positive side. A tidal wave of extraordinary classic specimens in all price ranges will sweep over the collecting world, leaving our bank accounts drained but our collections enriched. Other museums will acquire treasured suites from long-extinct local occurrences. Photographers will be kept busy for some time recording the best pieces, which in turn will then eventually be illustrated in books and magazines for the education and enjoyment of all. In fact, the *Mineralogical Record* will be publishing a retrospective on the museum, with plenty of photos of the best specimens.

Wealthy collectors will acquire the very best (and most expensive) specimens, some of which may one day be donated back to other museums for permanent display. Even in private hands, they will be seen and enjoyed far more than they ever were at the Academy. The key requirement in this dispersal process is that the specimens retain their historical provenance by means of careful, detailed labeling and record-keeping—an awesome task. But fortunately each specimen already carries a painted-on catalog number, and the corresponding museum catalogs of the collection have been preserved intact. The collection's noble history will therefore live on.

And so, in a way, it is time for a great celebration. The prodigal specimens have returned to the daylight, and we can all take part in welcoming them back. We will now get to see a treasure trove of minerals on the market, the like of which may never be seen again—certainly a once-in-several-generations event that we can tell our grandchildren about. But let's hope that the administrators of our other great museums don't start seeing dollar signs when they look at their mineral collections. If they do, we might someday have no great mineral museums left.

Wendell E. Wilson

notes from the EDITORS

No More Cobaltoan vs. Cobaltian

When the science of mineralogy was in its infancy, and the rigorous relationships between chemistry and crystal structure had yet to be puzzled out, the principal basis for naming and distinguishing minerals was physical appearance. A red mineral (e.g. ruby) received a different name from a blue mineral (e.g. sapphire), even though in later years they would be recognized as the same species bearing mineralogically trivial color differences.

Eventually, with advances in analytical techniques and in our understanding of the nature of minerals, mineralogists began to make an ever-clearer distinction between minerals and mere varieties. Nevertheless, the use of varietal names stubbornly persisted well into the 20th century. Minerals obviously enriched in certain non-essential elements continued to be accorded special varietal names all their own. Copper impurities, for example, can impart a blue or green color to many otherwise colorless species, Thus, that beautiful apple-green smithsonite from Tsumeb which owes its color to the presence of copper was called "herrerite" (named after the local Herero tribe), and the equally attractive Tsumeb adamite colored by the same chromophore was known as "cuproadamite."

As time passed, however, the literature became increasingly cluttered with varietal nomenclature. Max Hey's *Chemical Index of Minerals* (1955) listed approximately 25,000 mineral names, only about 2,000 of which referred to distinct species. More and more mineralogists came to conclude that this was unnecessarily confusing, and that only bona fide mineral species should have their own names. In order to mediate the massive revisions and restrictions that would be required to clean up mineral nomenclature, the International Mineralogical Association (IMA) was formed in 1959, and has ruled on such matters ever since.

The question remained as to how we should refer to specimens of minerals having particular chemical variances insufficient to qualify them as a separate species, but significant enough to set them apart in some way (such as color). Consequently the IMA adopted the usage of Waldemar T. Schaller, whereby the extraneous element characterizing the variety would be specified separately from the mineral name, and given a suffix indicative of its valence. In the case of copper impurities, if the copper was in the +1 state it would be "cuproan," and in the +2 state the adjective would be "cuprian." And so "herrerite" became "cuprian smithsonite," and "cuproadamite" became "cuprian adamite." The bright pink calcite from Morocco, colored by Co^{+2}, became "cobaltoan calcite." But wait—shouldn't that be "cobaltian"? No, "cobaltian" would be incorrect, indicating instead a *+3* valence state. The "-oan" suffix applies to the lowest of the valence states possible *for a particular element*, which is +1 for copper and +2 for cobalt, the "-ian" suffix applying to +2 copper and +3 cobalt. Confusing? Only if you're not a chemist, I guess.

Which brings us up to the present day, when a change has once again been mandated by the IMA. A proposal by Peter Bayliss, Herbert Kaesz and Ernest Nickel to do away with the so-called Schaller modifiers was formally accepted, and published in *Canadian Mineralogist* in late 2005 (in vol. 43, p. 1429–1433). They asserted that such chemical-element adjectival modifiers often erroneously represent the valence state or oxidation state of the element in question—not surprising!—and should be abandoned. The now-accepted chemical modifiers are of the form "Cu-rich" and "Co-rich," or even "Mg-Fe-rich," which can be further modified with valence or oxidation state if necessary, such as "Fe^{2+}-rich."

Specifically to be avoided, as before, is the practice of actually attaching or hyphenating the element to the species name, either as a suffix or prefix (e.g. "Cu-adamite" or "calcite-Co"), inasmuch as this actually renders a new name, and the practice is already in use to designate bonafide new species (such as florencite-(Ce), labuntsovite-Fe, sodium-zippeite, and calcio-ancylite-(Ce)).

Some exceptions are allowed. For example, hypothetical analogs or as-yet-unapproved natural analogs of existing species can utilize a hyphenated suffix, but only if used in quotation marks to designate it as a not-yet-formally-accepted name. Element-symbol prefixes can never be used in the formal naming of a valid species, but on a chart or other graphic where space is short, they can be abbreviated that way (in quotation marks) as long as the formally correct orthography is given in the text. So you can write "Al-goethite" on a chart, but must also refer to it in the text as an Al-rich goethite.

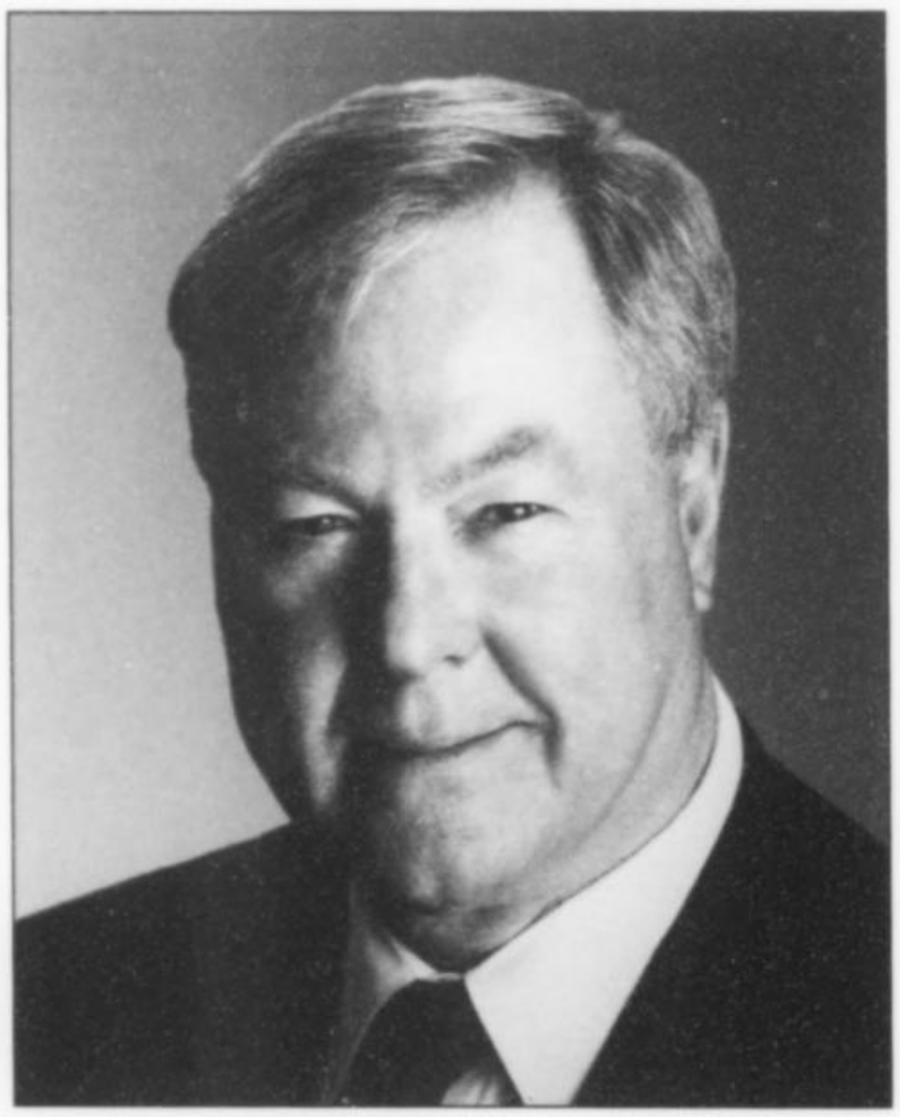
Bottom line: we no longer have to struggle with trying to correctly apply -oan and -ian suffixes. Bravo for the IMA!

Tom Gressman Joins Collector's Edge

Well-known Denver collector Tom Gressman has recently joined the managerial staff of Bryan Lees' *Collector's Edge Minerals* in Golden, Colorado. Tom, who served as a Mineralogical Record Auction volunteer from 1977–1990 and is a 20-year member of our Board of Directors, is a former CEO of several financial institutions in Wisconsin and Denver. (Additional biographical notes are posted on the "Label Archive" section of our website, at www.MineralogicalRecord.com.).

Tom Moore's Online Column

A new installment of Tom Moore's online column surfaces periodically on our website, usually every month or so, and contains timely information on new minerals appearing on the Web. If you would like to received e-mail notification the instant one is posted, please **send us your request (by e-mail) to be added to our notification list.** Send to **minrec@aol.com**.



William Hiss (1931–2006)

Died, William Hiss, 75

William Louis Hiss, a retired professional geologist/hydrologist with the U.S. Geological Survey, and successful second-career stockbroker, died Wednesday April 12, in Villa de Antofagasta de la Sierra, Catamarca, Argentina. He was 75. At the time of his death, William was participating in a field trip to study the geology of the Chilean volcanics. He died of natural causes "on the outcrop." He will be remembered fondly by his friends and family for his intellect, his good humor, his love of natural science, his gracious manner and warm conversation, his judgment on wines and his love of animals.

Bill alleged that he had sold three mineral collections. I know of two, one recent and one in the 1950's, the latter of which I sold for him while a fellow graduate student. That 1950's collection was the result of field collecting in the UK when that was still possible. He spent many days slogging through wet mines and collecting classic minerals. In fact, he shipped about a ton of specimens home as "household goods," courtesy of the US Air Force, in 1957. He resumed mineral collecting with great vigor after he retired from securities brokerage early in this decade. Armed with handsome option payouts, he assembled a mineral collection valued at nearly a million dollars in the space of three years, now dispersed.

Bill was born in Great Bend, Kansas in 1931. His parents, Rosa and William Hiss, were farmers during the Great Depression, and the rough times experienced by Bill and his family and others made a lasting impression on him that influenced him deeply. He vividly remembered the Dust Bowl and swarms of grasshoppers blowing in the wind and his frantic revulsion as they attached themselves to his clothes. He left the family farm determined to make a go of it, and talked his way into his first job, building a bridge as part of a construction crew. A quick study, he learned basic carpentry skills on the fly, and convinced others he knew what he was doing. This was but one of his jobs in which he learned as he went along. Through grit and determination he was able to get into college. He had great respect for those that struggled against adversity, and gave generously to those that he felt deserved some extra help.

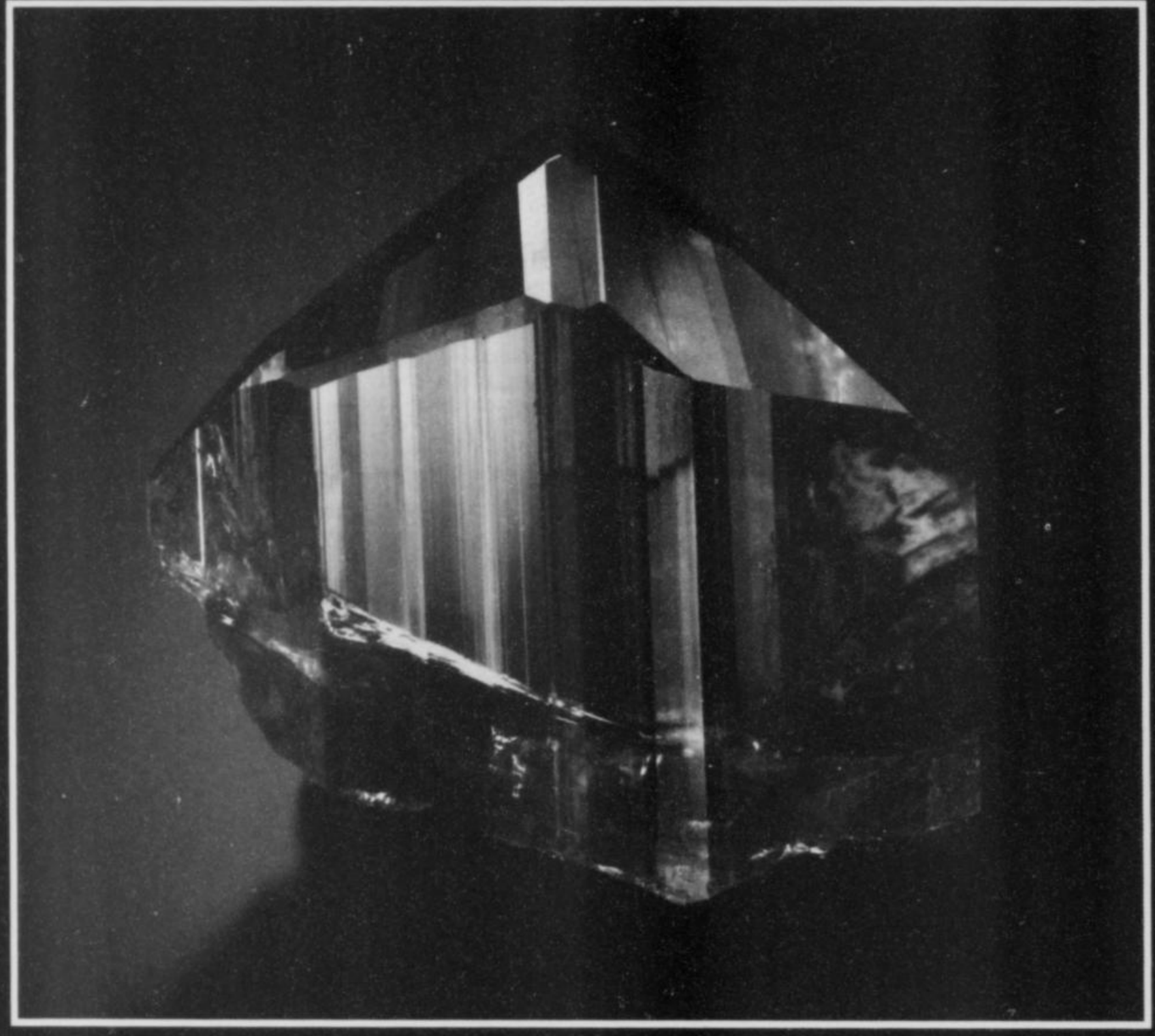
Bill graduated from Kansas State University in 1953, with a degree in Geology. He entered the Air Force in 1953, was trained as a meteorologist at Texas A&M, and served as a weather reconnaissance officer at Burtonwood R.A.F. Station in Warrington, England. He said that attempting to predict the weather for pilots toughened him up more than any other experience and prepared him well for his dissertation defense. His weather predictions were based on the available technology of the day (and thus were not always on the mark), leaving many a pilot ill-tempered and quite vocal about their displeasure.

After leaving the Air Force in 1957, he joined the reserves, where he was promoted to the rank of Major. He received an M.S. in Geology from the University of Oklahoma in 1960. He studied ferromagnesian minerals in the basic igneous intrusive rocks in the Wichita Mountains of Oklahoma. He completed his doctoral dissertation in Geology at the University of Colorado in 1975. William studied the movement of ground water in Permian Guadalupian aquifer systems in southeastern New Mexico and western Texas. Results of his research formed the basis of a lawsuit between the two states over water rights. Because of the interaction between his research and this ongoing litigation, his PhD work took the better part of a decade.

Upon finishing his dissertation, he joined the U.S. Geological Survey in Albuquerque, New Mexico and subsequently transferred to Menlo Park, California, where he was a hydrologist/geologist for almost 20 years. In collaboration with others, he developed a large number of computer applications used to store and analyze data on groundwater resources in New Mexico and west Texas, primarily for modeling the Capitan Reef and a variety of hydrogeologic applications and complex groundwater systems. After leaving the Survey, he embarked on a new career as a stockbroker.

Bill was a member of the Northern California Geological Society, the Geological Society of America, the Mineralogical Society of America, and the Berkeley Camera Club, where he won several awards for photographs of his travels to exotic places. He loved ballroom dance and he collected minerals and crystals and books from around the world. He was the founder of the William Hiss Award for "Creativity in the Earth Sciences" at the University of Colorado, Boulder, where he received his PhD.

John Watson
Fallbrook, California



EUCLASE, 4.1 CM, FROM THE GACHALA MINE, COLOMBIA JEFF SCOVIL PHOTO

Wayne A. Thompson

fine minerals

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The Arkenstone

Thank you!

... To all my friends who have allowed me to sell their collections in recent years, including:

Marshall & Charlotte Sussman
Charlie Key
Gary Hansen
Ed David
Eric Asselborn
Dick Hauck
...and many more!

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September 25, 2006

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P.O. Box 450788
Garland, Texas 75045-0788

Dear Rob:

I am delighted to hear that, through you, my treasured specimens are finding good new homes around the world. You provided me with many of these, all of which I have enjoyed for years. Your careful stewardship of these fine minerals contributed greatly to my collection. I would highly recommend that others who want to sell their collections consult with you.

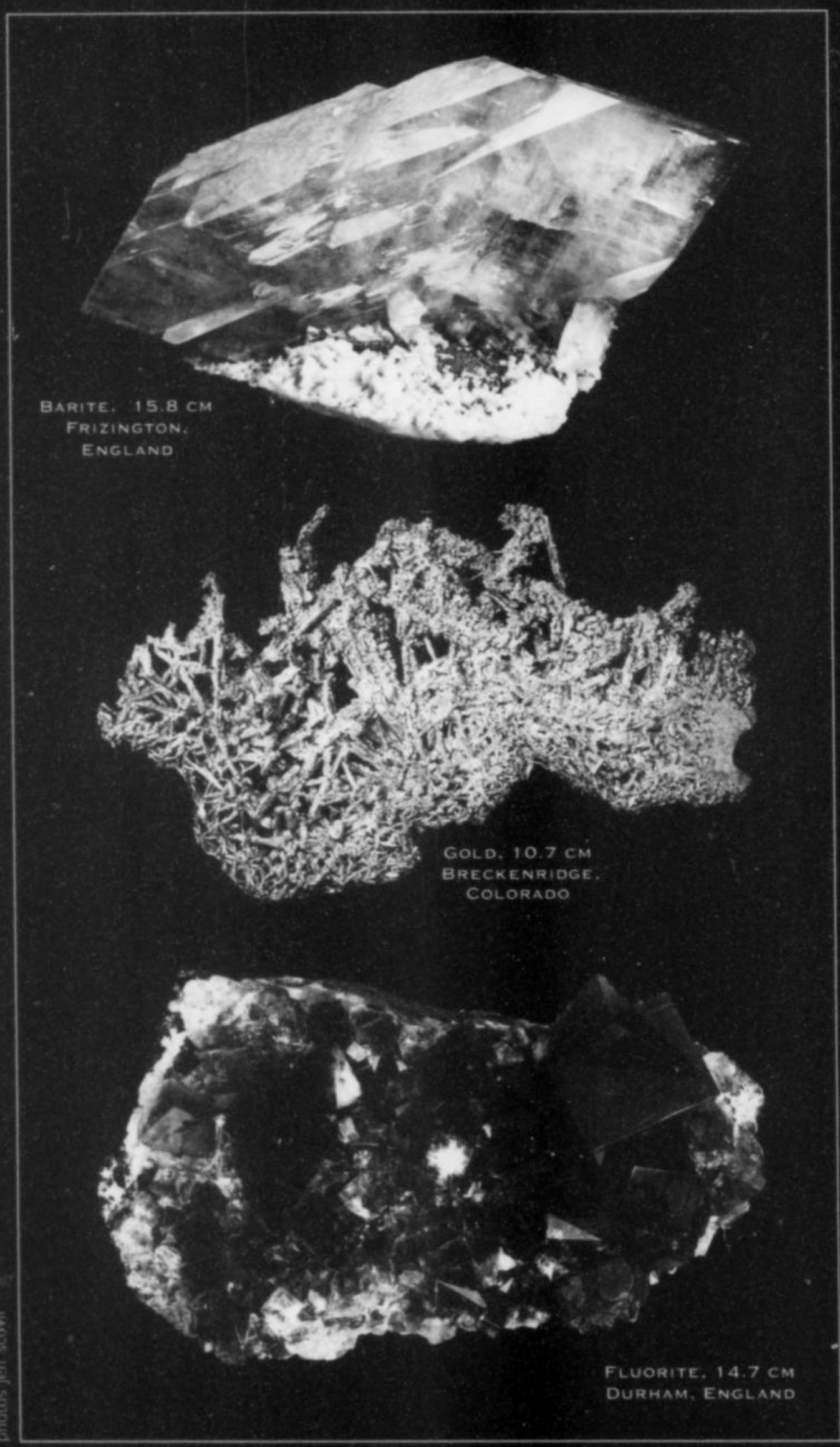
With best regards,

Ed David

Ed David

Photos by Jeff Scovil

wayne thompson & rob lavinsky



BARITE. 15.8 CM
FRIZINGTON,
ENGLAND

GOLD. 10.7 CM
BRECKENRIDGE,
COLORADO

FLUORITE. 14.7 CM
DURHAM, ENGLAND

photos jeff scovil

international dealers of fine mineral specimens

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The Arkansas Diamond Rush Continues!

A Book Review, and an Update

Jim Houran
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In 1906 John Wesley Huddleston, a local pig farmer, found diamonds in a kimberlite pipe near Murfreesboro, Arkansas. The site became the famous Crater of Diamonds State Park, still the only significant diamond locality ever discovered in the United States. Diamonds have been found there ever since, both by professional miners and by fee-paying tourists. Some major gem crystals have been found as recently as 2006, the centennial year. A book on the history of diamond collecting at Crater of Diamonds by Glenn W. Worthington, published in 2003, is here reviewed, and some very recent diamond discoveries are described.

INTRODUCTION

August 2006 marked the 100th anniversary of the first discovery of diamonds on property located about 3.5 kilometers south of Murfreesboro, Pike County, Arkansas. This discovery, by an illiterate pig farmer named John Wesley Huddleston, sparked America's only diamond rush, and the early 1900's saw several attempts to mine the property commercially. From 1952 to 1971 the land was privately held, and the diamond locality served as a tourist attraction, but it has since become a state park known as Crater of Diamonds. Officially, Arkansas' diamond rush is a historical footnote, but Murfreesboro locals can attest that it never really ended: the constant and passionate perseverance of tourists and regular miners have kept the fascinating history of the site alive.

The Crater's many human interest stories went largely unnoted by Kidwell (1990), whose article about the site and its history, published in the *Mineralogical Record*, is otherwise an excellent overview. The gap is filled by Glenn W. Worthington's 140-page paperback book, *A Thorough and Accurate History of Genuine Diamonds in Arkansas*, published (2003) by M.A.P./Mid-America Prospecting (e-mail: usadiamonds@yahoo.com), and selling for $12.00. This book provides an exhaustive account of the history of the site, the personalities and forces that shaped the development of the property, and attempts during the 1990's to mine the land (to my knowledge, this latter information on recent attempts at commercial mining is available nowhere else). Throughout the book, readers are treated to a myriad of entertaining—and often inspiring—stories behind some of the Crater's most famous diamond discoveries. This integration of diverse material is a fine contribution to the literature of diamond mining, and certainly picks up where Kidwell's article left off.

WORTHINGTON'S *GENUINE DIAMONDS IN ARKANSAS*

Worthington's writing proceeds from a perspective unlike that of Kidwell—that is, Worthington's personal role in the Crater's recent

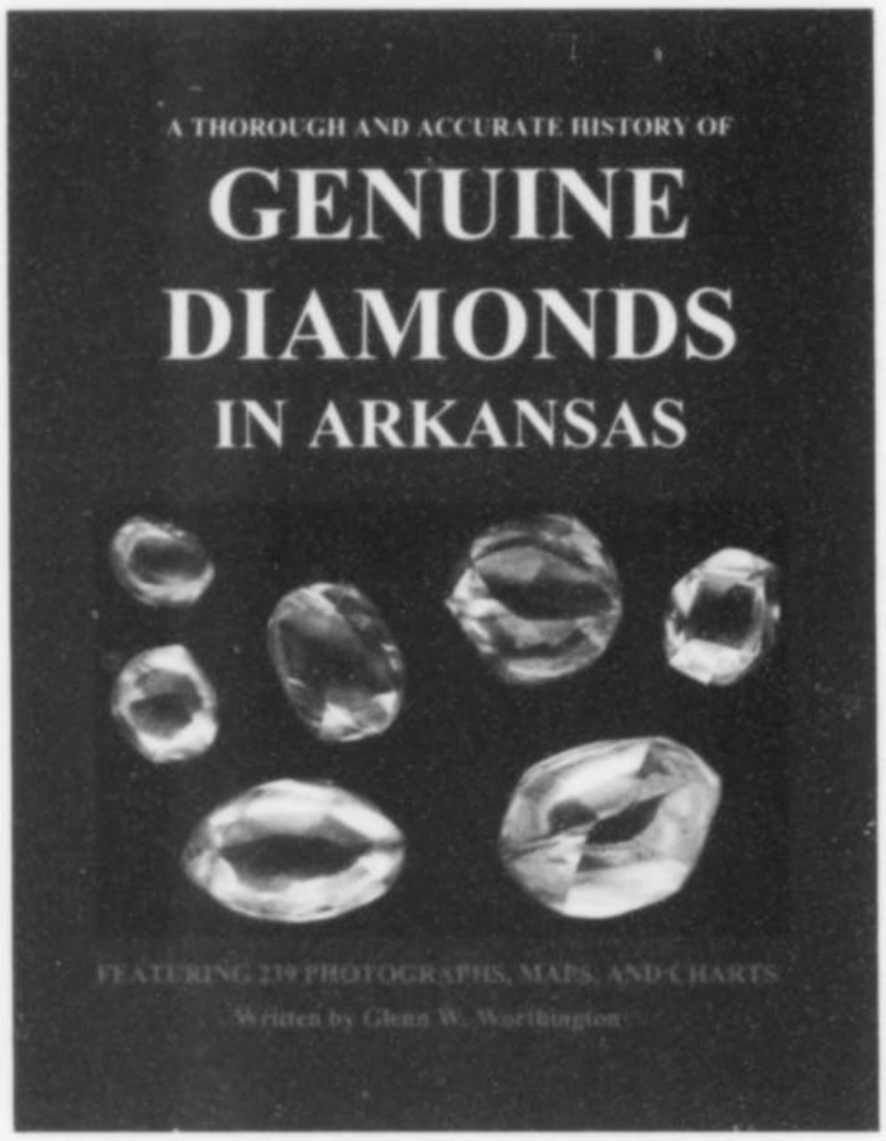


Figure 1. **Worthington's *Genuine Diamonds in Arkansas* (2003).**

history. He was an outsider who visited the park on a whim in 1978 and subsequently caught "diamond fever"; he has been a Crater miner, historian and advocate ever since. Worthington is not only respected locally, but is sought out by well-known diamond dealers like David New and John Betts to help supply specimens to serious collectors. Thus Worthington speaks in the book from experience and authority, but his writing is never pretentious: he writes as though talking personally, telling the reader stories around a campfire. It is as if his goal is to take us on the same intellectual and emotional journey he underwent himself as he discovered the Crater, learned about its amazing geological and social history, felt the excitement of finding his own diamonds, worked on the mining feasibility studies in the 1990's and documented the Crater's most notable finds. The journey is illustrated by an excellent selection of black-and-white and color photographs, many taken from the Crater's archives and the rest taken by Worthington himself.

As mentioned, the book focuses on the human stories behind the diamond discoveries. Many collectors enjoy learning about the history of special specimens—a facet of collecting beautifully represented by works like *The F. John Barlow Mineral Collection* (1996) and more recently *The Smale Collection: Beauty in Natural Crystals* (2006). The history of the Crater of Diamonds has given us striking stories of drama, tragedy, inspiration and even comedy, and Worthington interweaves those stories with historical, mineralogical and gemological information. His human interest stories touch on lucky tourists as well as the regular miners. One ironic fact made clear in the book is that while the bulk of the Crater diamonds have been found by the serious miners, it has been the tourists who have found many of the larger and most notable gems. It is amazing how often *first-timers* go into the field and find large, beautiful diamonds.

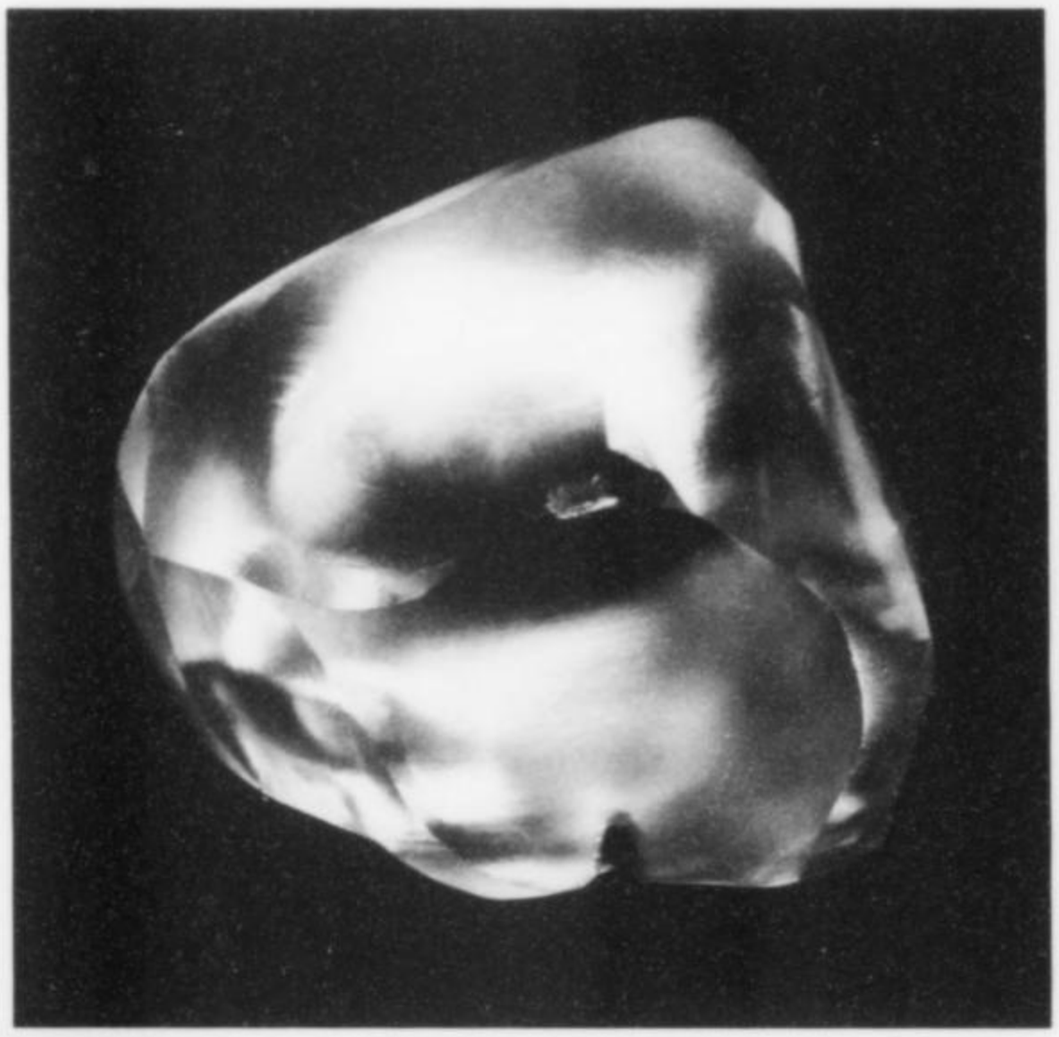


Figure 2. **"Lamle Diamond," 1.2 cm (8.61 cts.). Jim Houran collection; Jeff Scovil photo.**

Figure 3. **Canary diamonds like this 8-mm (1.75-ct) specimen have made the Crater famous. Ray Lofton discovered this stone in 1922, and reportedly paid $125 to the Arkansas Diamond Corporation to keep it as a souvenir. Along with the celebrated specimens in the Smithsonian Institution, this diamond is one of a few known specimens from the early commercial mining days at the Crater. The three diamond colors most often found at the Crater of Diamonds are white (60%), brown (21%) and yellow (17%). Jim Houran collection; Jeff Scovil photo.**

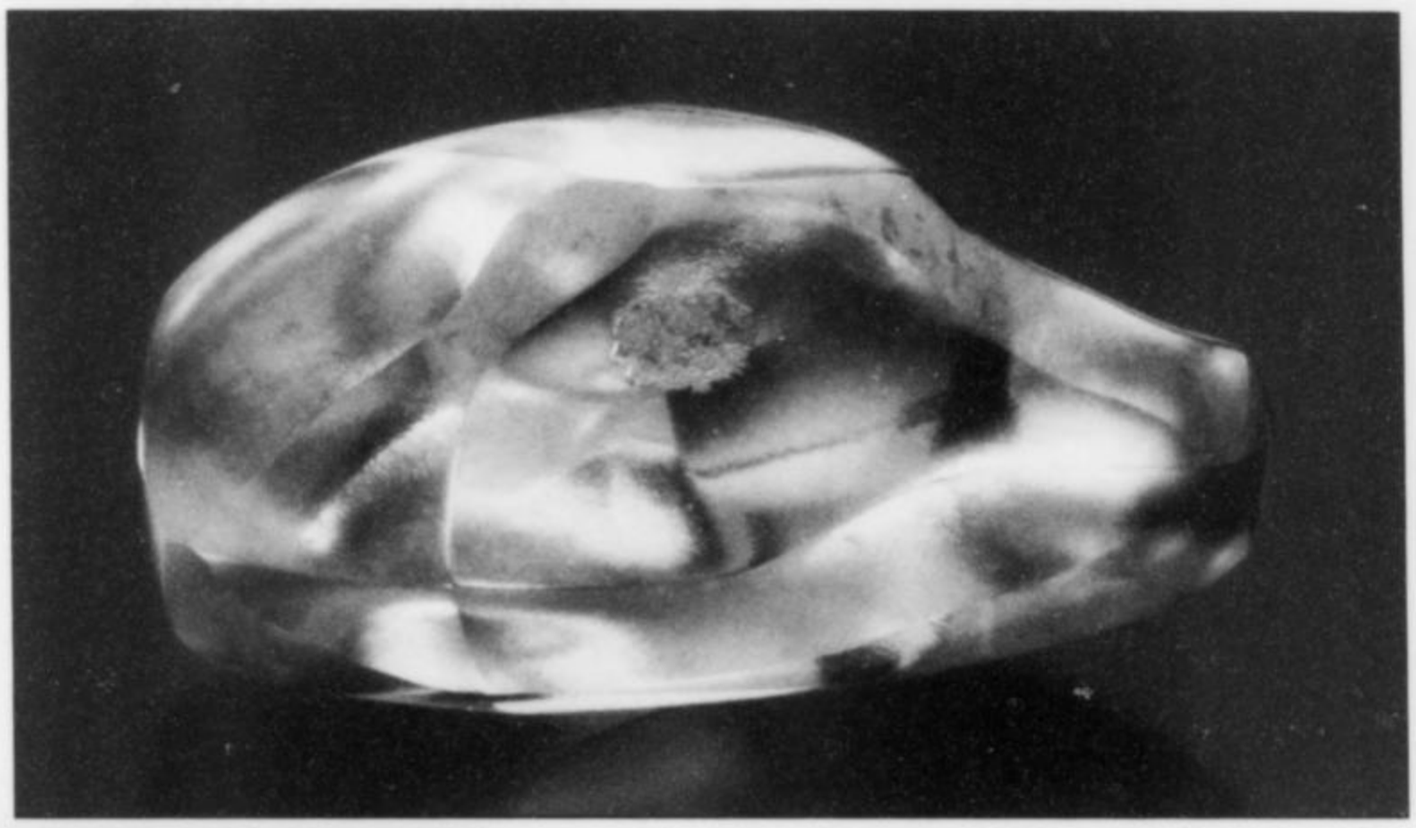


Figure 4. **"Francesci Diamond," 1 cm (2.24 cts.). Jim Houran collection; Jeff Scovil photo.**

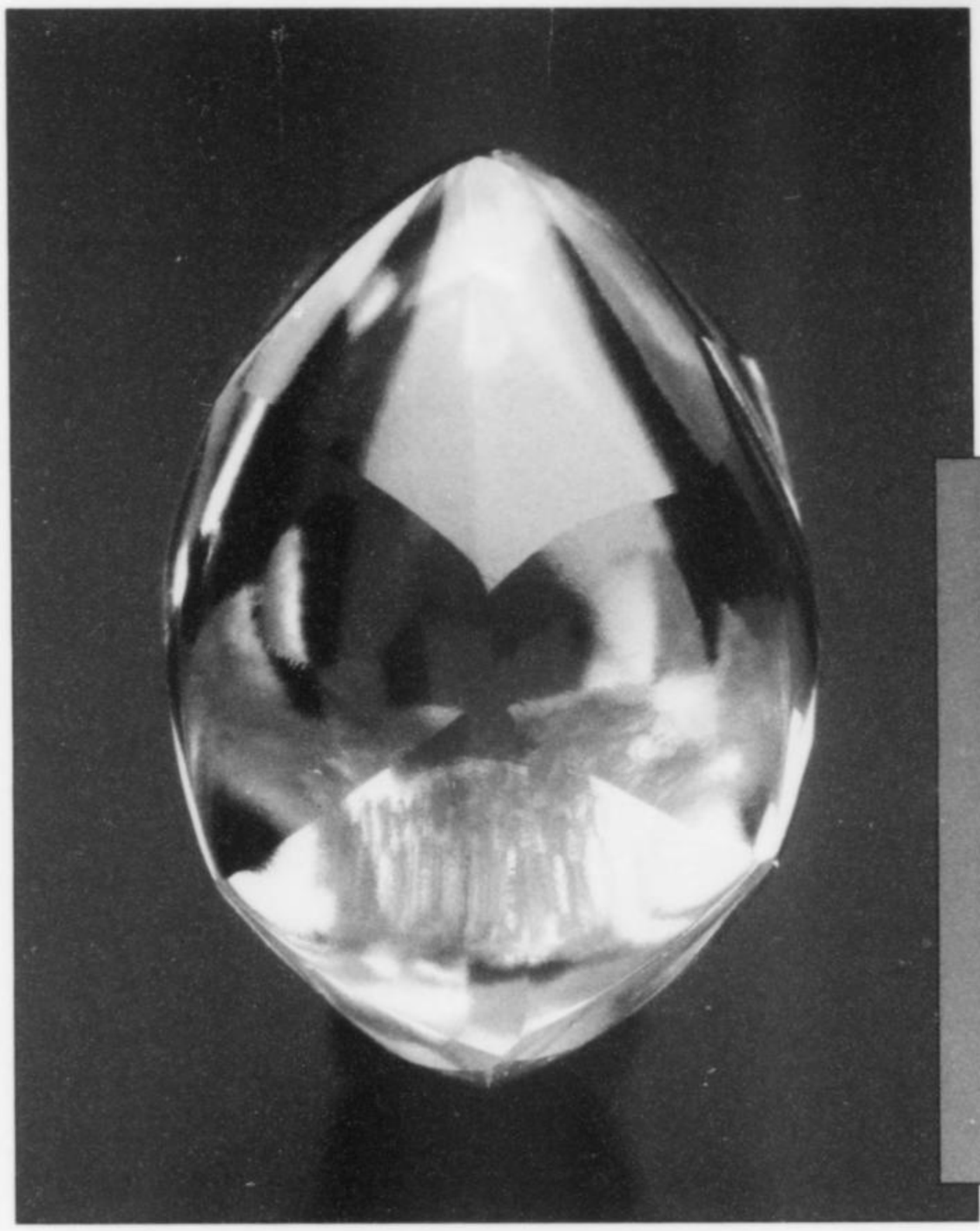
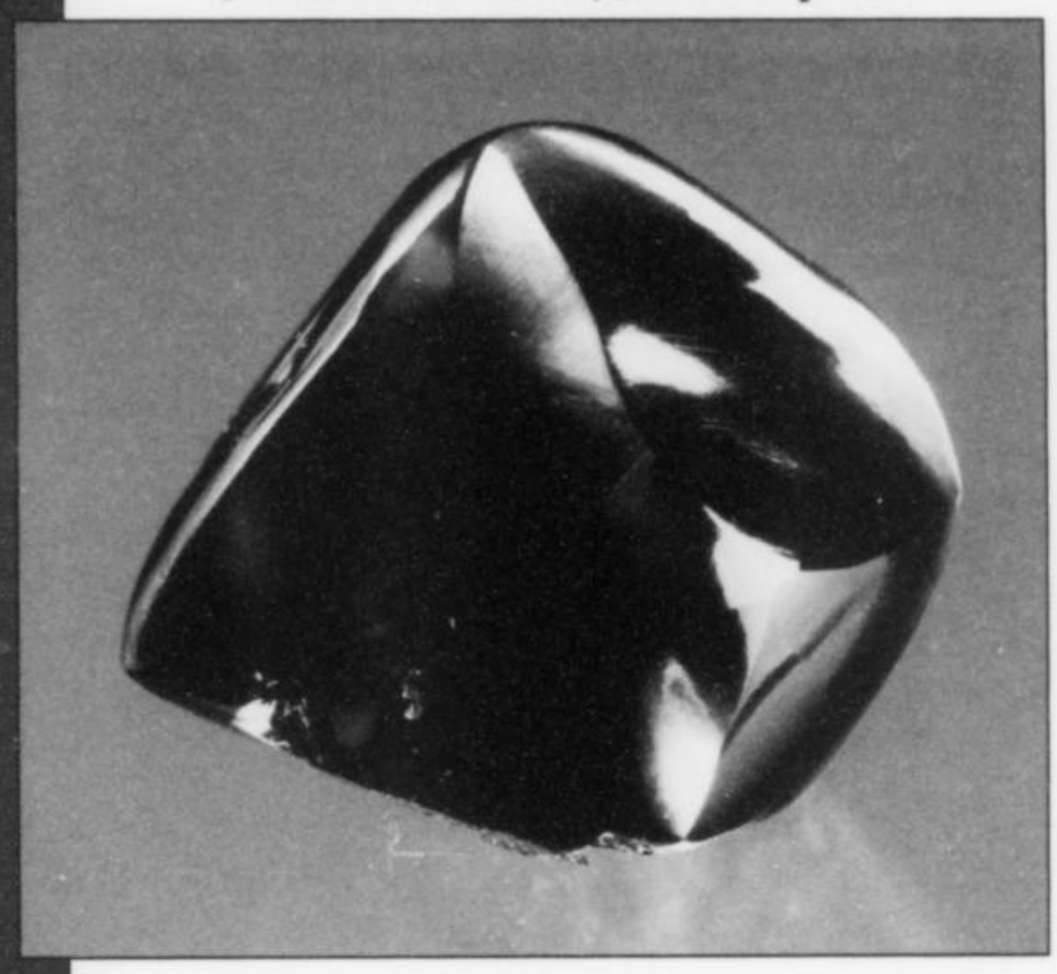


Figure 5. **"Okie Dokie Diamond," 1 cm (4.21 cts.). Jim Houran collection; Jeff Scovil photo.**

Figure 6. **"Cooper Diamond," 1.2 cm (6.72 cts.). Jim Houran collection; Jeff Scovil photo.**



For one example, Worthington takes us back to 1978, the year he first visited the park. In that year, first-time tourist Betty Lamle visited with her family and found an 8.61-carat brown beauty; the "Lamle Diamond" remains the third largest diamond found since the locality became a state park in 1972, and is notable for exhibiting fluorescence under ultraviolet light. This diamond was almost stolen after media reports disclosed the home address of the Lamles. Would-be thieves ransacked their home, but apparently did not recognize the uncut diamond sitting openly in the middle of their kitchen table! The diamond originally had been found in a hole dug by Worthington's brother. Indeed, the Worthington brothers had narrowly missed finding the diamond themselves, and Worthington was present when the gem was discovered. After nearly three decades of the gem's being locked away by the Lamle family, Worthington located it for a private collection after a diligent stint of detective work. The "big one that got away" from Worthington and his brother did not get away this time. A thorough account of the story of the "Lamle Diamond" appeared in *Rock & Gem* (Worthington, 2006).

Another winning story told in Worthington's book involves 12-year-old Alex Franceschi, who, with a busload of other children, visited the park for the first time in 1996. Alex's friends had found three baby bunnies on the search field. News of this discovery spread, and soon young Alex was off to see the rabbits for himself.

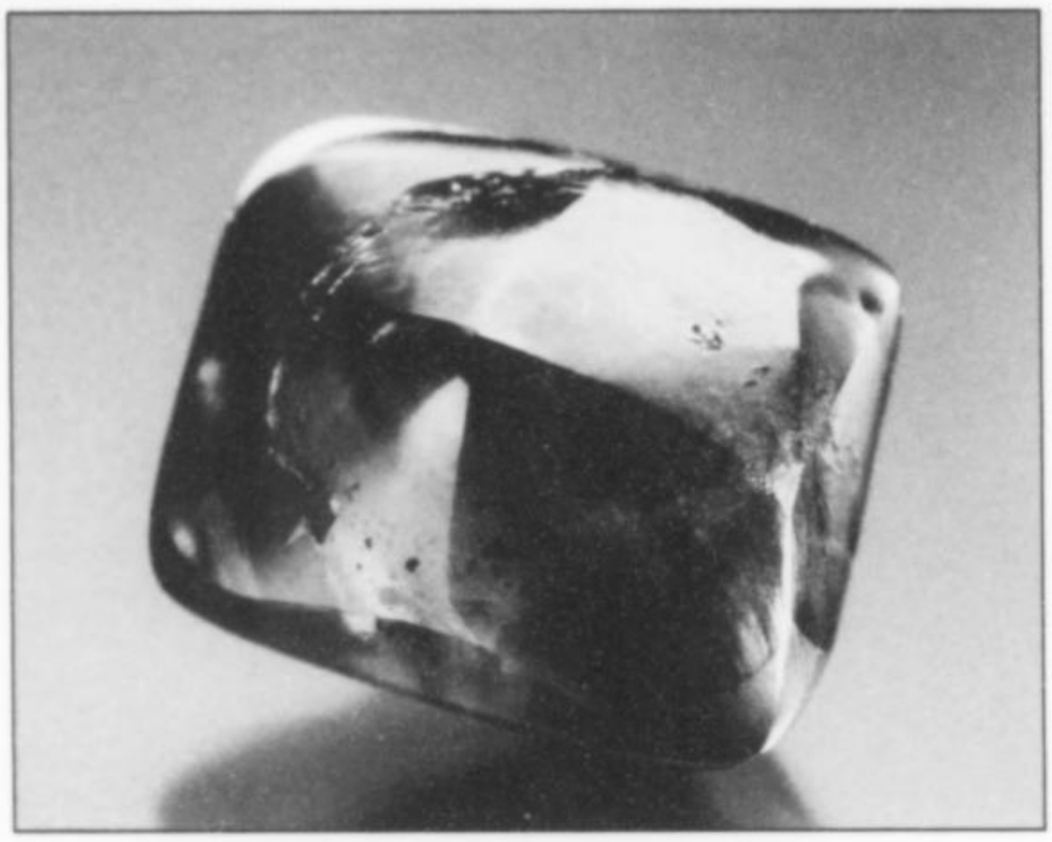


Figure 7. **"Lee Diamond," 9 mm (3.43 cts.). Jim Houran collection; Jeff Scovil photo.**

Along the way he became sidetracked with diamond digging. Alex's detour from trying to find the bunnies paid off when he found a lovely 2.24-carat yellow diamond. The award-winning headline in the local paper read "Boy Looking for Rabbits Finds Carats Instead."

Many of the book's human interest stories are highlighted by photographs of the diamonds involved (and one could wish for more of these: see below). For instance, there is the 6.72-carat "Cooper Diamond," found by veteran miner Richard Cooper in 1997. This diamond is of an unusual dark purplish brown color—virtually black—but still of gem quality. Specimens like this are known as "split pea diamonds" because they have a section that naturally cleaved or fractured away. The Cooper is the sixth largest diamond discovered since the Crater became a state park. We also see a photo of the brown, 3.43-carat "Lee Diamond," discovered by veteran miner Steve Lee in 2003 in gravel which he had originally dug about one year earlier and which had been kept in storage. Although brown diamonds are not favorites of collectors, this stone has an especially pleasing, rich, honey color. Steve Lee has found other large diamonds at the Crater, including a 6.31-carat white stone in 1988.

The book tells the poignant story of the 6.23-carat "Bleeding Heart Diamond," which was found by veteran miner Joe Fedzora in 1991. Fedzora was known to other miners as "Little Joe" because all of the diamonds he had found were small. Then, on the birthday of renowned Crater miner Shirley Strawn (a relative of John Huddleston), Fedzora discovered the largest gem of his lifetime—a heart-shaped diamond with a red streak of some mineral inclusion within. Its appearance inspired Fedzora to name it the "Bleeding Heart." After this find he was no longer "Little Joe": the diamond joined the ranks of the ten largest stones ever found at the Crater of Diamonds State Park. Worthington was unable to provide a photograph of the "Bleeding Heart," as its whereabouts were unknown when he was writing the book. Recently, however, he diligently tracked it down, so that, thanks to his efforts, the public at large may now see this unusual and special Crater diamond, illustrated here, for the first time in 15 years.

As I have a good knowledge of the Crater's history, I know that Worthington did not provide overviews for all of the famous regular miners. That omission is disappointing, but there are good reasons for it. Some miners are reclusive and shun publicity. In other cases, reliable background information or suitable photographs are unavailable. And since Worthington has a high standard for accuracy, it is thus probably unavoidable that his book could not profile all of the Crater's past and recent miners.

Although clearly this book was a labor of love, and its production quality is quite good, I would be remiss not to mention a few shortcomings. Like nearly every book, *Genuine Diamonds in Arkansas* has its share of typographical errors, although their number is small and they do not seriously distract the reader. A more serious flaw is the lack of an index, which would have made the book an even stronger addition to the literature.

Some readers may lament the absence of any detailed information on how to actually search for diamonds at the Crater. Granted, this was not intended to be a "how-to" book, but future editions might incorporate a chapter that teaches readers who are inspired to try their luck at the Crater how to select spots likely to be productive. It is also somewhat of a letdown that the book does not address the issue of evaluating Crater diamonds. Although collectors seek fine diamonds of different shapes and colors from a number of worldwide localities (Moore, 2004), fine diamonds from U.S. localities, being exceptionally rare, are especially sought-after. Therefore many readers probably would be curious to learn about the factors which drive the market value of Crater specimens.

Finally, Worthington does not provide enough photographs of diamonds to satisfy me! That is not his fault—many stones have been lost or stolen or kept in private collections and are therefore not available to photograph. Worthington compensates by means of his engaging writing style—you may not always get to see the most special Crater diamonds, but Worthington nicely relates the stories behind these famous finds so that the reader is still left with a rich educational experience.

RECENT DISCOVERIES AT THE CRATER

The rarity of Crater diamonds is apparent from the summary statistics presented in Table 1. Approximately 25,369 diamonds have been registered since the property became a state park. Of these, only 719 (or ~3.5%) weighed one carat or more. But even after 100 years, the Crater of Diamonds is still yielding fine stones; in fact, several impressive specimens have been found since the publication of *Genuine Diamonds in Arkansas.*

Figure 8. **"Bleeding Heart Diamond," 1 cm (6.23 cts.). Jim Houran collection; Jeff Scovil photo.**

For example, two well-known contemporary miners not mentioned in the book are Harold Lay (who often mines with his wife Debra) and Claud Dill. These miners are personifications of incredible patience and perseverance, and, as a result, both can boast of having found some exceptional diamonds. One of the Lays' best finds was the 2.01-carat "Fried Chicken Diamond," the largest of five stones discovered on Christmas day, 2003 by the couple. They called it the "Fried Chicken Diamond" because that was the lunch that Harold had brought along that day. However, the park staff christened it the "Christmas Star" because it displays an optical "star" effect, like that of a star sapphire, under the right lighting conditions. One of the former park staff members told the local newspaper that it was the most beautiful diamond she had ever seen from the Crater. The Lays' luck has not waned: they discovered a gorgeous 3.36-carat canary diamond on December 19, 2005. Whether these remarkable Christmas-season finds are destiny or just a coincidence, they make great stories.

Similarly, Claud Dill has found some outstanding stones. One of his recent finds proves a point that Worthington makes throughout his book: world-class stones comparable in quality to those from many other worldwide mines are lying in wait at the Crater. Claud's best discovery to date is a 4.14-carat white diamond which he found on September 27, 2003. Normally a lone miner, Claud was working on that day with two other miners to dig a huge hole whose output would be divided among the three men. Claud's specimen was the largest diamond from that hole, and the largest found at the Crater in 2003. His cousin Felicia acquired the crystal and had it faceted. The Lazare Kaplan firm produced the final stone, which measures 3.93 × 6.75 × 7.55 mm. According to certified gemologist and appraiser William G. Underwood, the "Dill Heart Diamond" has an American Gem Society cut grade of 2 and a clarity grade of 1 (approximate GIA equivalent grade of H color, VVSI clarity). The "Dill Heart Diamond" belongs to the grade just under "flawless" and is considered by many experts to be one of the most superb cut stones ever found in the Crater.

The 2006 centennial year was especially productive. A pair of prospectors found a 2.30-carat brown diamond on March 26, and three noteworthy specimens were discovered by casual tourists. Specifically, a child found a 2.12-carat canary yellow stone on March 24, and a second child found a 1.11-carat white stone on June 9; both specimens were described by the park administration as gem quality. Another impressive find was made on July 23 by one of the newer generation of miners—it was a 2.18-carat white stone with excellent internal clarity.

Arguably the most important find of 2006 was a 4.21-carat canary-yellow diamond with, reportedly, a perfect and undamaged external form and an essentially flawless interior—found on March 12. This find was an incredible "lightning strikes" story—and may well be included in future editions of *Genuine Diamonds in Arkansas*. Inspired by a segment about the Crater on a Travel Channel program called "America's Best Places to Find Cash and Treasures," Oklahoma state trooper Marvin Culver and his wife made their first visit to the Crater on his birthday in March 2006. After digging a bucket and a half of soil, Culver discovered the flawless canary-yellow diamond. Up to that time, it was the largest gem found in 2006 and the largest found at the Crater since 2000. Because of its gorgeous color and attractive crystal shape it has been called the "sister stone" to the famous Kahn Canary found at the Crater in 1977 and worn by Hillary Clinton in a ring at Bill Clinton's presidential inaugural galas as a special tribute to their home state of Arkansas. Culver named the new stone the "Okie Dokie Diamond," since park officials pointed out that none of the other notable diamond finds had been named for his state (incidentally, Culver's second choice for a name was "Old Yeller"). Culver

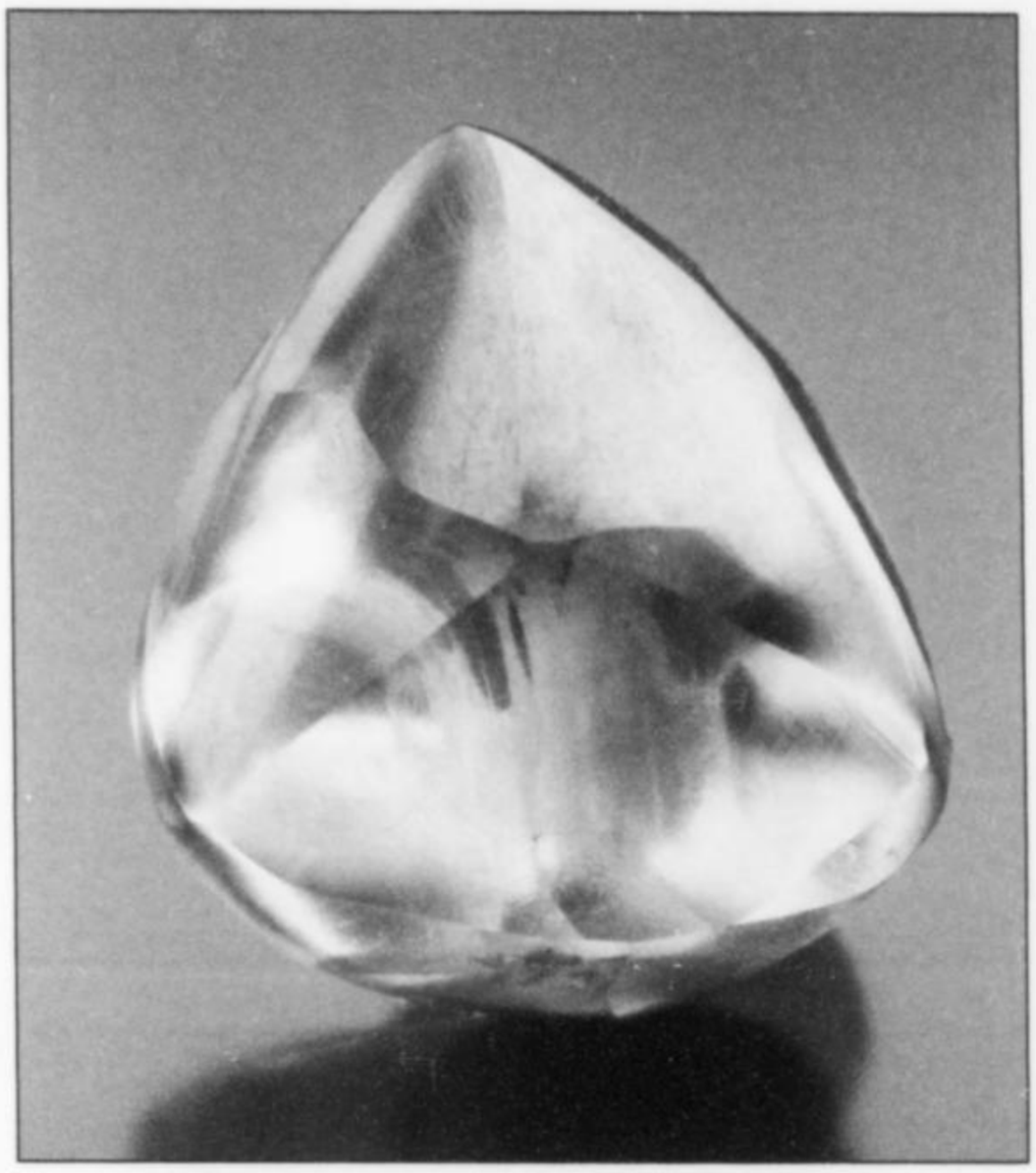


Figure 9. **"Fried Chicken Diamond," 7 mm (2.01 cts.) Jim Houran collection; Jeff Scovil photo.**

and his family recounted the story of its discovery in several media features, including NBC's *The Today Show*, MSNBC's *Inside Edition*, the *Tulsa Times* and *Tulsa Today*. This diamond also was the June 2006 cover photo for *Lost Treasure* magazine and has been discussed in many mineral and gem periodicals.

CONCLUSION

Worthington's *Genuine Diamonds in Arkansas* offers much to the reader, and clearly there is more information, and there are more photographs to be shared in future editions. But history at the Crater tends to be written slowly. Headline-grabbing diamond finds are rare, and a new generation of miners is now gradually replacing the old-timers who have ended their mining careers or are coming

Figure 10. **"Dill Heart Diamond," 3.93 × 6.75 × 7.55 mm (1.15 cts.). Jim Houran collection; Jeff Scovil photo.**

Table 1. **Crater of Diamonds State Park Statistics Summary: 1972–2005 (courtesy of the Crater of Diamonds State Park).**

Year	*Total Found*	*Total CT. Weight*	*# Over 1 CT.*	*White*	*Brown*	*Yellow*	*Other*	*Paid Visitation*
1972	135	55.44	12	65	43	12	15	34,664
1973	151	71.20	19	61	31	17	42	35,669
1974	241	90.92	21	126	66	33	16	54,336
1975	663	88.05	34	388	167	88	20	96,452
1976	395	98.95	18	225	94	65	11	93,870
1977	366	141.06	41	212	79	54	21	91,849
1978	611	232.30	40	359	153	96	3	119,844
1979	402	149.87	24	257	68	67	10	93,793
1980	579	190.97	26	400	101	73	5	80,803
1981	1324	238.58	26	838	266	213	7	97,490
1982	1383	264.38	37	886	237	242	18	71,413
1983	1501	312.57	44	796	353	332	20	87,271
1984	1339	202.26	18	776	304	241	18	75,838
1985	699	148.54	24	458	146	91	4	67,532
1986	930	154.21	23	589	168	165	8	73,447
1987	959	160.38	20	617	185	145	12	71,107
1988	1280	185.14	17	762	246	247	25	75,491
1989	1277	176.29	15	836	226	190	25	86,479
1990	1292	265.17	36	847	239	197	9	67,563
1991	442	105.82	10	245	108	78	11	70,133
1992	470	96.36	14	291	101	73	5	67,145
1993	800	144.44	12	432	204	142	22	55,589
1994	1421	192.09	24	832	270	266	53	53,187
1995	813	138.85	16	464	196	131	22	57,786
1996	923	161.35	20	518	226	160	19	61,252
1997	673	130.15	23	363	159	142	9	55,140
1998	506	103.16	14	318	95	86	7	60,705
1999	471	82.60	10	279	85	100	7	50,698
2000	606	130.02	20	390	106	101	9	46,513
2001	543	78.98	12	353	82	104	4	46,260
2002	614	73.79	7	418	105	89	2	45,167
2003	641	128.37	18	388	136	117	0	47,864
2004	383	58.72	5	231	90	62	0	47,373
2005	536	103.43	19	310	137	89	0	51,852
Totals:	**25,369**	**4,954.41**	**719**	**15,330**	**5,272**	**4,308**	**459**	**2,291,575**

close to doing so. Worthington's book remains timely and historically relevant, as well as entertaining and inspiring. I know many people within and outside of the mineral-collecting world who have caught "diamond fever" from reading the book, and perhaps that is Worthington's most valuable contribution of all: introducing the Crater of Diamonds to new people and thus inspiring the next generation of diamond-seekers, casual and professional.

The centennial year was a heady time for the Crater, with great media attention, several notable finds, and a centennial celebration on June 16–17, 2006, which included a special "Diamond Hall of Fame" display. On public exhibit for the first time were many of the important diamonds described in Worthington's book. It was the largest display of Crater diamonds ever assembled—and Glenn Worthington was directly responsible for that exhibit. For him, it is not about selling books or diamond specimens; it is about preserving an important chapter in American history. *Genuine Diamonds in Arkansas* showcases and celebrates the fact that this history is still being written.

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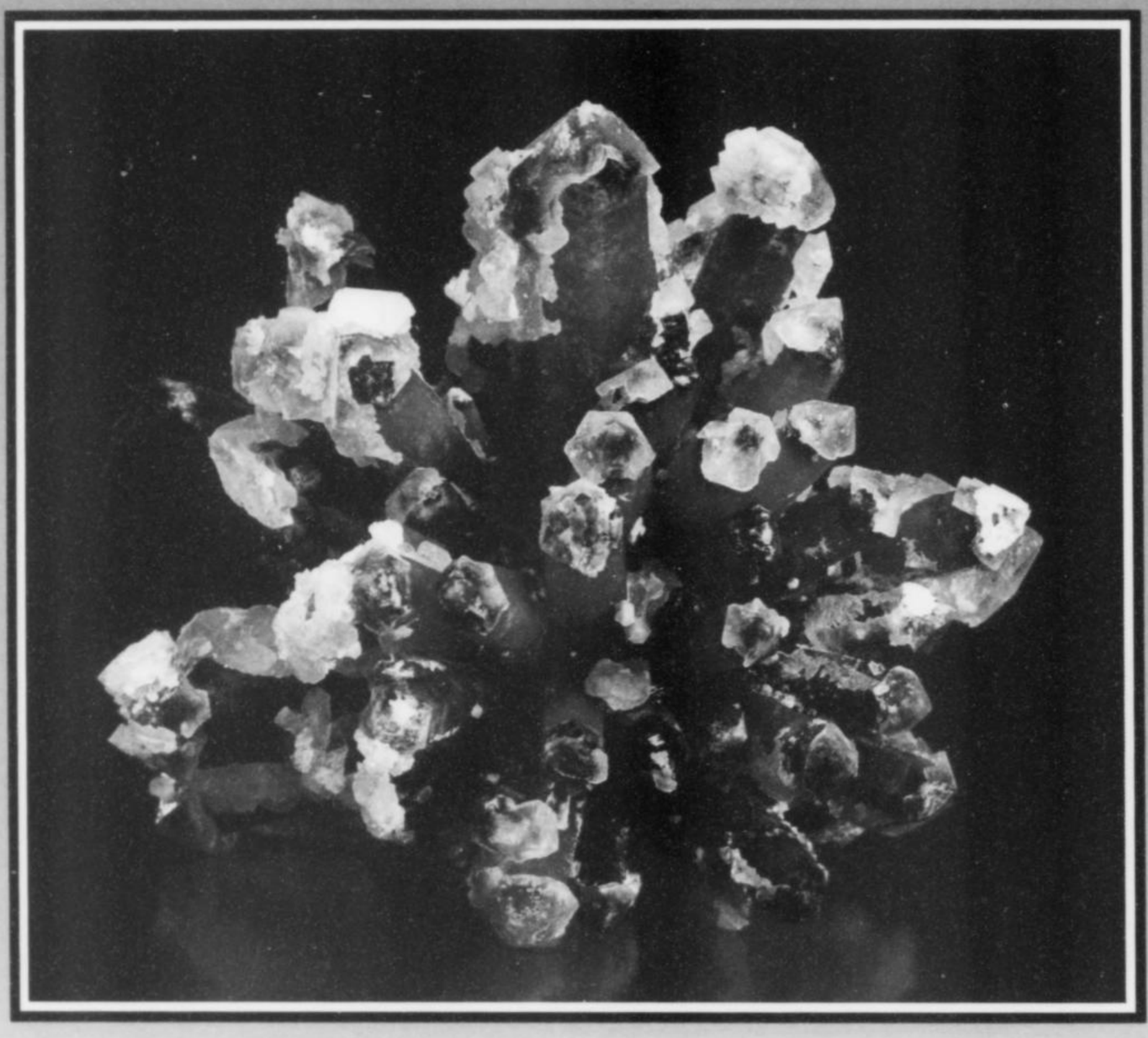

QUARTZ, 5.5 cm, Dalnegorsk, Russia. Jeff Scovil photo.

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The deposits near the small village of Alchuri in the Shigar Valley, Pakistan, have produced attractive specimens of zoisite (the finest outside of Tanzania), the world's best clinozoisite crystals, epidote to rival the specimens from Untersulzbachtal in Austria, fine green to butterscotch titanite, green chromium-rich diopside and other highly collectible species. It also seems to be the faden capital of the mineral world, yielding faden crystals of quartz, fluorapatite, clinozoisite, orthoclase, titanite, zoisite and diopside. Thus it was a tempting target for a personal visit, the first by any Westerner, as recounted in this article.

INTRODUCTION

The Raja Bazaar, Rawalpindi, Pakistan:

A hot June night, streets teeming and pulsing with people pushed off the sidewalks by tiny shops extending their stores' boundaries and wares outward from their buildings' edges. Household wares, spices, food, furniture,, electronics, barber shops, are all illuminated by glaring, garish, multicolored fluorescent signs as tightly packed as the bodies on the street, a mass of humanity that parts like water as cars slowly ply their way forward, and closes after the vehicles pass, ebbing and flowing: an old bazaar in Asia, mostly unchanged by time, home to the poor and common man. Decades have passed and only the human faces have changed; generations of shop-owners following family traditions; signs in Urdu, not English; every need in life found on one cramped city block; sights, sounds, smells overwhelming; intimidating and intoxicating, tempting and repelling, vibrant and chaotic; this is real, this is raw, this is Asia.

"What is a Western-born man, unnoticed in traditional garb and local beard style, doing here?" I asked myself, mesmerized by the scene. I have spent so many years in Asia that my soul has flip-flopped, torn between cultures, and now I was fascinated by one

of my favorite pastimes, watching life unfold in the bazaars, from birth to death, and every facet in between.

I was with my close friend, Amir Ullah, and we were looking for a specific hotel, in a sea of hotels amongst the overwhelming stimuli, searching for the key to our Northern journey, our hopes depending on a known con man, maybe holding an airline ticket impossible to obtain elsewhere, and the hotel impossible to find thiswhere. Uncertainty abounded. Thirty minutes of stop and ask, shoulder shrugs and vague points and waves, so many businesses crowded into a city block that locals do not know what lies 200 meters distant.

"Have we been misled by the con man? Does this hotel really exist?" I pondered as our taxi driver for the third time declared that this was it, but knowing his serious need of prescription glasses, left me doubtful, as we faced the impossible task of finding a place to park, forcing us to beg to have a makeshift, portable street restaurant remove an empty bench for customers over a few feet for us to squeeze in. As Amir Ullah pleaded, I jumped from the rear seat and raced to the dimly lit doorway and up the steep stairs, space at such a premium that the stair angle had to be very steep, and found our man sitting on a sofa in a tiny lobby, perfectly content with his world. I rushed him back down the stairs hoping that the car had not been moved by the force of humanity into some endless circle like the vortex of a black star.

We squeezed into the back seat and our car slowly turned and wound down the narrowest of lanes, a shortcut made long by the slowest of speed.

"Do you have the tickets?"

"No, but noooo problem." Alarm bells rang in my mind. The flight was to leave in 12 hours and the tickets were still not in hand.

"Tomorrow the tickets are coming."

Sure. The con man then informed me that I had a confirmed ticket for Saturday morning at 9:30 a.m.—the only problem being that it was already Saturday night. What to believe? What choice was left? Every seat to Skardu was booked for the next 18 days. Go with the flow, even if it is upstream through class-six rapids.

We finally emerged at our hotel destination. It had been a long day, 15 and a half hours and a 14-mile run since 5:20 a.m. We were among the very few occupants; the owner had been waiting for a good offer to sell this prime location of real estate, and had let its secondary function as a hotel deteriorate. The room charge was $8 for two, quite moderate for a large city in Asia, but in the end not worth the price. The air conditioning was anemic, decreasing the temperature of the stuffy, stifling atmosphere from 90 F to 89 F after nine hours of continuous operation.

We waited an hour for dinner, not cooked in the hotel restaurant but assembled by an anemic, lethargic staff from various kitchens throughout the bazaar. Morning tea arrived too late, and the stale taste of the previous evening's putrid onions was still lingering in my mouth after a worthless night of sleep; we decided to reconsider our choice of hotels for our next stay in Rawalpindi.

Of course, the con man was entirely convincing in his "noooo problem" approach, declining our invitation for breakfast and a free ride to the airport, saying that we should relax in the morning and show up at the terminal entrance one hour before the flight was to leave, and he would meet us with the tickets. Immediately our suspicions were raised. For a man known to freeload on every meal or ride or room or even a cup of tea, passing on a free breakfast and ride was totally out of character. After he departed, we speculated: Is he going to skip town tonight with the advance money I gave him, including the 25% "premium," or will he arrive early at the airport and somehow con two tickets from someone, or does he not want us there to discover his "source," which put almost 2000 rupees in two people's pockets? Or, the least likely of all, is what he says true? We did not want to think about another option. The simmering tension from the previous summer's religious altercation in Gilgit had again been inflamed by an assassination of an important Shiite cleric in January, and the resulting retaliation against the other major religious group, the Sunni, had sparked a tit-for-tat battle that had exposed six to seven hours of travel along the Karakoram Highway to automatic weapon fire from militants. Every local mountain person with whom we spoke in Peshawar refused to travel through the line of fire, even with an armed military escort, some not returning home to Gilgit for over two and a half months. It was comforting to know that our lives were in the hands of the flimflam man, which of course further improved our evening's disposition.

A groggy morning start following a fitful night's sleep did not improve our optimism, and we decided that it was in our best interest to arrive at the airport early. We parked at exactly 8:00 a.m., anxiously walked to the open-air domestic terminal entrance, and wandered inside, both of us constantly craning our necks in search of our elusive savior. He was not to be found, and the ticket handoff was to be at this minute. We settled in amongst the immediately identifiable Baltis with their distinctive facial features and hats, knowing this was the gathering for the Skardu flight. After ten minutes I had grown confident that my 7000 rupees had purchased someone a small refrigerator or a new carpet, but then I spied the short, squat man scurrying away from the terminal. I assumed that the deal had failed and the great escape was in progress. As I briskly chased him down and was about to grab him by the scuff of the neck, he abruptly turned and reached out for a luggage cart. I realized that he was not trying to escape and I called out his name. He responded with a warm welcome, and of course the first thing to roll off my lips was, "Do you have the tickets?"

"Not yet, but noooo problem!"

I was greatly reassured, and herded him back to the terminal. It was now about 8:20 and uncertainty was still gnawing away at our insides, decreased only by the fact that we now had him as a hostage. Suddenly, a tall, fair man approached with a smile and flourished the tickets, saying "50-50 chance of going today, inshallah [God willing]."

I quickly grabbed the tickets and scanned them, surprised to actually find one with my correct name, and saw that the departure date of the 11th had been scratched out and the 12th hand-written in its place. Half way there! Now if only the flight would go.

Another ten minutes passed and the ticket courier reported that the odds had increased to 70%—encouraging. The check-in line started to move and the Skardu crew surged forward to form a chaotic queue at the security checkpoint, then another at the luggage check-in. A second security check and we were in the departure lounge, where I, with my extremely limited computer abilities, guessed the correct password to hack into a computer to check my hotmail account and return a message to Wendell Wilson at the *Mineralogical Record* about my latest article, which I had just finished while in Sri Lanka a few days before.

At ten minutes before take-off there was an announcement saying that there would be a delay because of bad weather. We blissfully, wishfully fooled ourselves into believing that this was good news—the flight could have been canceled outright, after all—only to receive the death knell an hour later, when it *was* cancelled. The entire morning had been wasted.

Now, I wondered, what would happen with our tickets? Would they be usable tomorrow? Our "travel agent" disappeared into a room with an "entrance forbidden" sign and I was made to wait with a mound of luggage for about 30 minutes, by which time I had concocted all sorts of scam scenarios that might be happening in the adjoining room, and likewise worrying about being a victim of a random drive-by shooting while sitting exposed in the open-air

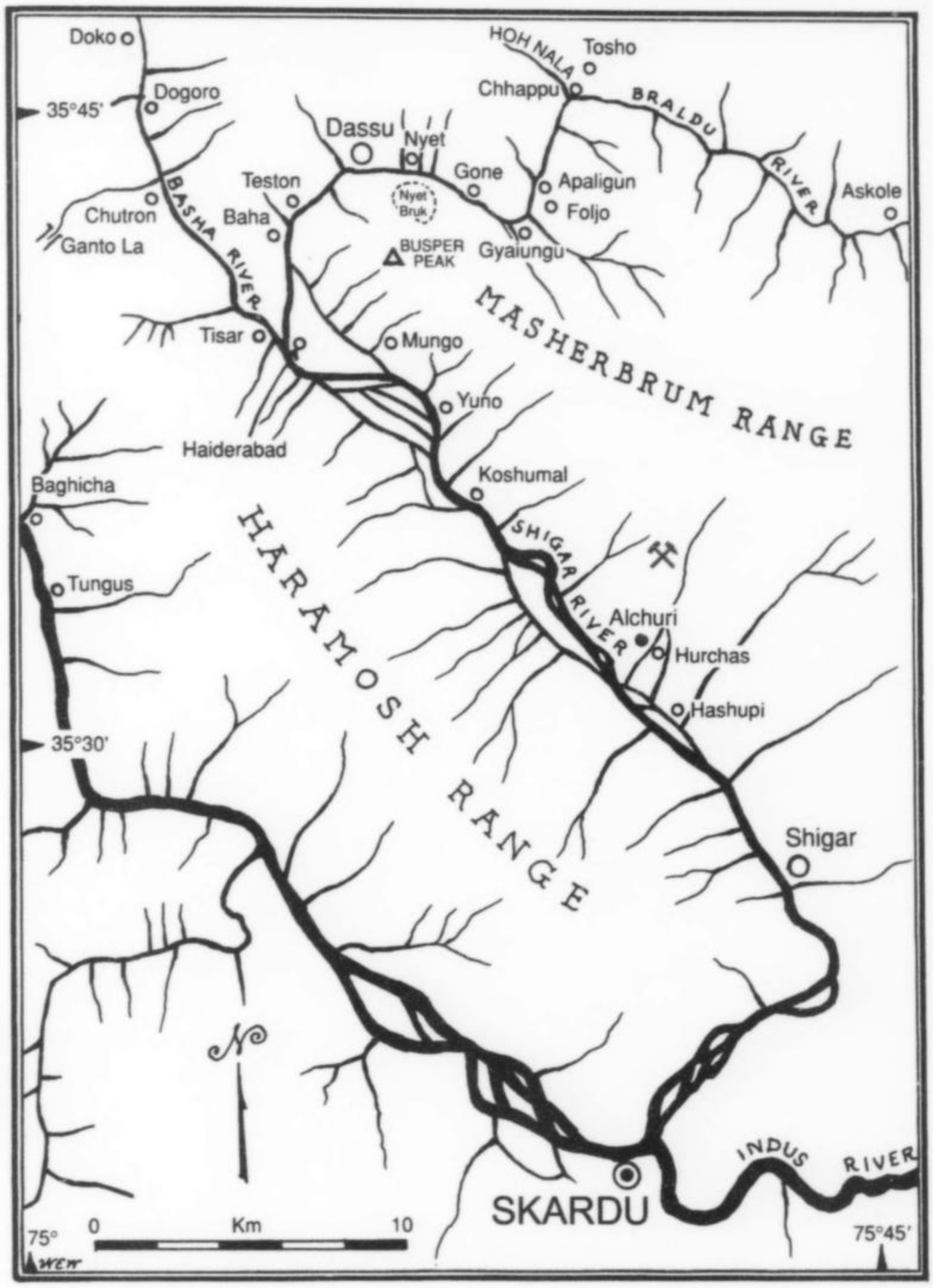


Figure 1. **Location map showing the Skardu-Dassu region of the Northern Territories, Pakistan. The Alchuri collecting area is shown by the crossed hammer symbol, up the valley from the village of Alchuri.**

entrance. The flimflam man reappeared and matter-of-factly handed me my ticket with a new scratch line across the date and "13th" inscribed above. Try again tomorrow....

We returned to the same bazaar but moved to a new hotel, 30 meters distant physically, a light year away in quality and service. Owned by an Ismaeli (a sect of Islam) from Hunza, the hotel exuded the typical friendliness and efficiency for which these people are noted. I settled in for an hour's nap to refresh myself before tackling several hours of writing. As dusk approached, I taxied to a large park with a nice running trail to run loops for two hours, getting speed workouts by racing the young men trying to beat the old white-bearded fellow (they always burn out after a kilometer or two). The 36 ounces of energy drink slung on my runner's belt was not enough liquid to quench my thirst in the 100-degree heat, but a light sprinkle of rain lowered my body temperature a bit to keep me from overheating. After the run came a social evening and Pushtun meal shared with Amir Ullah's brother-in-law and family in nearby Islamabad.

FLYING TO SKARDU

A much better night's sleep followed and a bright clear morning reinforced our optimism. This time our "travel agent" spent the night at our hotel, but slunk away in the morning on some unknown errand. He returned in time for our short drive to the airport, encouraging us with word from Skardu that the weather was now completely clear, and as we pushed our luggage carts into the terminal, the "ticket master" appeared and declared that our chances of flying today were 100%. He was right, and after a repeat of the chaotic check-in scene where the counter was overwhelmed with people pushing forward with wait-list tickets, we boarded the plane and departed.

As the plane angled westward and then shifted north to follow the Indus, we started to approach the first snow-capped peaks of the middle mountains. All reports had indicated that it had been a very heavy-snowfall winter, starting off with an unseasonably deep 2 meters in mid-October in the upper Chitral Valley. I tried to compare past memories of flights in June to today's in terms of visible snow depths and used the peridot mine location as a reference, easily identifiable by its position at the very head of the Kaghan Valley, a very long, large valley paralleling the Indus to the east. The reports were accurate; snow depths were still very high despite the heat on the nearby plains.

I soon lost interest in the snow depths, my attention being attracted instead by the rapidly increasing cloud cover which obscured the

view and, more importantly, raised concerns that the flight would be cancelled in mid-route, forcing us to return to Islamabad and make new plans. I noticed Amir Ullah's unspoken but visible concern and whispered, "Do you remember ever flying the Skardu route with this many clouds?" Barely audibly he answered hoarsely, "No."

The Indus Valley below us was filling rapidly with puffy white pillows, billowing and evolving as if being blown from a circus fog machine. But so far the clouds were remaining below us and most of the upper west face of the Nanga Parbat (an enormous peak also known as the "killer mountain") was visible, save one threatening, thin, dark blade of a cirrus cloud casting brooding shadows across the summit.

We veered abruptly right as the Indus changed course, emerging from the southeast, with Skardu about 170 km ahead. The plane bucked slightly in an updraft as a rugged snow-capped peak reared too near and above us. A moment spent wondering, and then the plane leveled and re-emerged above the clouds for the continuation of the flight, the rest of which turned out to be uneventful as weather conditions abruptly improved.

The pilot made a leisurely landing, taking broad circular sweeps like a bird of prey, allowing us to look at the landscape, and to finger-point and identify all of the features that we knew so well from the ground. We all sighed a prayer of relief once the plane had coasted to a halt, after an initial rough bounce. (Two days later the plane circled Skardu three times and then aborted a landing and returned to Islamabad.)

I was one of the first to emerge from the shuttle bus and briskly walk the narrow sidewalk past rows of bright red blooming flowers. This tiny terminal serves between 150 and 200 flights in a year. A vaguely familiar face appeared at the opening of the double door, already showing signs of recognizing me, but at this distance I couldn't distinguish his features clearly. A few more steps and I realized that he was one of the heads of the airport security, and even though everyone else around me believed me to be a Pathan, he picked me out of the line-up. I joked to him in Urdu as I neared, and said, "You never forget my face, do you?"

He smiled as he led me to the foreigners' registration desk, and I quickly filled out the vital information in the log book and then returned to the crowds, people elbowing each other, reaching for their bags along the only accessible six meters of the one short conveyer belt in the baggage arrival area. We wrestled our luggage out the narrow doorway. We are never 100% sure of anything at any time, anywhere in the Northern Areas, so Amir Ullah and I had not made the final decision on which hotel to use, being too elated at actually landing and being on the ground before we had even begun to think about it. A tout, swinging a wooden hand sign that advertised one of our two hotel options, made our decision for us by providing free transportation to our lodging.

We minivanned our way to the hotel on the edge of Skardu, newly opened in 2004, and were greeted warmly by the owner, who remembered us well since we had spent a number of days there during Ramadan the previous fall. We were given a double room with a great view to the south overlooking the hard-flowing stream emanating from the beautiful Satpara Lake; this stream is a drainage outlet for the vast high-altitude plateau known as the Desai, and is also the source of Skardu's drinking water supply.

We ordered lunch and negotiated the room price, settling on 1200 rupees ($20), with the owner pointing out that he had just rented it out to two Italian climbers for 2000 rupees the previous evening.

We flagged down one of the tiny dilapidated taxis that plied the roads and made our way down to Yadgar Chowk, to raise our flag. Within a few minutes, the word-of-mouth system which we laughingly call the "BBC network" was working, and the news of our arrival was spreading. We were warmly greeted by a member of one of the oldest established mineral-dealing families in the Northern Areas, and after an immediate invitation for tea or a cold drink and the usual pleasantries, the conversation turned to how old we all had become, my sun-bleached beard, a bit whiter than before, having served as the impetus for this conversation.

Amir Ullah and I asked about market conditions and were told that not many quality minerals were available at the moment in Skardu: only a few from the usual top two to three dealers. We were not disheartened, though, knowing that the mining season was moving into full swing and that there would be daily fresh offerings for us to view while we toured the Shigar and its upper valleys.

I decided to visit one of the locals who occasionally had some fine minerals and walked the short 200 meters to his simple home, one room of which served as his office-warehouse. This time the material was rather ho-hum, enough so that I lay down on the carpeted floor and took a fifteen-minute nap. Being refreshed did not improve my view of the specimens' aesthetics, though, and I did not make any offers, although I asked the price on a few things, more out of courtesy than out of any real interest.

It was already mid-afternoon, and when I reappeared in the bazaar, Amir Ullah suggested that we return to the hotel, noting that if people were really interested in showing me things they would bring them to me there; this would be one way of avoiding having to go through mountains of junk to find one small overlooked treasure. Our two or three previous trips to the Kattah Gah market, a cluster of small simple mineral shops mixed in with cloth merchants' establishments, had been not only unsuccessful but unpleasant, almost painful. So the decision to avoid the whole process this time was easy.

One of the first dealers to arrive at our hotel was a good friend of ours who worked in the Pakistan International Airline office in Skardu and was a mineral dealer on the side. We arranged a date for tickets for the return flight, and then perused his stock. This time he had some bi-colored tourmaline, dark blue with nearly white terminations. Everyone will think that these are from Afghanistan, but they were dug from the Ho Nala, a very narrow, very steep gorge between Apaligun and Chhappu, aptly suited for the new hydroelectric plant which in two years will provide the first electrical power to the Braldu Valley. Although a bit small for specimens, but fine for cutting gemstones, the two different lots yielded a few dozen acceptable pieces. Of more interest to collectors, there was also a fine miniature of tabular yellow apatite crystals from the Alpine cleft-type deposit of Alchuri. I was hoping, on this trip, to be the first foreigner ever to visit Alchuri, and to take some photos and record the history of the locality.

An unknown dealer who had received word that we were in town came to our room to show the usual aquamarine specimens, good but not notable. We asked their prices, mostly just to start getting a feel for market conditions, rather than out of any real interest, and found that the pricing was relatively high, as expected. We declined the pieces and the dealer left.

I quickly changed into some running clothes, long-legged and long-sleeved so as not to offend local sensibilities, and took off running westward until I crossed the Satpara stream and started a long, long, seemingly unending climb toward Satpara Lake. The goal was to run upwards for about an hour and then return. I worked at a slow, steady pace, always veering upward and southeasterly when I came to major intersections. Eventually I reached the main Satpara road, which runs mostly south, and I strained as this tarmac road steepened. I passed the new water treatment plant and some new barracks for the laborers working at the new hydroelectric project under construction, desperately needed by the expanding population of Skardu. *Beezly, ata aur jata* ("Electricity, it comes and goes") is a refrain heard often here.

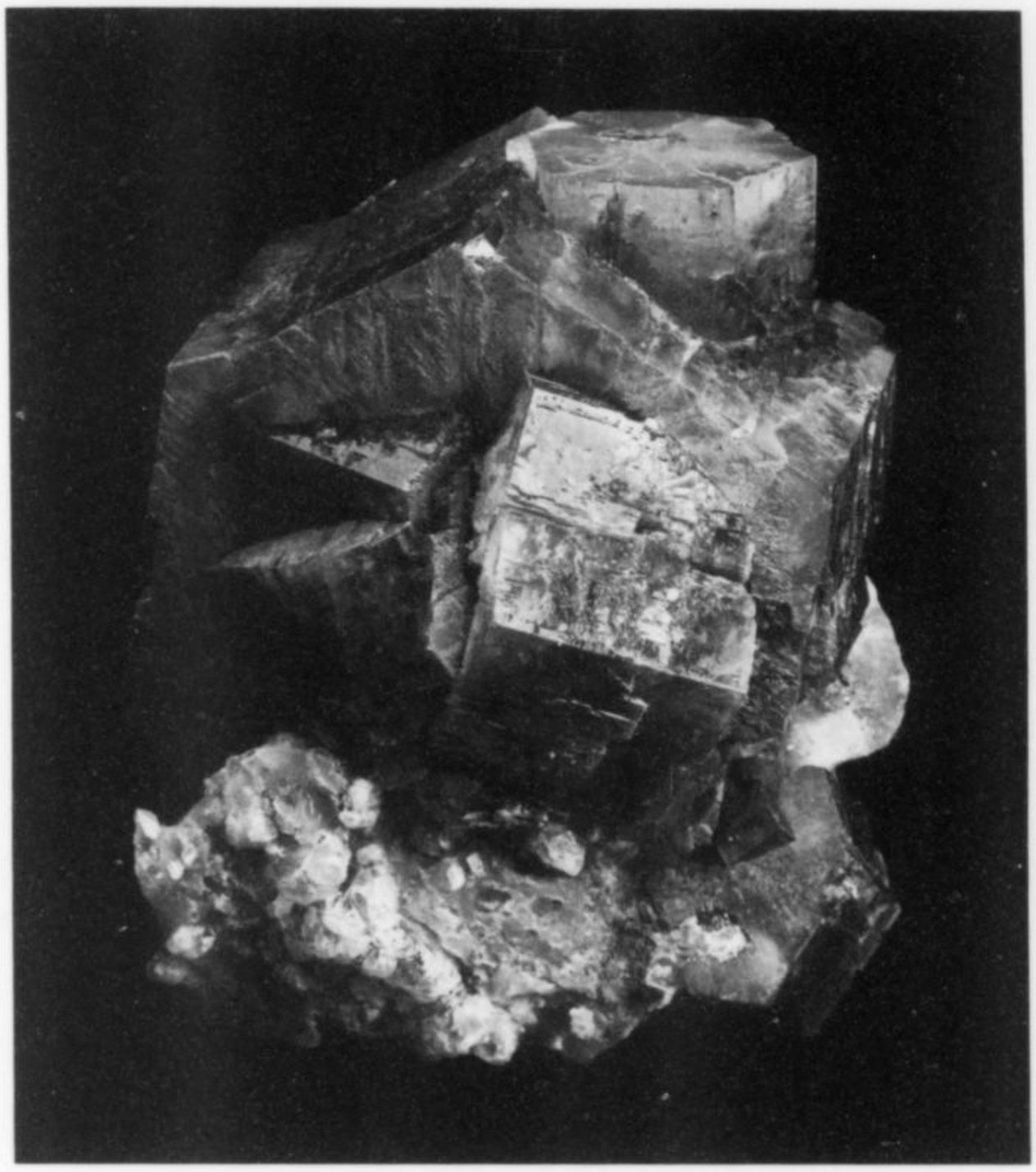


Figure 2. **Aragonite crystal cluster, 7 cm, from Alchuri. Dudley Blauwet collection; Kevin Dixon photo.**

The hard road surface started to peter out, along with the light in the gathering dusk, and I decided to go a bit farther, and farther, each corner enticing me with the thought that the lake was within reach; repeatedly I was disappointed, but started the cycle over again. The returning workers stared with puzzled expressions as they saw me laboring upwards. They took long strides down the steep road, while I moved so slowly that it was as though I was running in place. Eventually I saw above me that the frothing rapids of the stream had eased, and I knew that I was near the outlet of the lake.

I crossed a small bridge and after a few more steps, "Voila," the lake popped into view across the new dam workings. One hour and twenty-seven minutes, the stopwatch read. I was doubly elated, first at having reached a goal that had evolved over the course of the trip, and second at my perseverance. But the joy quickly dissipated as darkness settled and I found that I was alone, miles from the hotel with absolutely trashed quadriceps and calves. Gravity provided some relief as I slowly headed back, but the steepness required continued use of my quadriceps as I jogged. I switched on the head lamp that I had wisely hung on my belt, and upon rounding a corner was greeted by a great view of the evening lights of Skardu, scattered down the valley. But I was stunned at the elevation drop and distance to my hotel, its huge shape still not discernible. There was no other choice but to continue downward, and finally I reached the outskirts of the city. I started to flag down vehicles, almost all of which were taxis heading uphill. (Few people in Skardu are wealthy enough to own a vehicle.) Eventually I reached a large *chowk* and approached a tiny Suzuki car, similar to most of the taxis, and asked the two occupants in Urdu the price for a ride to College Road. After a ten-second consultation they replied "*Pachas rupiya*" [please translate].

I immediately accepted and climbed in, realizing while I did so that this was not really a taxi, mostly because the normal taxi rate would be quadruple or more. Regardless, the young man was happy to collect a small fee and have some "different" entertainment in the normally quiet city of Skardu. We had a pleasant conversation and said good-bye at the hotel gate, and I walked into my room just as dinner was being served.

Amir Ullah and a friend were awed by the news that I had run to Satpara, with the friend commenting that it is an hour drive by jeep (an exaggeration).

Our regular jeep driver checked in, having filled his vehicle with all of the diesel fuel that he could squeeze into it, but he asked to move the following morning's start time back half an hour. We were perturbed that he had not purchased all of the fresh vegetables and fruit we had requested, but understood when he explained that the selection and freshness would be much better earlier the next morning, hence the reason for the later start.

I slept in until 6:00 a.m.; early morning exercise was out of the question after the previous night's run had pushed my week's total to over 150 km. After the jeep driver, Shahji, arrived I strolled out into the blinding high-altitude morning sunlight and immediately noticed the new bright red jeep. I asked when he had obtained this, and he replied that it was the same jeep that I had ridden in on the previous trip, only with a $4000 facelift. A company in Karachi will strip a jeep down to the last bolt and rebuild every single component, making it like new. It had an operating speedometer and functioning gauges, something that I had never seen before in a jeep in the Northern Areas.

Our party of four (a friend from Baha was hitching a ride with us) made a last-minute stop to buy tissue paper and surgical cotton for wrapping hoped-for mineral specimens, and then we rolled down the road toward the Shigar River, crossing and climbing a low pass only to descend to the extended town of Shigar. The heavy

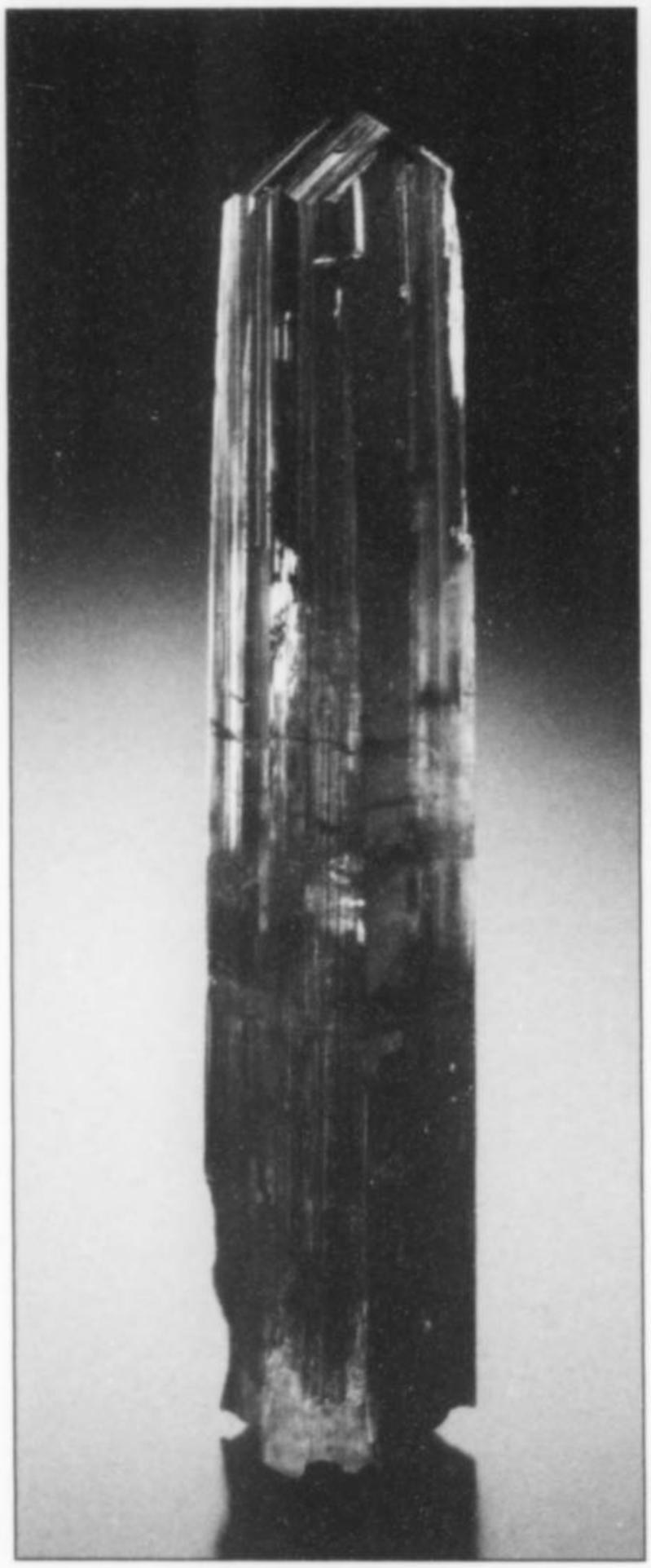


Figure 3. **Clinozoisite crystal, 7 cm, from Alchuri. Dudley Blauwet specimen; Jeff Scovil photo.**

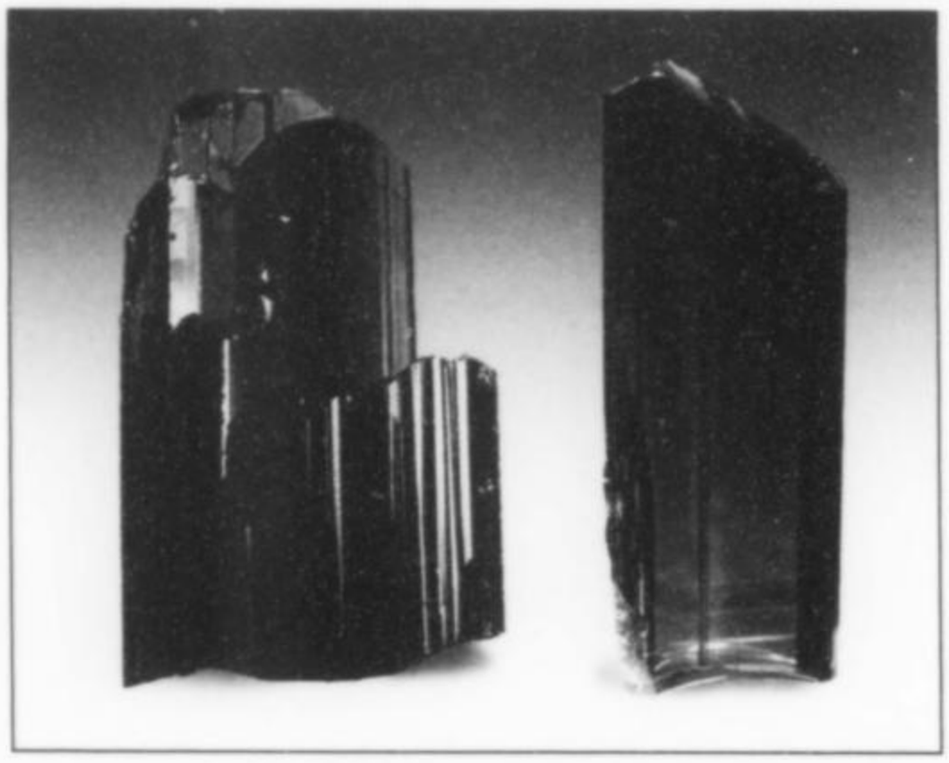


Figure 4. **Clinozoisite crystal, 3.8 cm (the green one probably closer to epidote composition than the brown one), from Alchuri. Rob Lavinsky specimens and photo.**

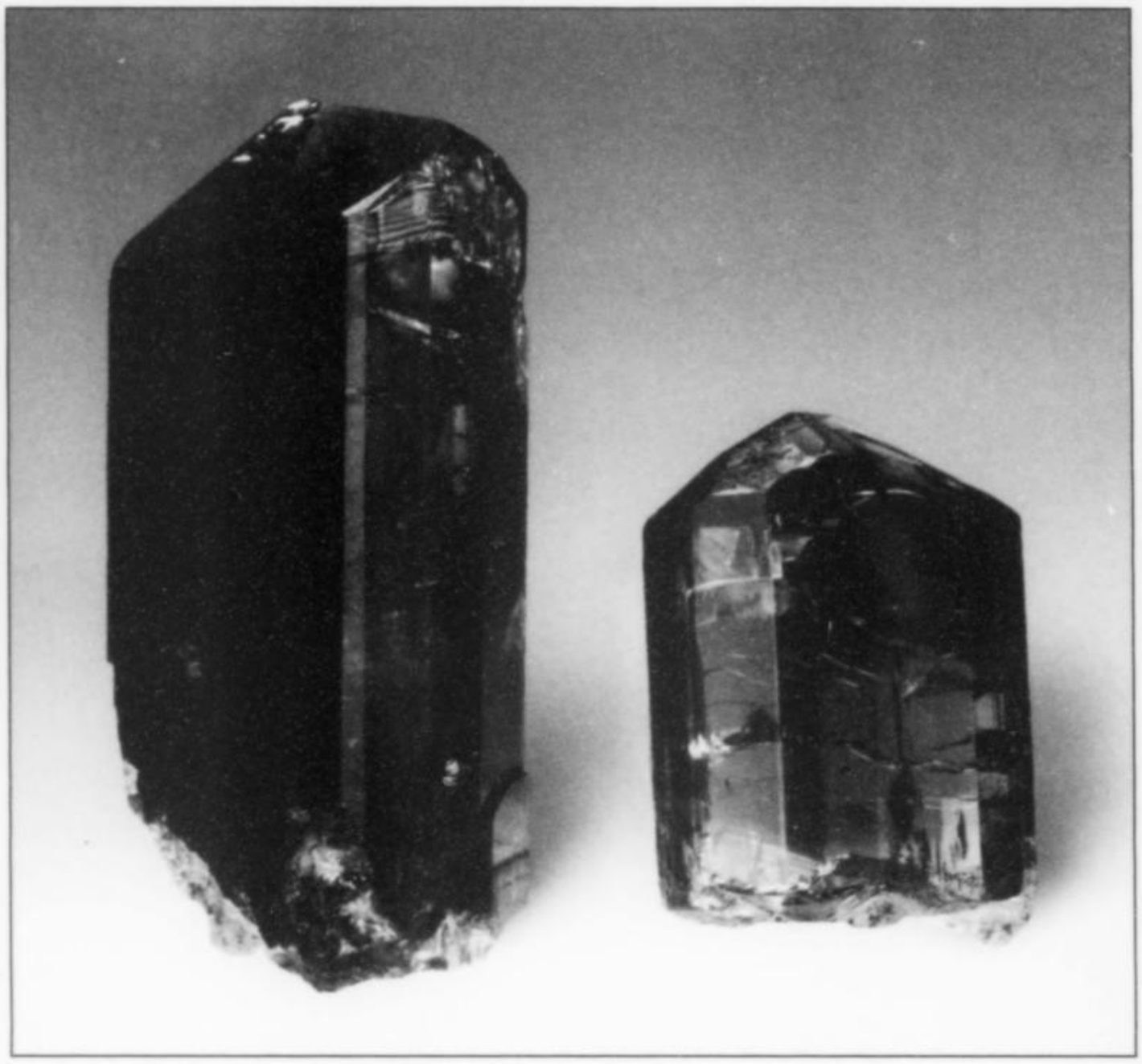


Figure 5. **Clinozoisite crystals to 3.5 cm, from Alchuri. *Aesthetics Underground* (left) and Steve Perry specimens; Wendell Wilson photo.**

winter snowfall and cool, rainy spring had produced lush fields of wheat in various shades of green, standing over a meter high.

There is no mineral shop to speak of in the town of Shigar, so we continued up the valley to Hashupi, where we were disappointed to learn that the local orchard had none of its wonderful black cherries, as it had been another victim of the unseasonably cold spring. At this same date the previous year, the Hashupi *bagh* had also been out of cherries, but then it had been because it was past the season.

We jeeped another 4 kilometers to Alchuri, one of the top Alpine cleft-type locales in Pakistan, and inquired from a villager about the whereabouts of a local schoolmaster. We were told that he was now teaching in the girls' school a short distance down the road. We tracked him down and asked him if he would arrange for me to visit the actual Alchuri mining sites. He agreed, setting a time between 11:00 in the morning and noon on the following day.

We ambled up the valley in relative comfort, with the notorious choking dust of previous drought years held at bay by adequate moisture. The village of Yuno came into view, reviving memories of all of the fine topaz with pristine white albite that I have purchased from there over the years—Yuno, though, is now facing declining production. After several short discussions with some young men from the village, we learned that there were no minerals available at the moment in town, but a group of miners were currently working on the south-facing ridge above town and some specimens would possibly be available in a few days. It later turned out that some of the "bic pen" terminated aquamarines had been found, and I purchased them three days later.

HAIDERABAD

Haiderabad lay just a short distance ahead, and as we neared this new village—most of the buildings having been constructed during

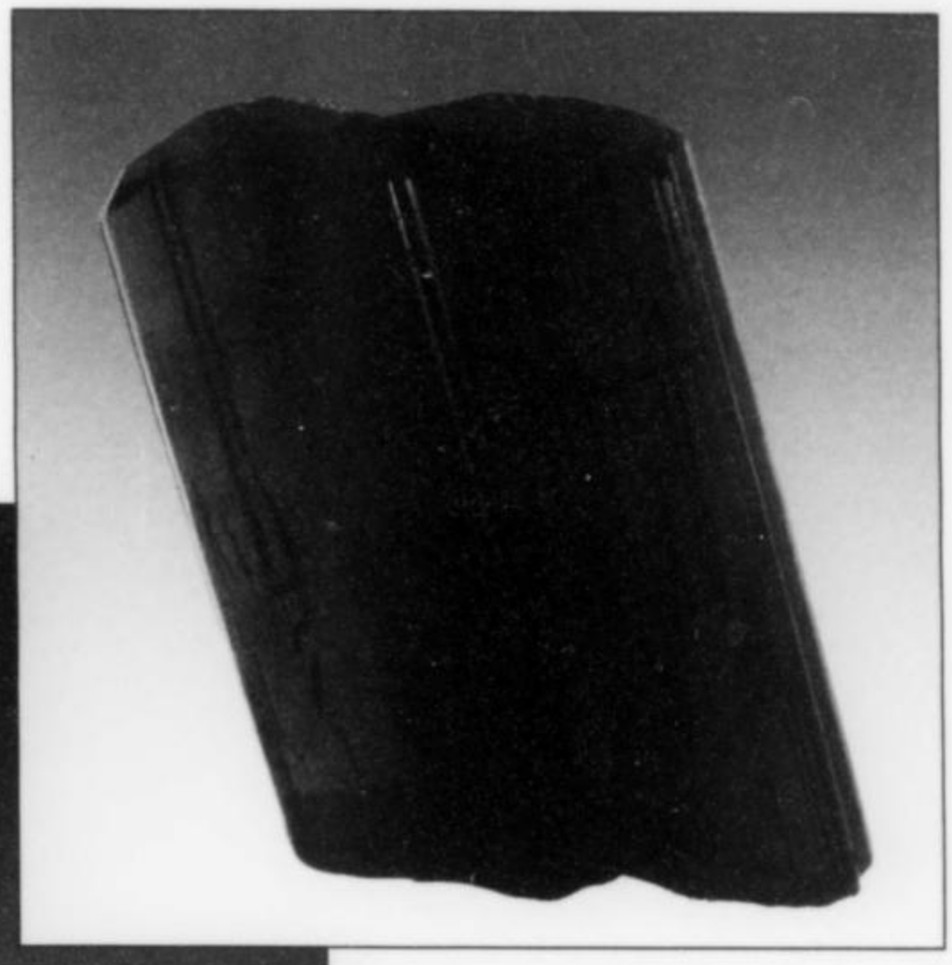
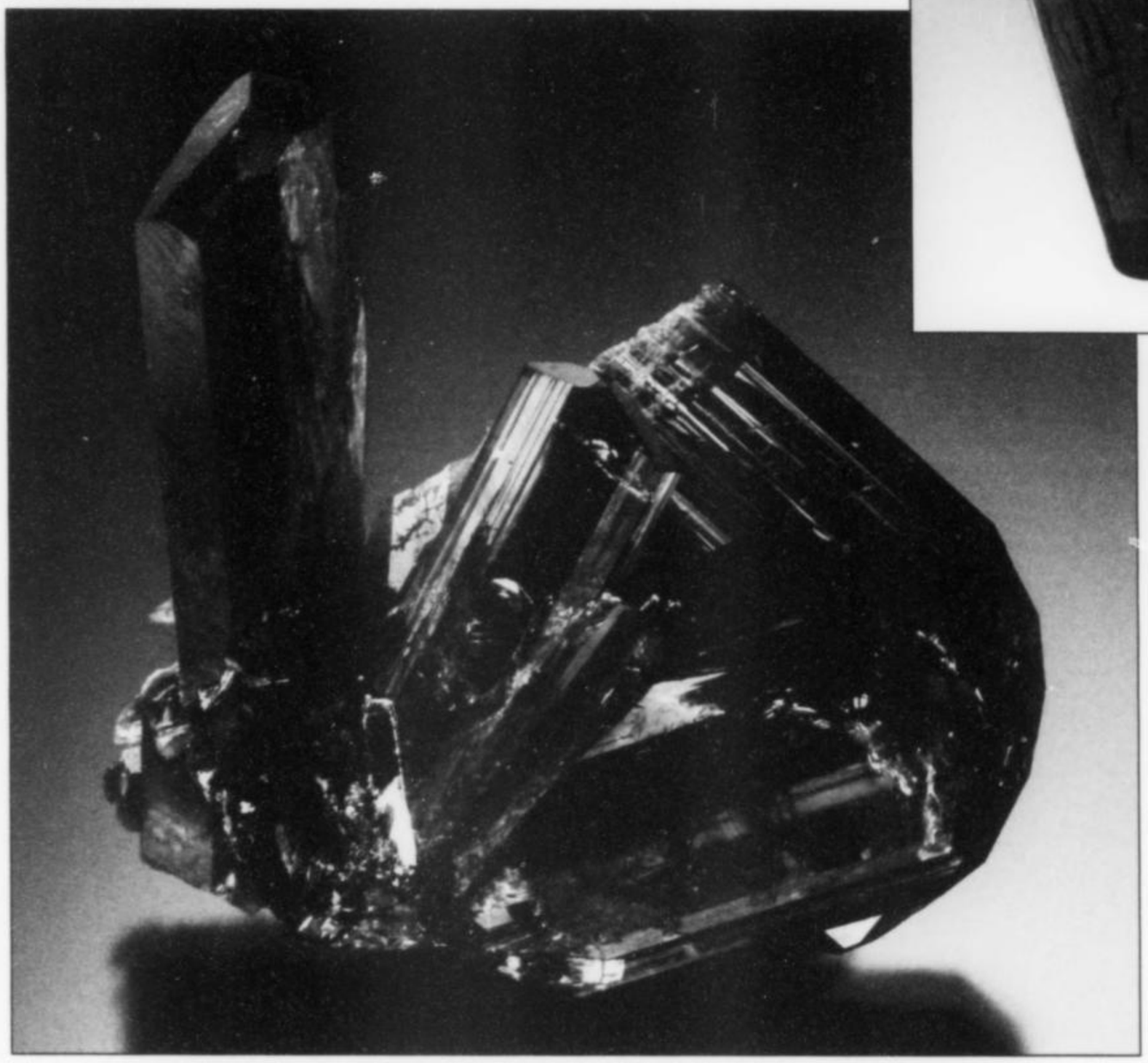


Figure 6. **Clinozoisite crystal, 4 cm, from Alchuri. Rob Lavinsky specimen and photo.**

Figure 7. **Clinozoisite crystal cluster, 3.8 cm, from Alchuri. Dudley Blauwet specimen; Jeff Scovil photo.**



the past 15 years—we discussed our possibilities. One option was to cross the old Bangla Bridge and drive the 45 minutes up to Chutron, our intended base for the next five days, where we could leave our luggage with Amir Ullah (who was a bit weak to spend the entire day bouncing in a jeep). Or, alternatively, we could drop off Amir Ullah in Baha with his friend while the jeep driver and I continued up the Braldu to Nyet. We decided on the latter, guessing that we would not be able to complete our desired itinerary with the added time of driving to the Basha Valley. The jeep driver insisted that he could hire someone to watch our luggage in the non-locking jeep, while we climbed from the lower parking area up to the village of Nyet. We completed our plans at our friend's house in Baha, leaving four live chickens purchased in Skardu in his shed, so that they would not have to be subjected to further bouncing in the jeep.

We traveled a very short distance to a "mineral shop," and after we beeped the horn, the occupants of the shop piled out. I recognized the brother of one of my favorite dealers and then scanned a second face and immediately realized that it was an old friend whom I had not seen in nearly a decade. He responded instantly to my greeting and I jumped from the jeep; we gave each other a traditional customary chest-to-shoulder hug and exchanged greetings and handshakes, one free spirit to another. The man is a hardcore miner; the last time we met we had a conversation about his love for the high mountains, the fresh glacial streams, the grassy wooded upper meadows, and the work of mining in this awesome environment. He is different from most of the miners in that he was born in a small village near Gilgit, and somehow became interested in collecting gem crystals. He started working the Shigar and Braldu Valleys, driven more by the lifestyle than by the pursuit of wealth. In the Northern Areas, almost all specimen collecting is done by people from whatever local village controls the mining area. His expertise, friendliness, and freewheeling attitude has ingratiated him with locals who accept him and allow him to do his own thing. When I met him previously he had been working in upper Nyet Bruk, an area which is strikingly beautiful even from a distance. Now he was working the pegmatites across the road from Baha, and had taken up residence in that village.

We all retreated into the simple shop, consisting of a small room with wooden shelves packed with quartz and broken, uninteresting mineral specimens. There is a smaller back room for private deals, but with nobody else around the shop owner unwrapped the good specimens from their toilet paper and newspapers and laid them on the carpet in the front room. He had several good gem aquama-

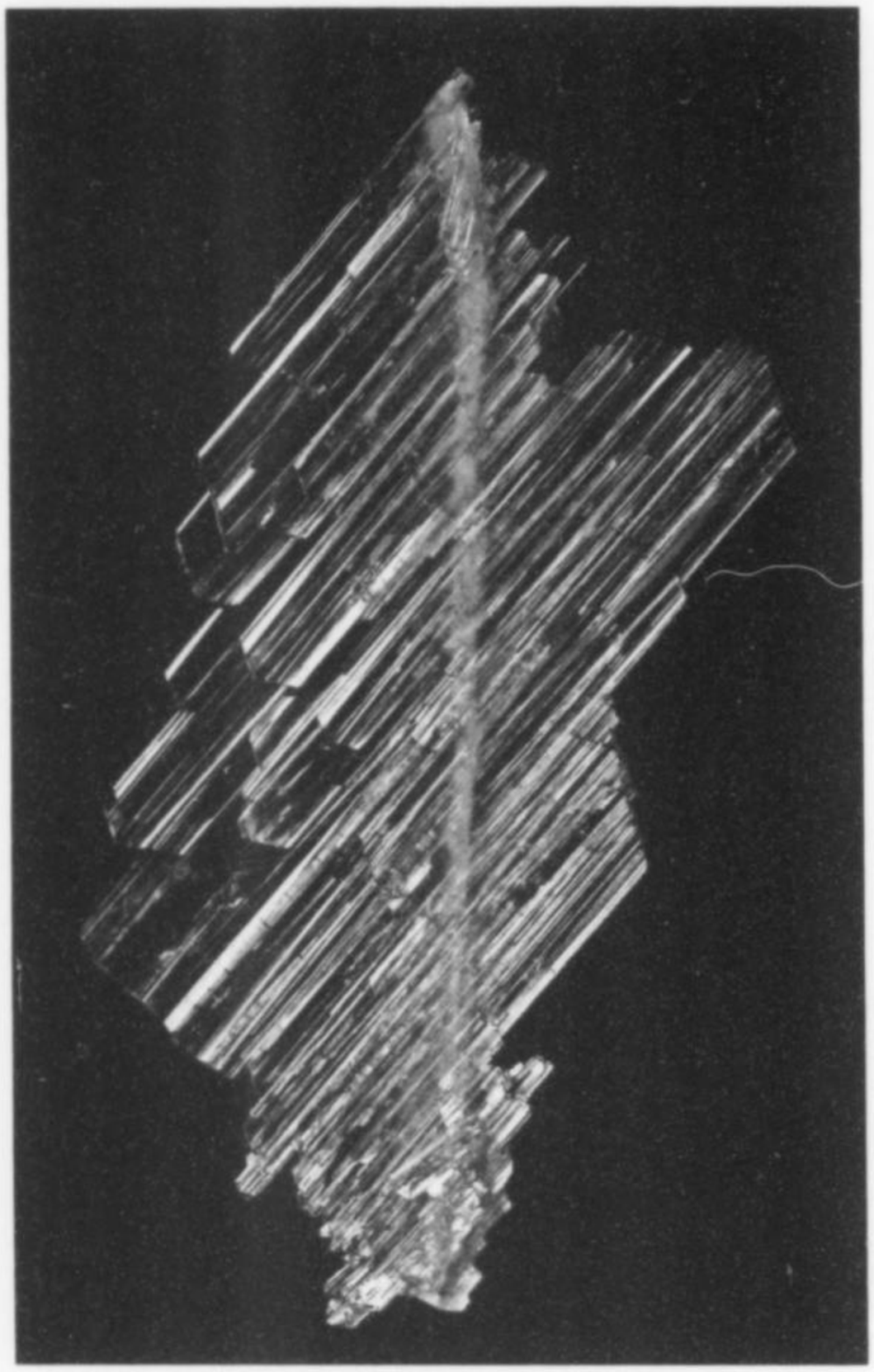


Figure 8. **Clinozoisite faden, 8 cm, from Alchuri. Dudley Blauwet specimen; Kevin Dixon photo.**

rines, the smaller specimens more perfect and attractive than the larger. We discussed the price and I told him to hold the pieces and show them to Amir Ullah, a few minutes away, for his opinion; I told my friend the free spirit to tag along with the shop owner, indicating that my Peshawari friend would be most happy to see him, being of similar ilk and having a friendship spanning decades. The miner politely awaited his turn, then reached into a pocket sewn into his inner vest and pulled out his latest find, a thick, gemmy aquamarine crystal about 8 or 9 cm long, its surface etched and slightly frosted, but its interior flawless and very appealing. I put this on hold and said that I would return in the evening and work on a deal after obtaining Amir Ullah's input. Mostly, however, I wanted to wait for the shopkeeper's brother (with whom it would be easier to negotiate a good price) to return from Skardu.

We said our good-byes and Shahji and I headed up the sandy double-track a few more kilometers until we were stopped by a wooden pole pulled down over a fulcrum at the military checkpoint. I climbed out and strolled up to the cement barracks where three or four soldiers were lounging around on a charpoi. The officer in charge surveyed me quizzically and I asked him about foreign registration. He immediately asked if I had a special written permit from a government office in Islamabad. I had no permit, and flashed back immediately to the previous November when I had had to argue vociferously to obtain passage to the upper Braldu. I thought that that experience, with newly stationed officers throwing their weight around, had been a one-time ordeal. This was again a new officer, so I immediately flagged Shahji to come over, hoping he would have some influence. We had a three-way conversation in a mix of English and Urdu, often using both languages in a single sentence, but sticking to the Urdu syntax of subject-object-verb.

The articulate young sergeant told me that I absolutely could not go further and that all of my whining about 20 years of travel there and writing articles about the upper valley was to no avail. "New regulations," he spouted, and Shahji informed me that all of the Chinese who have come across the border in search of optical quartz have absolutely been banned entry. I showed him my passport and my one-year business visa and still he refused. I really began to suspect that I would not be able to continue, but I doggedly and persistently presented my case, refusing to back down.

He asked, "Where is the Pathan man with whom you say you are traveling?" I replied that he was weak from travel, still recovering from cancer conquered a few years earlier, and was staying with an acquaintance living just down the road.

"You mean at Momdali's house? Is he a friend of yours?"

Knowing that Momdali had pulled off innumerable scams as a con man, I surveyed the sergeant's face, trying to determine if he was an angry victim. But his expression was noncomittal, so I responded noncomittally: "Yes, I know him."

"He is my friend," was his response, upon which I immediately said the same thing and added that Momdali had traveled from Skardu in my jeep and that I had known him for many years. (Momdali is a retired sergeant, relatively intelligent, with a great sense of humor. With his days of travel in the military and frequent trips to Peshawar, he is much better informed than most of the locals and is also a good conversationalist—a welcome ear to a Punjabi officer stuck in this very remote outpost.)

Finally the officer relented and said that I could go as far as Nyet, but I must return in two and a half hours, and he would hold my passport as hostage. We both noted that it was 1:15 p.m. I trudged back to the vehicle, elated but wearing a disgruntled face for having been given a time limit.

Just then a convoy of four jeeps filled with foreign trekkers pulled up behind our vehicle, the occupants handing their passports, with the all-important paper permit protruding, to their Pakistani guide for him to register in the entry log. The barrier pole was lifted and we continued our short journey, crossing the Braldu on an ancient wooden bridge to emerge on the west and north bank and passing below Teston. From there we veered right into Dassu.

All of the signs in the village used to spell it "Dusso," but in the Balti-to-Urdu-to-English translation a "u" is pronounced as an "a" and "o" as a "u." If you pronounce the first vowel as a long English "u" and the second as a long "o," nobody will know what you are talking about. By June 2006, new English signs had appeared, and this village is now officially spelled "Dassu." The transliterations of numerous other names have been corrected as well.

We stopped at a small shop near a bridge crossing over a side stream and Shahji inquired in the sing-song Balti language if there were "stones" to be had. The owner answered affirmatively, and as we entered the familiar shop I remembered the heavily cluttered windowless back room from a previous trip, with the stale smell of a *sui* gas canister used for lighting permeating the air. Only one small piece was of interest: a small "flower" of prismatic morganite crystals that had been found in an upper mine above Dassu.

NYET

We negotiated the price, packed the small specimen and continued the short distance to Nyet, climbing the whitish brown clay cliff on the swirling zig-zag "road" to emerge at a shaded parking

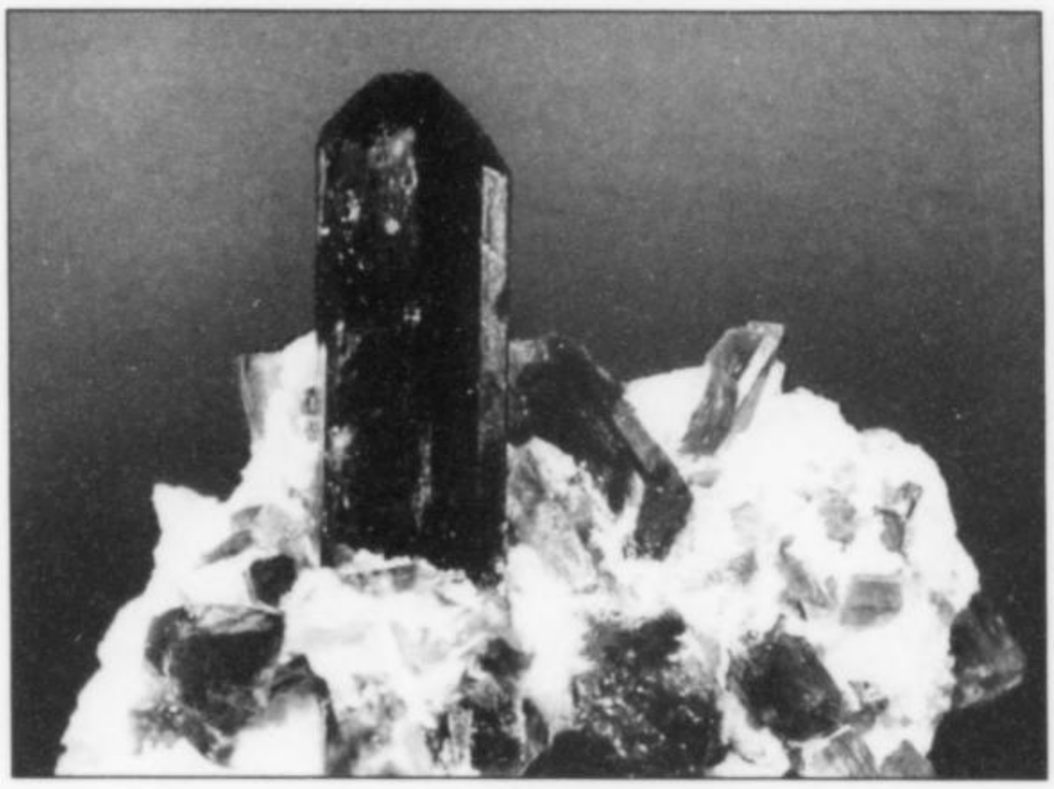


Figure 9. **Cr-rich diopside crystals on matrix, 3 cm, from Alchuri. Bill and Carol Smith collection; Kevin Dixon photo.**

area. We hired a local boy to watch our belongings and then walked by the school, where we met the schoolmaster and arranged a meeting for an hour or so later. We then encountered a 28-year-old man with prosthetic limbs: he had lost both arms because he had erred in his judgement as to when an explosive charge was to detonate. Amiable, with a broad smile, he immediately embarrassed me by inquiring about a camera that he had asked me to purchase for him. I had remembered this request just before leaving the US, but had planned on purchasing the camera in Dubai on my way to Pakistan, being heavily loaded with a bicycle and other racing gear that I was bringing to race the World Long Course Duathlon Championships in Italy while en route. I had forgotten to purchase it while transiting Dubai, partly because of fatigue from very little sleep after a hard race. I apologized as well as I could to the man, promising to bring a good camera with me the next time I visited. (which I did—in November I brought a better camera than he had requested). I told him that I would return in two days, and asked him to "catch and hold" some good material for me.

We parted and I walked uphill through the village, lost in time, ambling along winding dirt trails framed by hand-stacked rock walls, the second floor living quarters visible above, dirty snot-nosed children playing below with simple make-shift toys. With no electricity or modern conveniences, Nyet could pass as a 19th (or 18th for that matter) century movie set.

We climbed a handmade wooden ladder along the path and again made our way upward to a house that I had visited previously, the home of a successful dealer. The owner led us up a steep open staircase, with the bottom floor of the ramshackle building housing animals, and warned me to watch my head as I crossed the low-slung doorway and entered the sitting-family- sleeping room, carpeted, with lounging pillows around the perimeter. The sole south-facing window opened up to the beautiful Nyet Bruk, the village grazing area and the prime mineral mining site located on the opposite side of the Braldu Valley, miles distant in the clear, thin mountain air.

I settled in cross-legged on the floor, and awaited the small offerings. This close to the mining scene, the locals often buy and sell lots in a day or two, with the limited numbers of specimens being more than compensated for by their absolute freshness out of the ground. I selected two aquamarines: an etched but super-lustrous, rounded, gemmy crystal found directly above the village, and a more unusual one, selectively etched to resemble a thick corkscrew, also found nearby.

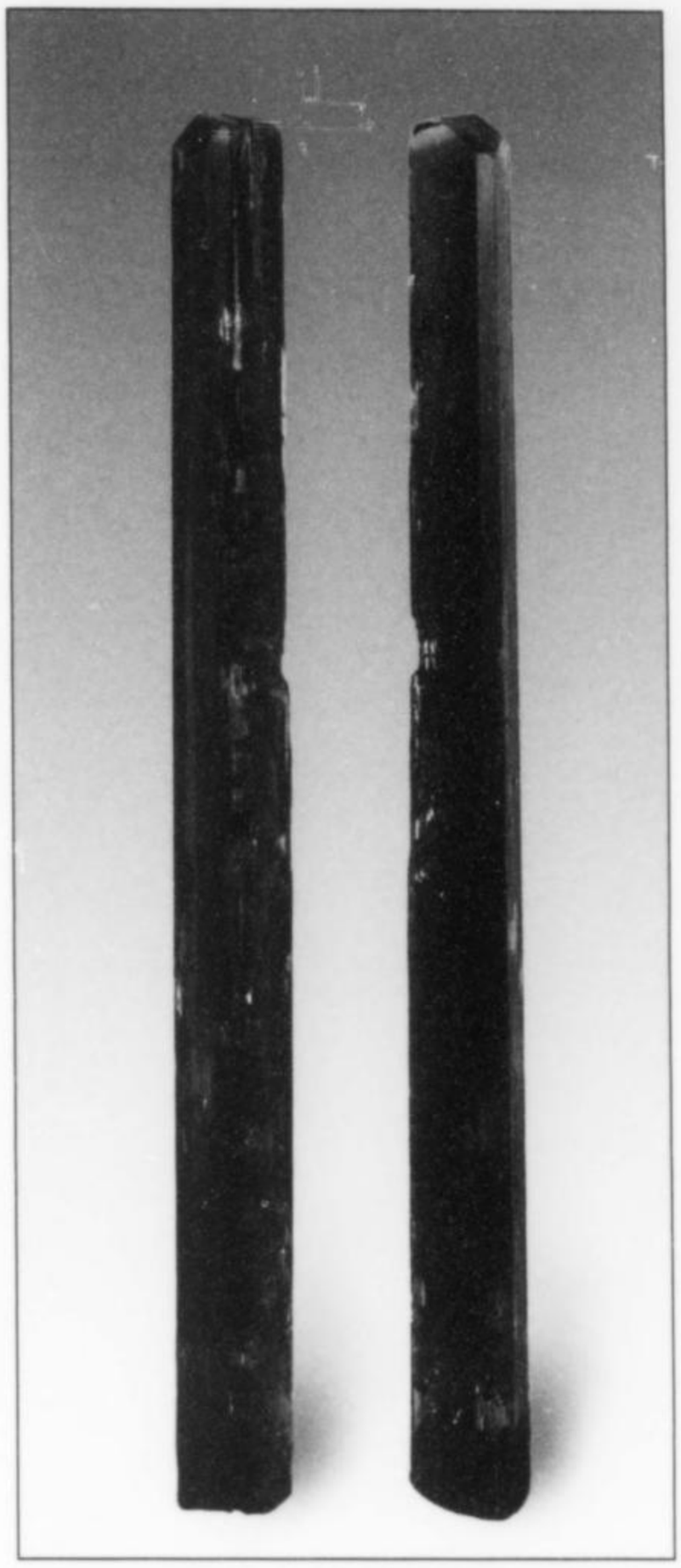


Figure 10. **Cr-rich diopside crystal (two views), 4 cm, from Alchuri. Rob Lavinsky specimen; Jeff Scovil photo.**

A bit of bargaining was in order, and if anyone thinks that one can buy here for 10 cents on the dollar, they are badly mistaken (as the next dealer to arrive would show). The owner and I reached an agreement, and as he was lamenting the fact that his partner had the key to a locked cupboard holding new material, his cohort unexpectedly arrived. I waited eagerly, as I remembered from previous trips that the newcomer often had fine material, but I also recalled that the prices he asked were rather high. He unwrapped three nice matrix specimens, two of them aquamarine on feldspar, and the third a combination of lustrous black schorl with small aquamarines on good feldspar, all found on the steep mountainside directly above us.

I liked these, but was more attracted to a fine fist-sized specimen of a very well-crystallized microcline, abundantly sprinkled with bright red garnets, found up the road near Apo Ali Gun (=Apaligun; most people shorten the word by dropping the second vowel.) I inquired about the price; it was double my expected selling price. I probed cautiously, not wanting to upset the owner, but I ran into a stone wall, as he insisted that there would be no bargaining; his price was set. With one garnet visibly expelled off the matrix near the base, I knew that the specimen would not command the asking price that a perfect piece would, and reluctantly, after repeated

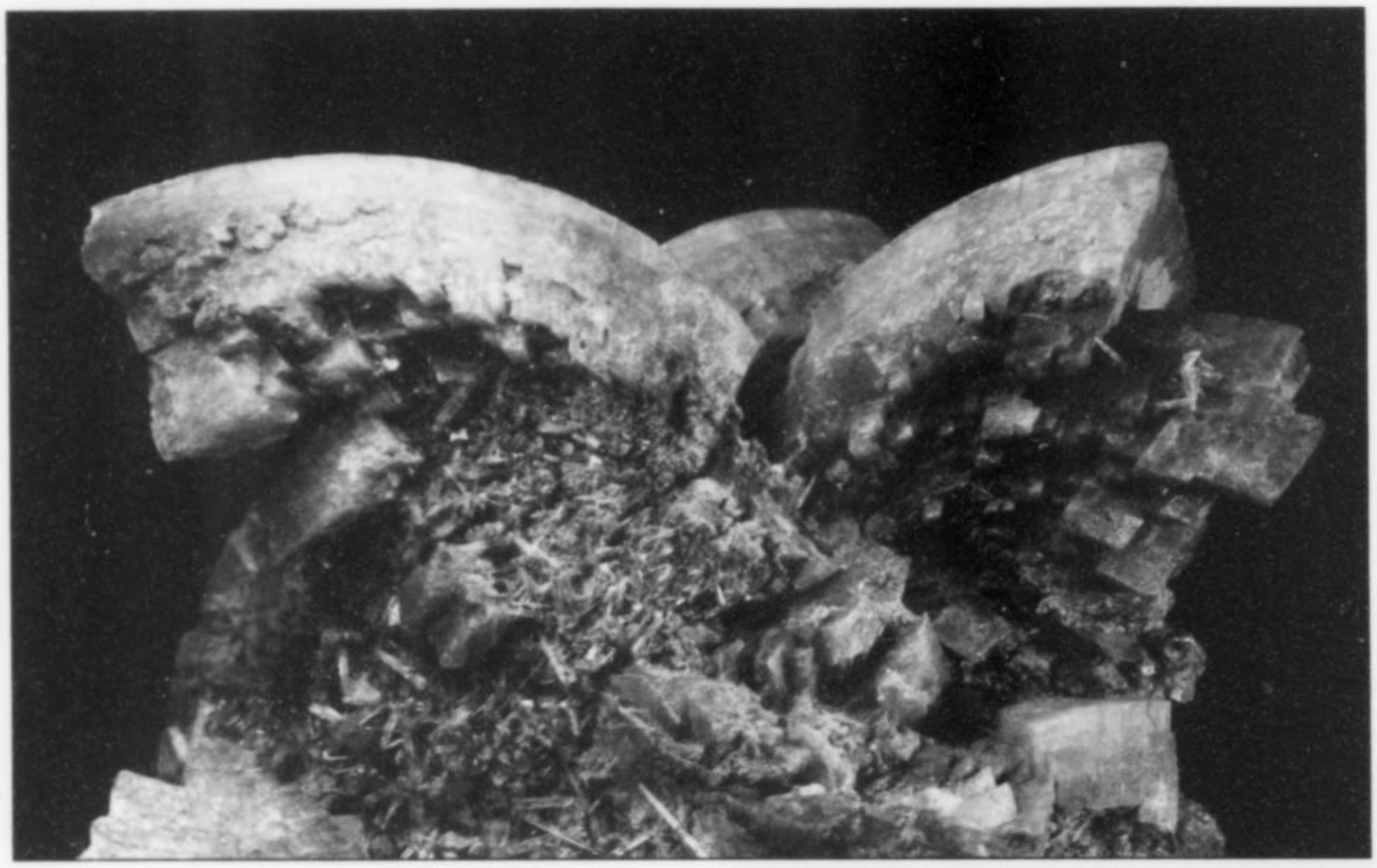


Figure 11. **Dolomite crystal group with radically curved crystals, 3.8 cm, from Alchuri. Bill and Carol Smith collection; Jeff Scovil photo.**

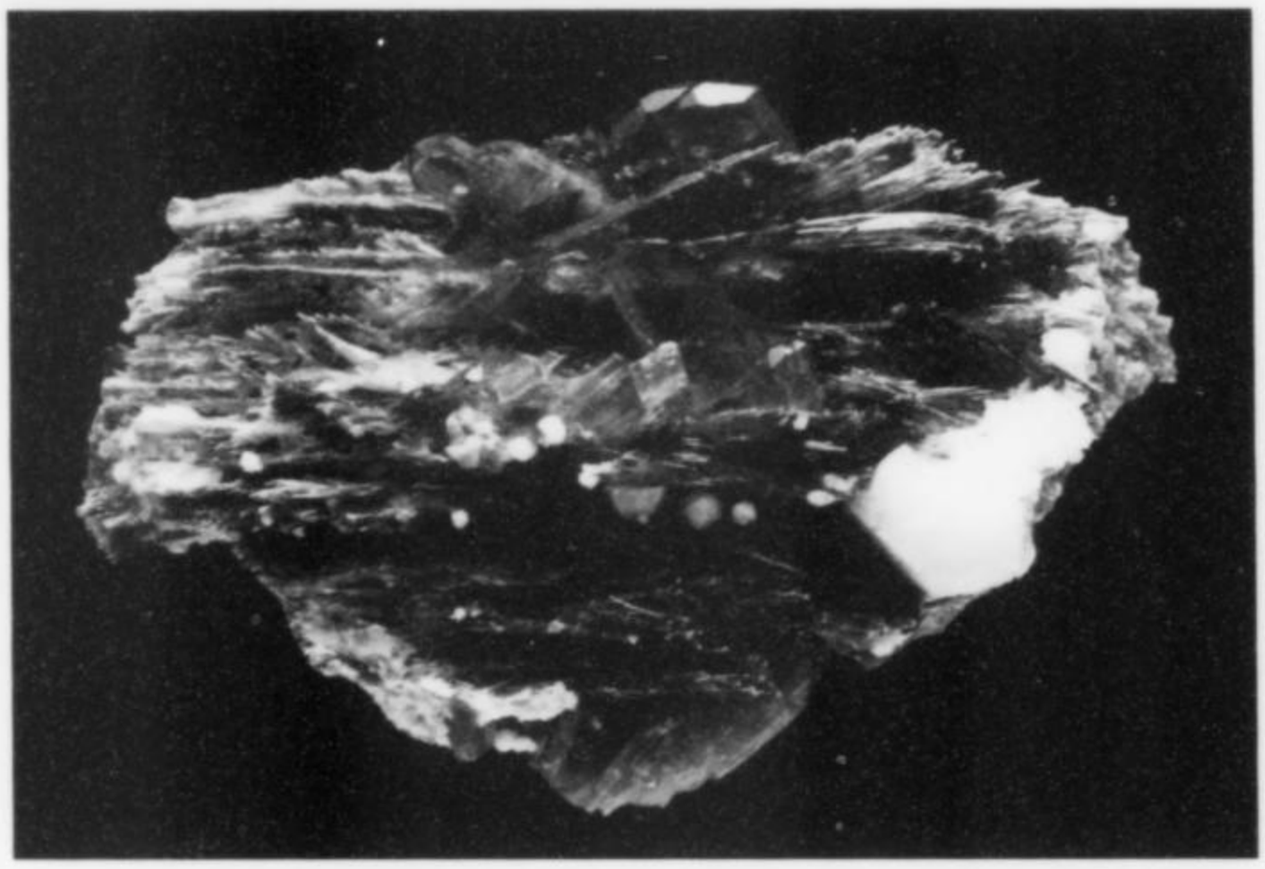


Figure 12. **Epidote crystals on Cr-rich diopside with feldspar, 6.8 cm, from Alchuri. Jordi Fabre specimen and photo.**

futile attempts to reduce the price, I had to pass. He was only slightly softer on the price of the initial three pieces that I had selected, and it was harder bargaining than I would have liked to settle one deal with this man.

My time was up, so we packed the purchased specimens and hurriedly retraced our steps to the jeep, eyeing our watches, not wanting to antagonize the officer by being late and jeopardize our return in two days. But a stop at a newly opened hotel-restaurant between Nyet and Dassu to view some specimens (and getting none) took a few more minutes from our schedule. While we were driving down the road with two locals hitching a ride in the back of our jeep, I tried to seal a deal on a small lot of gem aquamarines. After initially selecting the top four specimens, I then offered for the entire lot and thought the deal was done until I discovered that the supposedly agreed-upon price was for the initial four pieces, not the entire collection. (Exactly the same lot was again offered to me days later in Skardu by a different dealer.)

Disappointed, I turned to the teenage boy who had watched our belongings while we were traversing Nyet. He was the son of a mineral dealer from Skardu whom I have known for at least a decade. He had a small single topaz crystal in his hand, unremarkable except for the inclusion: a small orange garnet perched on a slender prismatic pink apatite crystal. I offered a reasonable price, and we moved to within only a hundred rupees difference, at which point I paid the boy my offer price in cash and then handed him a 100-rupee note extra as a tip for watching the jeep. Everyone was happy, as this was perfect local etiquette.

We let the two riders off in Dassu and I glanced at my watch and realized that it was 3:45, my exact time limit. I crawled between the seats of the swaying, bouncing jeep, opened one of my bags and pulled out one of my emergency supplies: my *Mineralogical Record* article on Pakistan mineral locales, published in 1997. I showed it to Shahji and he nodded his approval, and as we pulled up to the military compound I sprang from the jeep and headed directly to the young sergeant. Before he had time to react, I apologized for being late and then flashed him the article. Immediately his attention was drawn to the mineral photos and I quickly turned the pages to the photo of nearby Apaligun, a village that he would recognize. I withheld the article from his grasping hand and then pretended to reluctantly hand it to him, with an agreement that he could have it for two days, *provided* that he would give me an extended pass to travel up the Braldu upon my return in two days. He agreed, and I sauntered back to the jeep, elatedly assuming that my troubles for this trip had been solved.

CHUTRON

We rolled the short distance to Momdali's home, where we picked up Amir Ullah and then motored down the sandy track to Haiderabad. There we found that nothing new had arrived, so we left and crossed the old Bangla bridge, which was under repair, with new wooden planks being installed—a welcome change from the broken boards and holes that had terrified me while crossing this span seven months before.

The track turned into two parallel lines in deep sand as we crossed the flat expanse between the two major tributaries forming the Shigar River, the Braldu and the Basha. The Basha is a series of ever-changing rivulets, set across a wide, flat valley, fed by the melting glaciers on the northern side of the Haramosh Range and the drainage of the steep south-facing slopes on the opposite side. We had to shift into full four-wheel drive as we neared the opposite bank, ploughing through deep white sand, after which we crossed a small bridge and reached the outskirts of Tisar, an extended village squeezed between the river bank and the high-angled slopes of the Haramosh.

After traversing the town we crossed a fast-flowing stream that emerged from a major gorge and continued another 15 minutes to Chutron. We pulled up to the gate of the government rest house, and were greeted by the son of the retired army officer who is in charge of the premises. We asked about the newly finished two-room bungalow and were told that it had not yet officially opened, even though the actual building was completed. Eventually, though, we talked our way into the south room.

We all helped to prepare a number of vegetables with herbs and spices for a mixed vegetable curry and then waited our turns to submerge ourselves in the hot-spring mineral bath, glimpsing from the partially open-air roof the setting moon dropping over the Haramosh Range. Fortunately it was a dark evening, because the

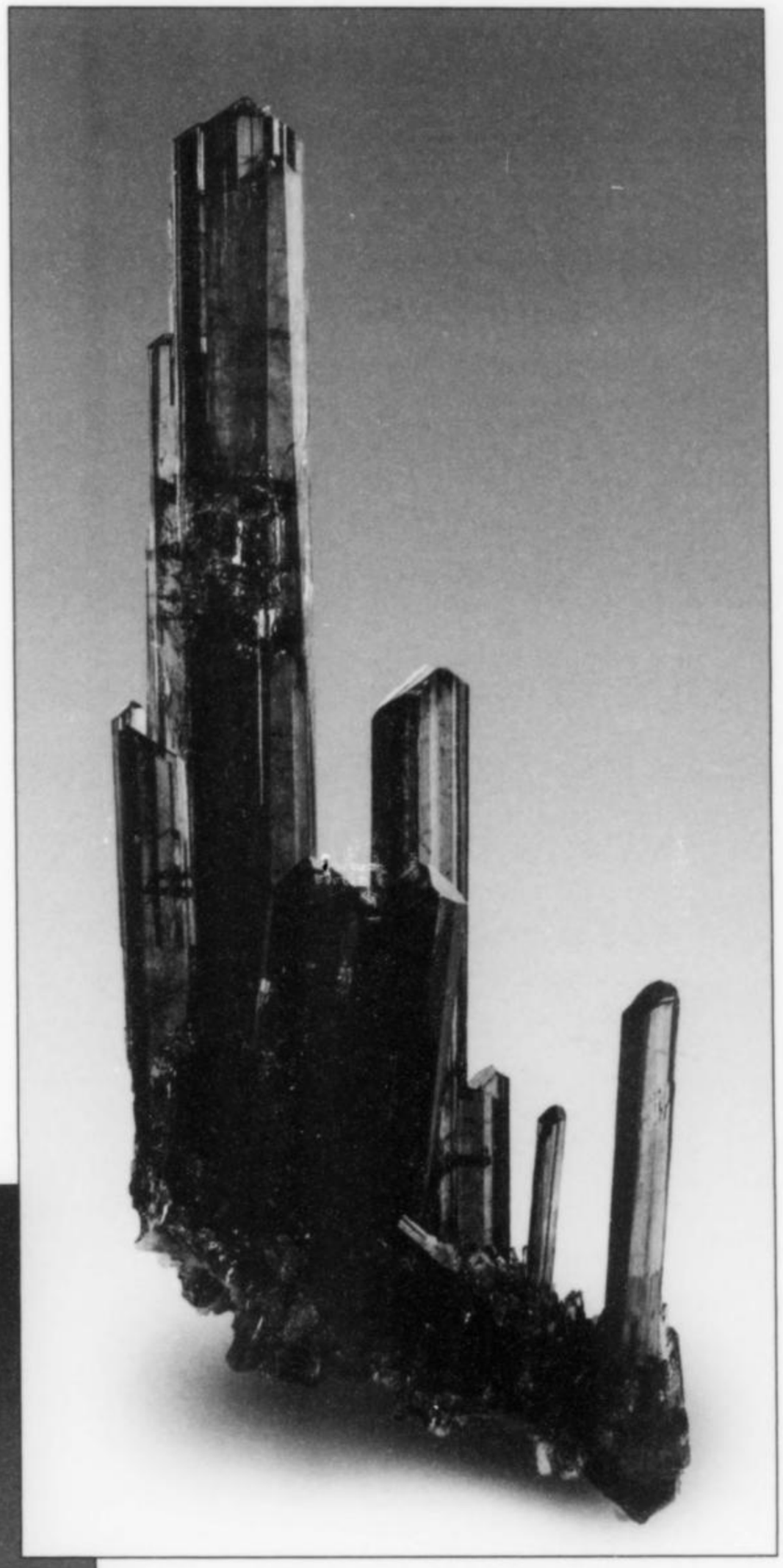


Figure 13. **Epidote crystal cluster, 9 cm, probably from Alchuri but possibly from nearby Hashupi. Rob Lavinsky specimen and photo.**

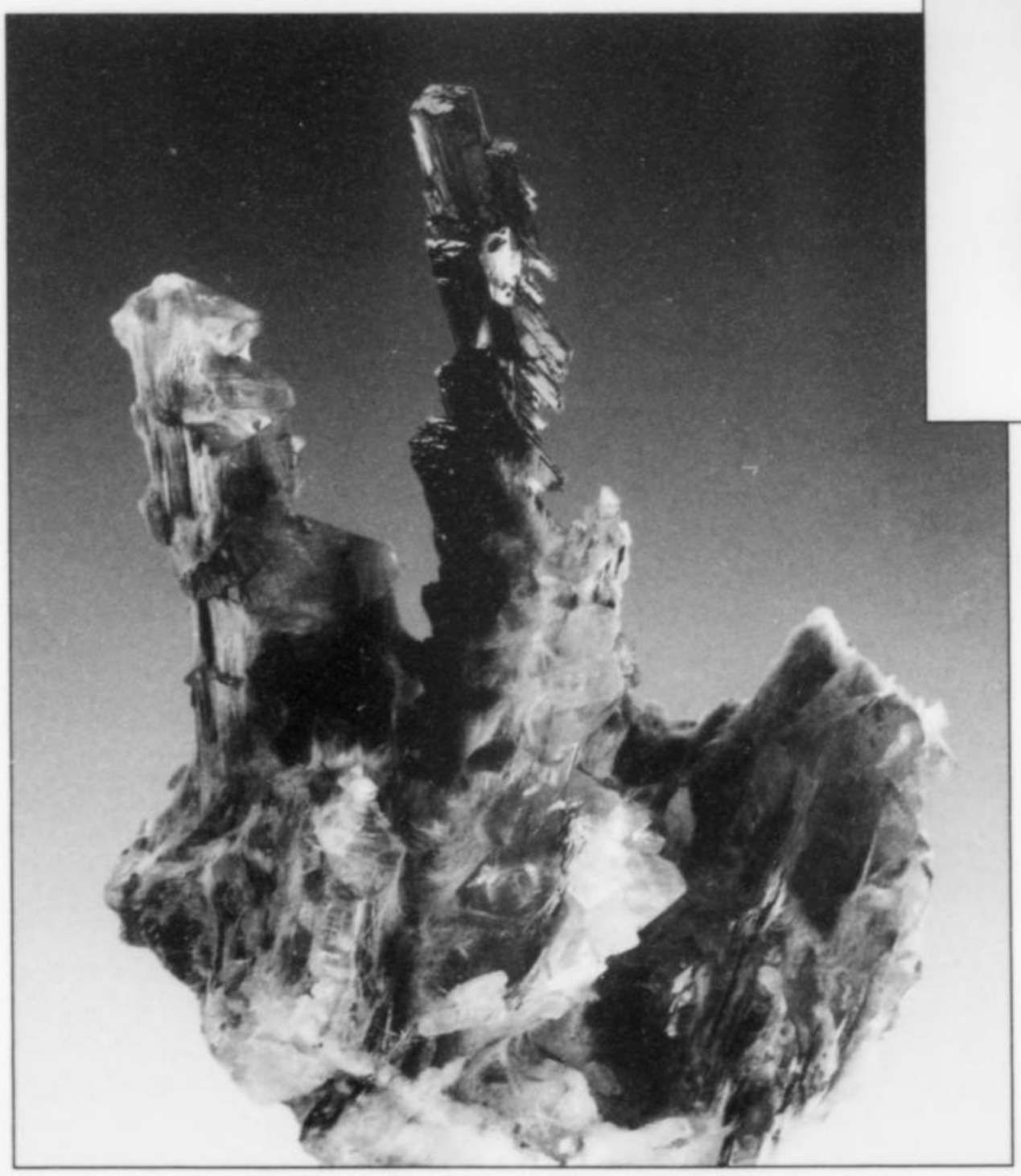


Figure 14. **Epidote crystals with byssolitic actinolite and calcite crystals, 6 cm, from Alchuri. Rob Lavinsky specimen and photo; now in the James and Gail Spann collection.**

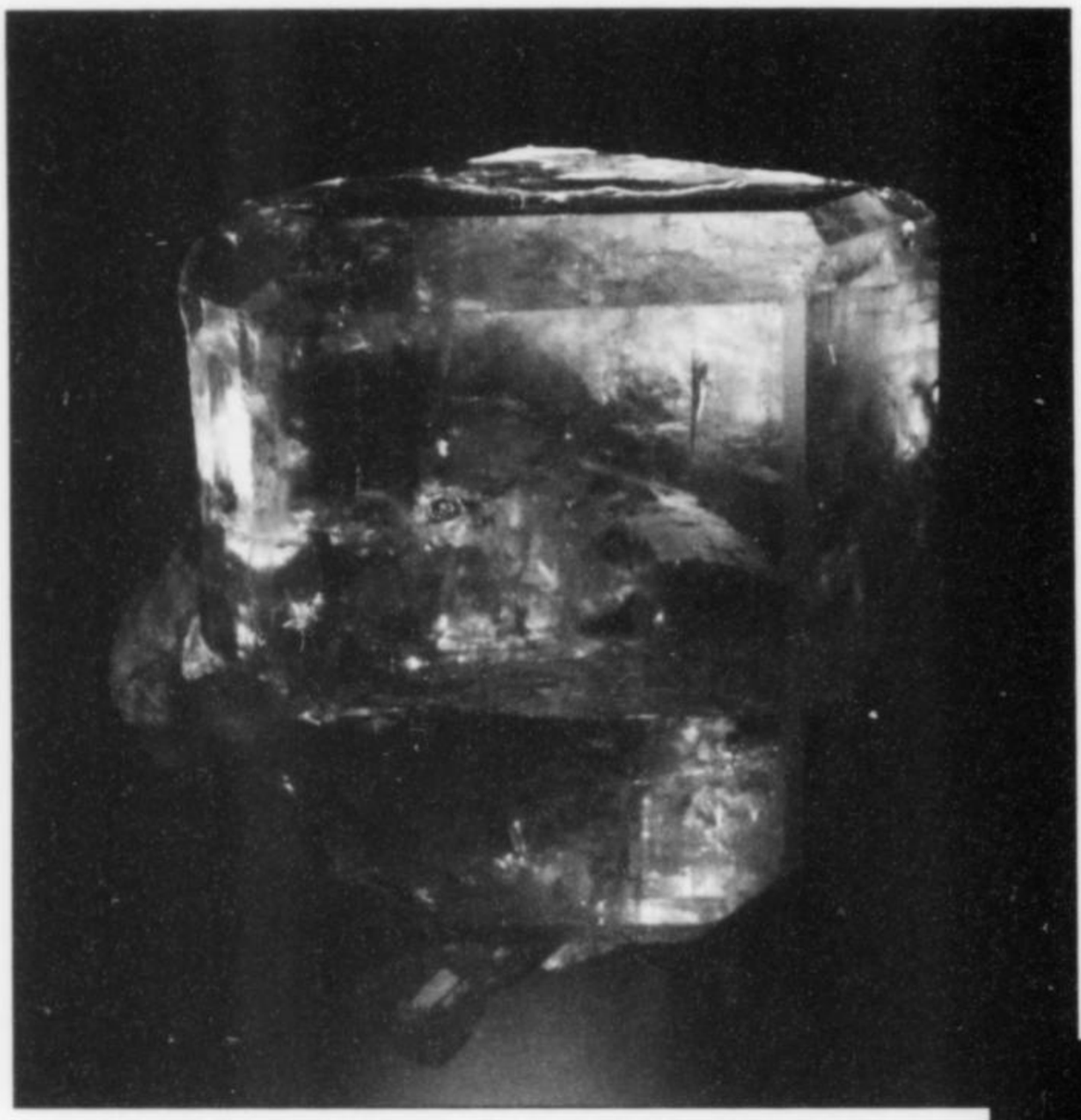


Figure 15. **Yellow fluorapatite crystal, 4.4 cm, from Alchuri. Dave Bunk specimen; Jeff Scovil photo.**

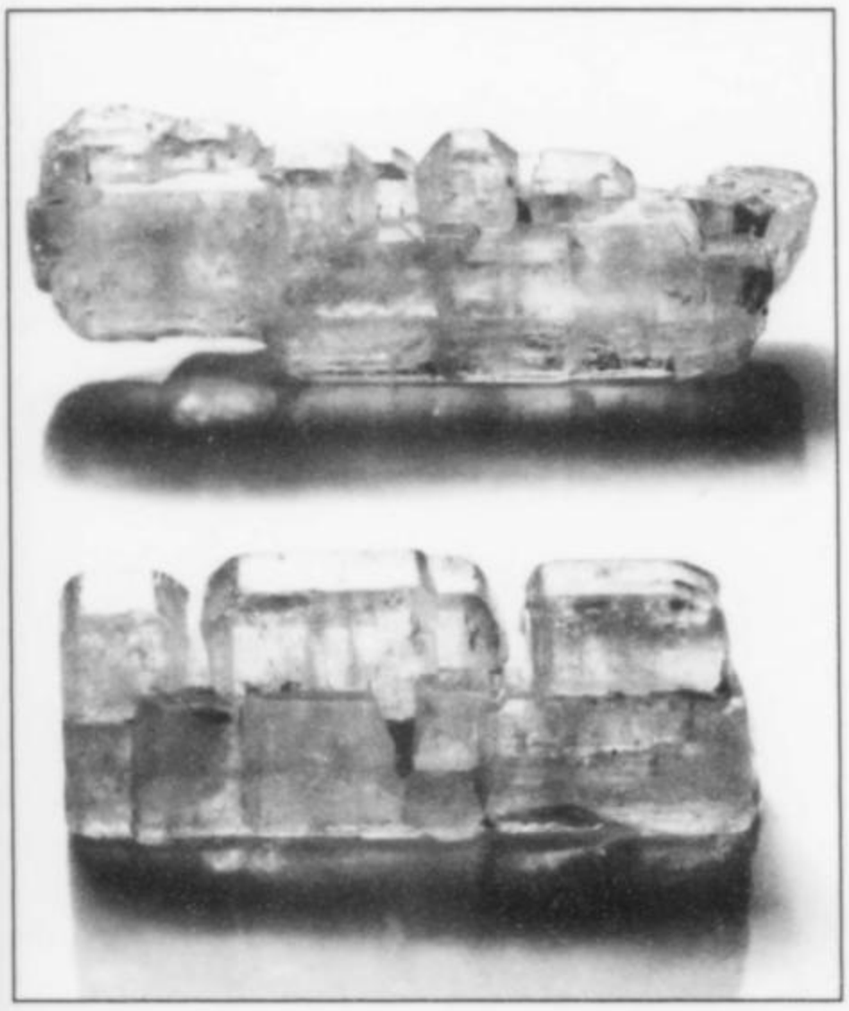


Figure 16. **Pale pink fluorapatite crystals with faden lines, 2.5 cm, from Alchuri. Rob Lavinsky specimens; Wendell Wilson photo.**

Figure 17. **Pink fluorapatite crystals on siderite, from Alchuri. Bill and Carol Smith collection; Kevin Dixon photo.**

once-acceptable bath had been trashed by the locals' bathing and washing laundry in it, and the old adage,"out of sight, out of mind" was appropriate.

We ate our fragrant curry, using the coarse, thick, grainy local bread called *qorba* as a scoop with our bare fingers. Though I had arranged for the Baha man to come over for dinner to discuss the two aquamarines seen earlier that day, we had not seen him by the time we finished eating. Just as we were beginning to think he would not arrive, we heard the sound of a jeep rolling up that lonely road. He and his friend finished off the dinner left-overs and then unwrapped the aquamarines.

As we normally do, Amir Ullah and I agreed on the exact price for the two specimens and then began to negotiate in earnest, but the young dealer was absolutely steadfast. We tried various tactics of attempting to buy one or two or the entire lot, but to no avail. I gave my last offer, but the price did not come down. (The owner had probably paid more than my offer.) Just as I thought that the evening was wasted, however, the young man pulled out two very small wads of red toilet paper, and I wondered to myself what could be inside.

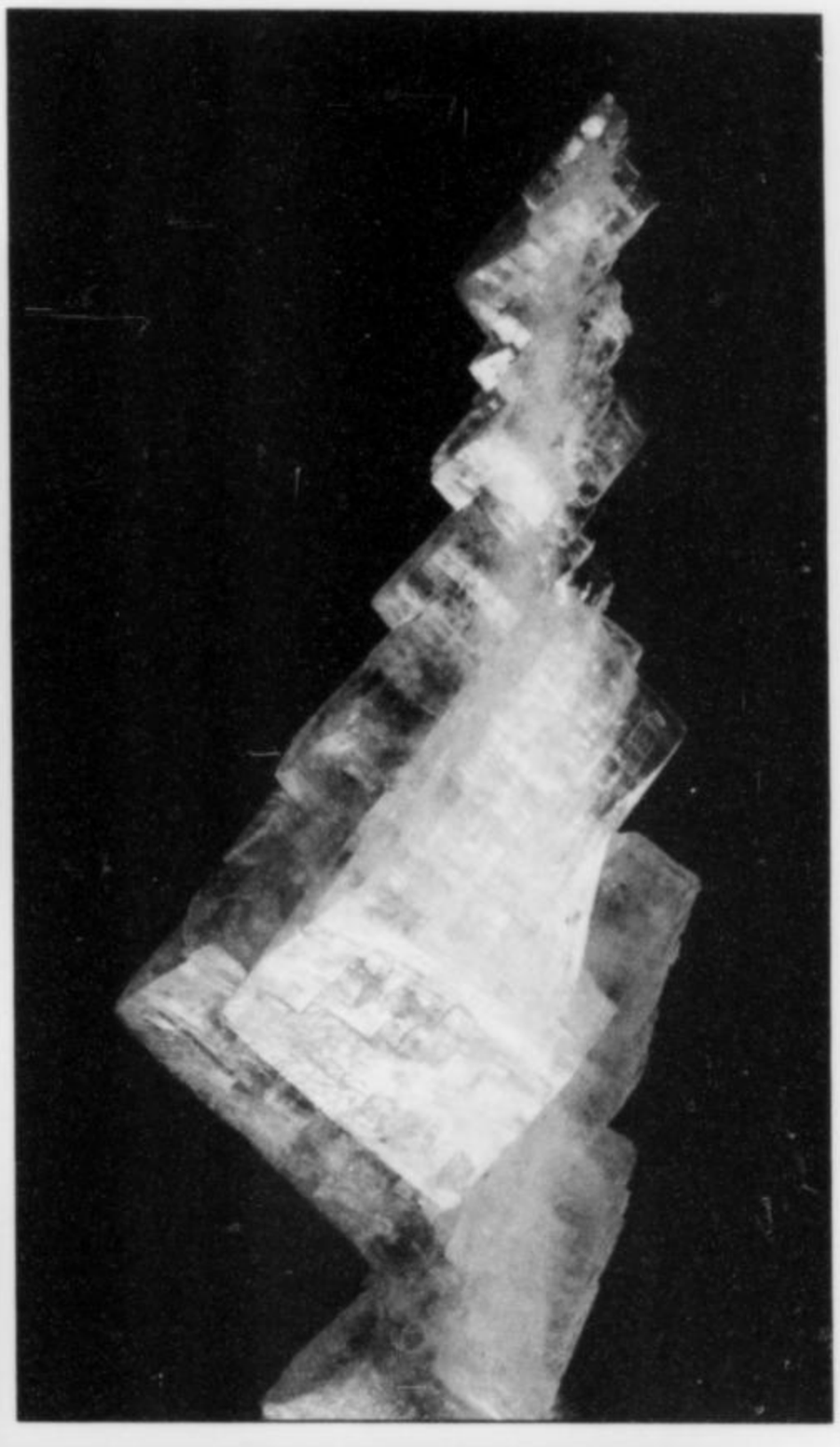
"Are you interested in these things?" he asked as he handed me two small but very red and very transparent v‰yrenenites, the larger being a full 2 cm in length.

I concealed my excitement, and with a stupid look on my face asked him, "Are these red sphene?"

"No, no, these are something too rare," was his response.

I casually asked the price and it was near the full price that I was willing to pay, with no hope of a "killer deal." We started discussions, but the owner was clever enough to know that I was really interested, and he was unyielding. It took another 20 minutes to reach a deal with a small discount. I happily packed up the "red things" and after he left a young Pushtun man from Peshawar

Figure 18. **Adularian orthoclase crystals in parallel growth, 6 cm, from Alchuri. Dave Bunk specimen; Jeff Scovil photo.**



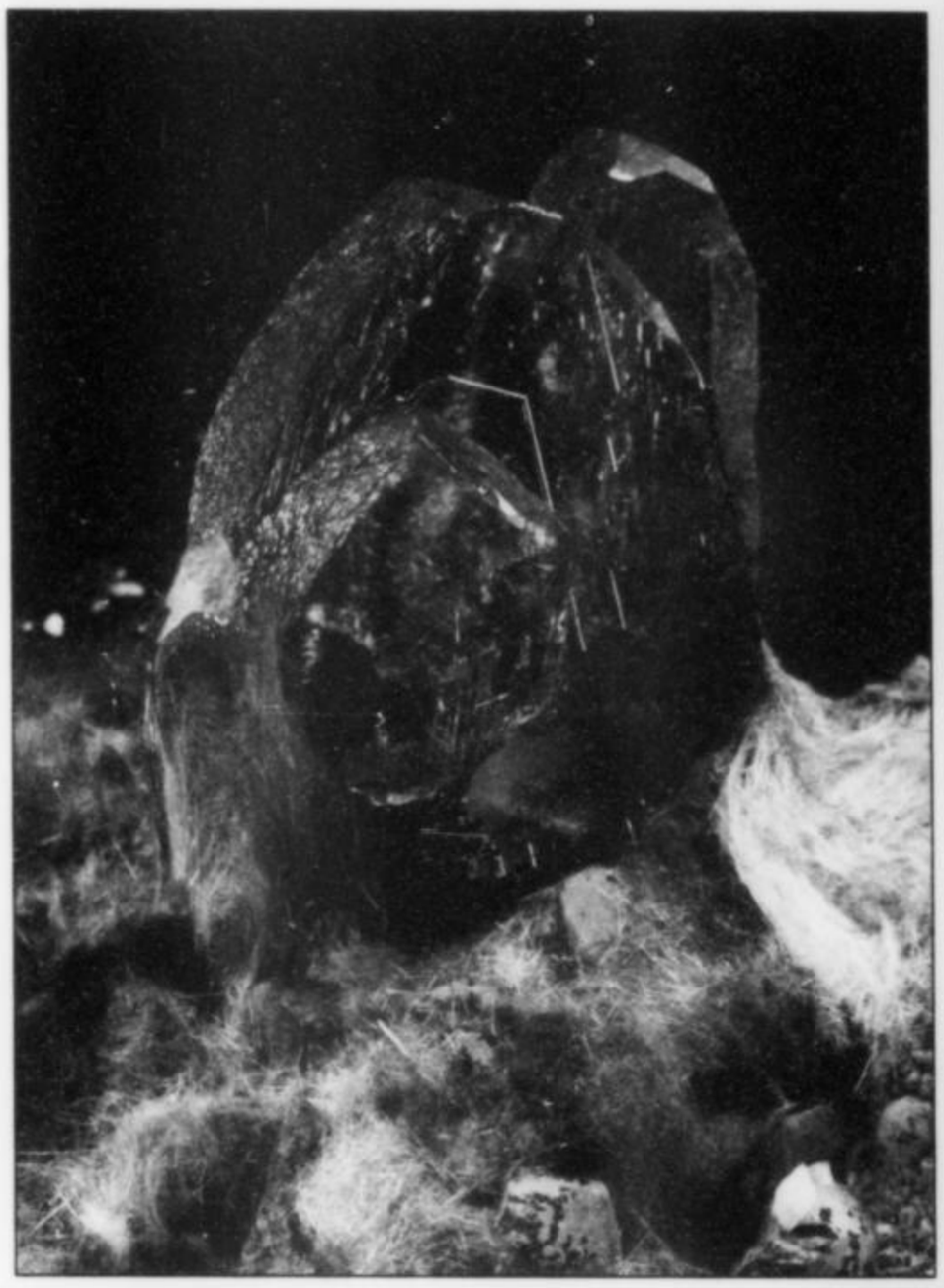


Figure 19. **Fluorapatite crystals colored green by byssolitic actinolite, 3.2 cm, from Alchuri. Dave Bunk specimenl Jeff Scovil photo.**

entered the room, along with his Skardu partner, and we discussed the earlier aquamarine lot which they had also seen. Their offer was virtually the same as ours, with everyone agreeing that the asking price was too high.

Both Amir Ullah and I were feeling a bit under the weather, thinking it might be food poisoning from our dive hotel in 'Pindi, or a strange virus that Momdali had been complaining of having contracted while staying in the other dive hotel there for four days. Whatever the cause, we both had a very poor night's sleep, tossing and turning restlessly, which is not the norm in this quiet village where people go to bed at 8:00 p.m. after evening prayers.

Morning tea was served an hour after the early sunrise of 4:40 a.m., and already some clouds were forming over the mountain tops. For once we had a leisurely morning, and I took another hot bath, sticking to the fresh water inlet side of the pool, disgusted with the accumulated garbage on the bottom of the pool and along the outer edge. Later the young Pushtun came to our room and showed me a small aquamarine standing vertically on feldspar. It looked good initially, but instinctively I had doubts and I pulled out my loup for an examination, discovering that the crystal had probably been glued on. The two boys protested, with the Skardu boy claiming that that the specimen had been bought from a miner, as if that is conclusive

Figure 20. **Adularian orthoclase crystals in curving parallel growth, 15.1 cm, from Alchuri. Erica Pohl collection; Jeff Scovil photo.**

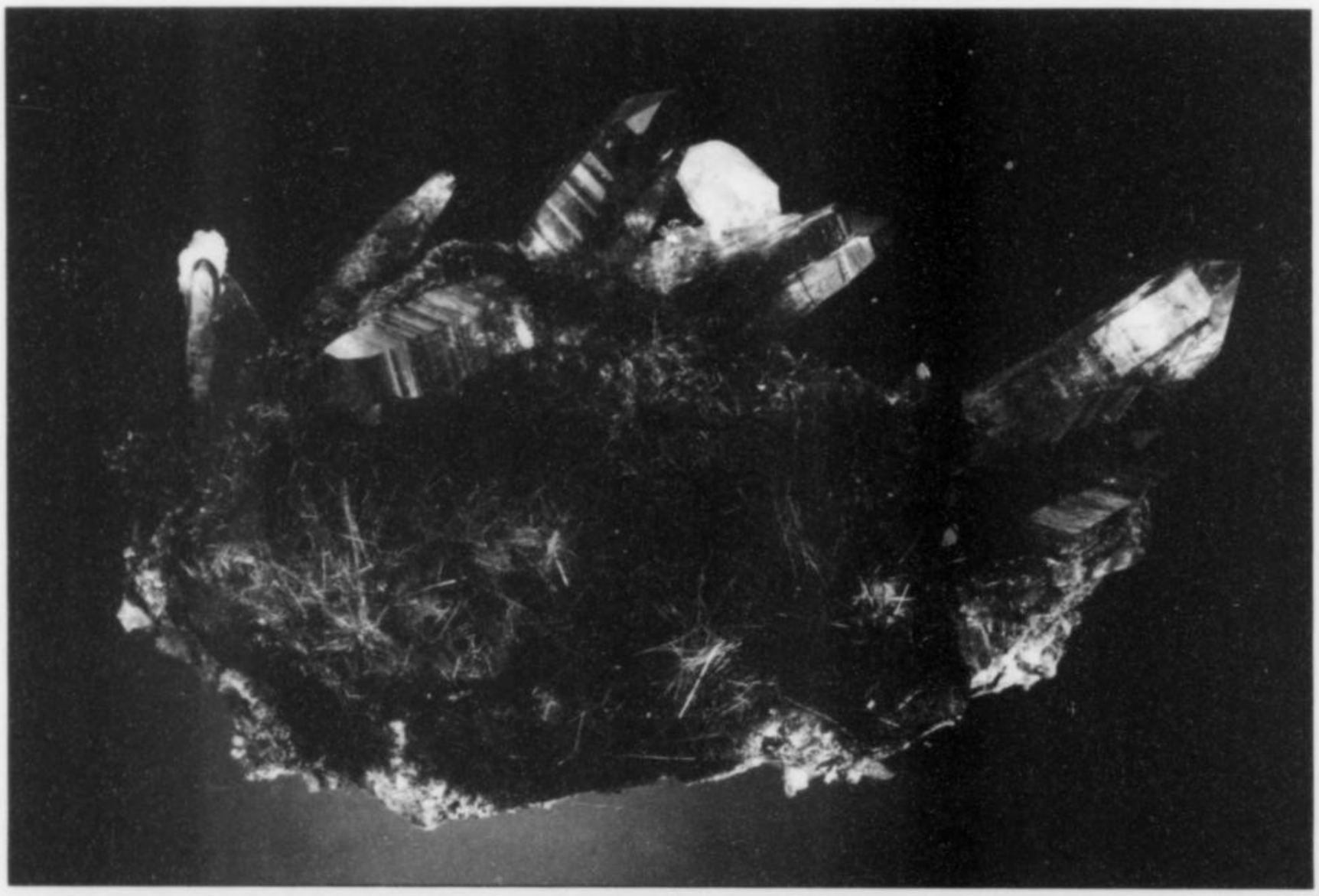


Figure 21. **Quartz crystals with byssolitic actinolite, 17.4 cm, from Alchuri. Private collection; Jeff Scovil photo.**

Figure 23. **Quartz crystals with byssolitic actinolite, 12.4 cm, from Alchuri. Francis Benjamin collection; Jeff Scovil photo.**

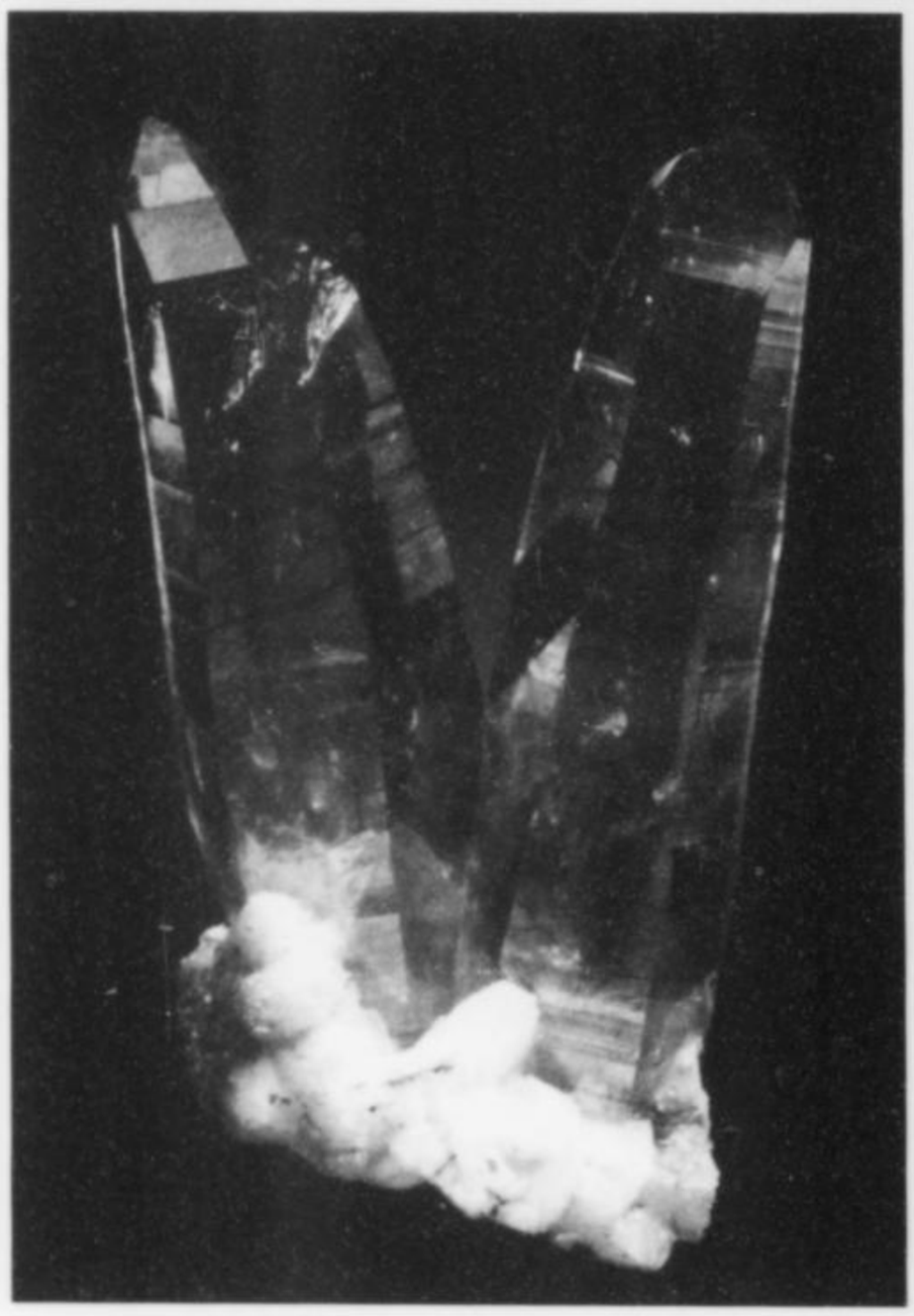
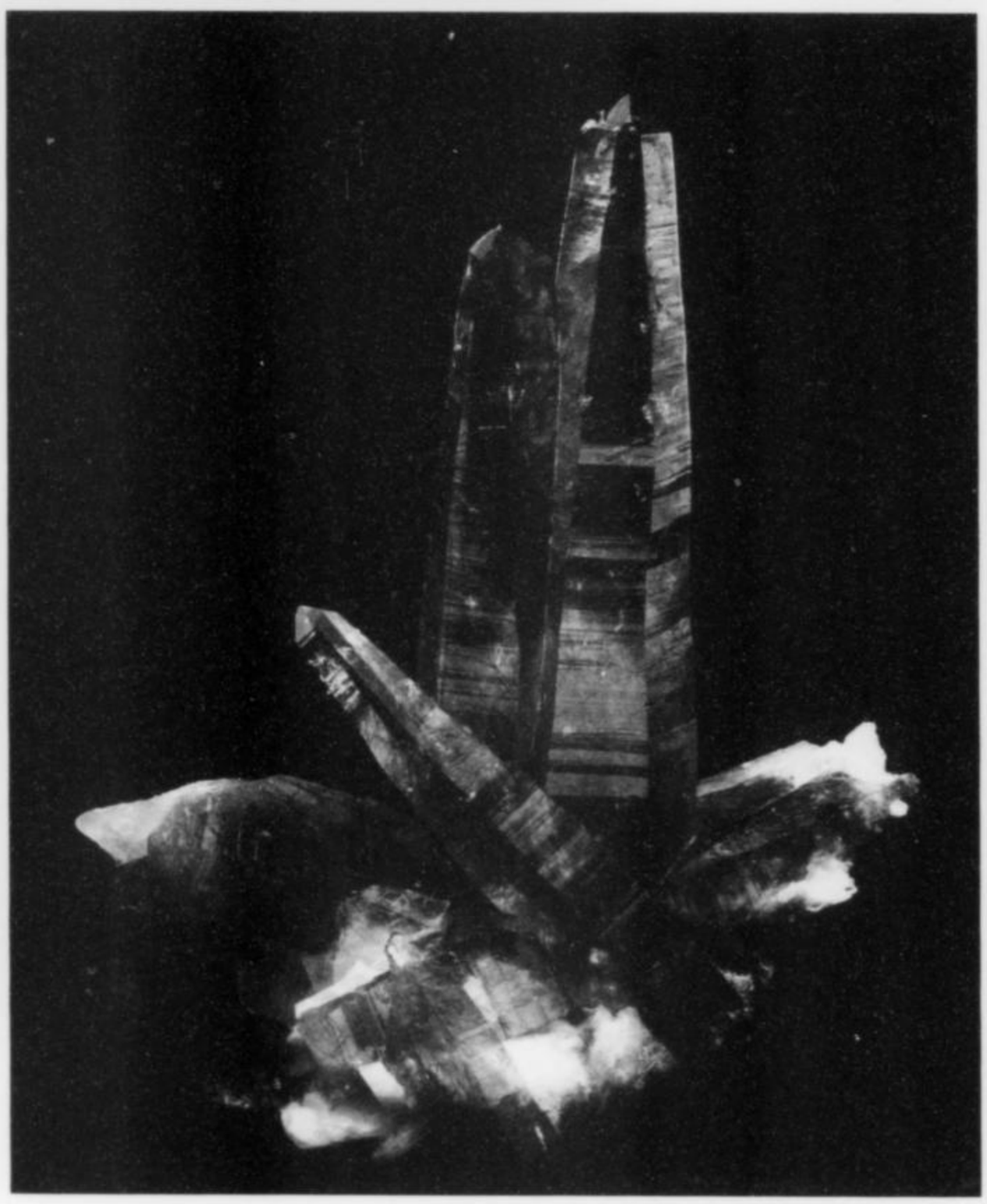


Figure 22. **Quartz crystals with byssolitic actinolite inclusions, 12.6 cm, from Alchuri. Dave Bunk specimen; Jeff Scovil photo.**



evidence of non-gluing. Momdali appeared and stated decisively that it was glued. Momdali, the glue master (nicknamed Sergeant Glue) is the ultimate authority, having manufactured hundreds of specimens for sale to trekkers and climbers, and his word was accepted.

About 9:00 a.m., the driver and I climbed into the jeep and retraced the previous night's route back to Haiderabad, while Amir Ullah settled in for a rest day in Chutron, and Momdali decided to go up the upper Basha to Doko in search of specimens. We looked at a few lots in various shops along the road, but nothing was very interesting, and so we continued our backtrack toward Skardu. I had a queasy stomach and was feeling a bit weak.

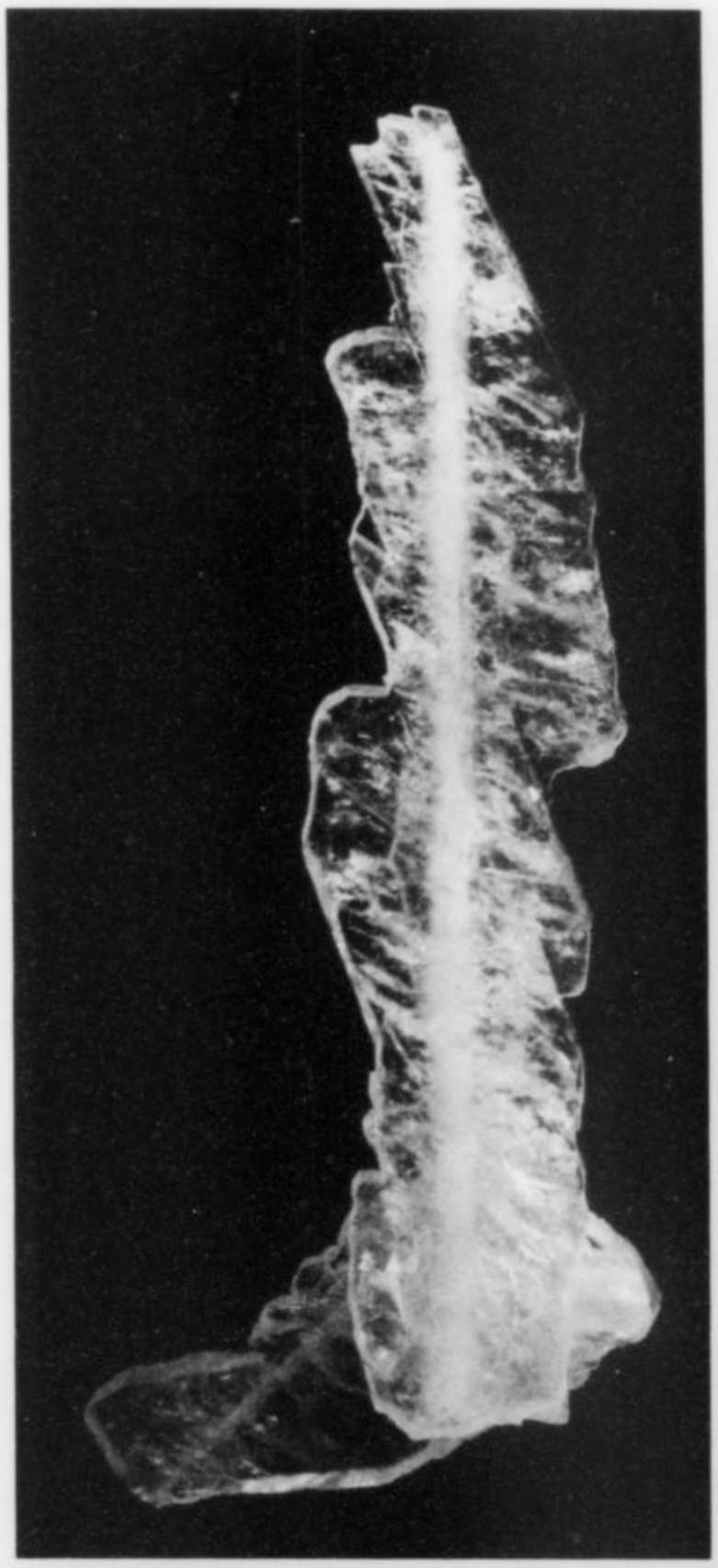
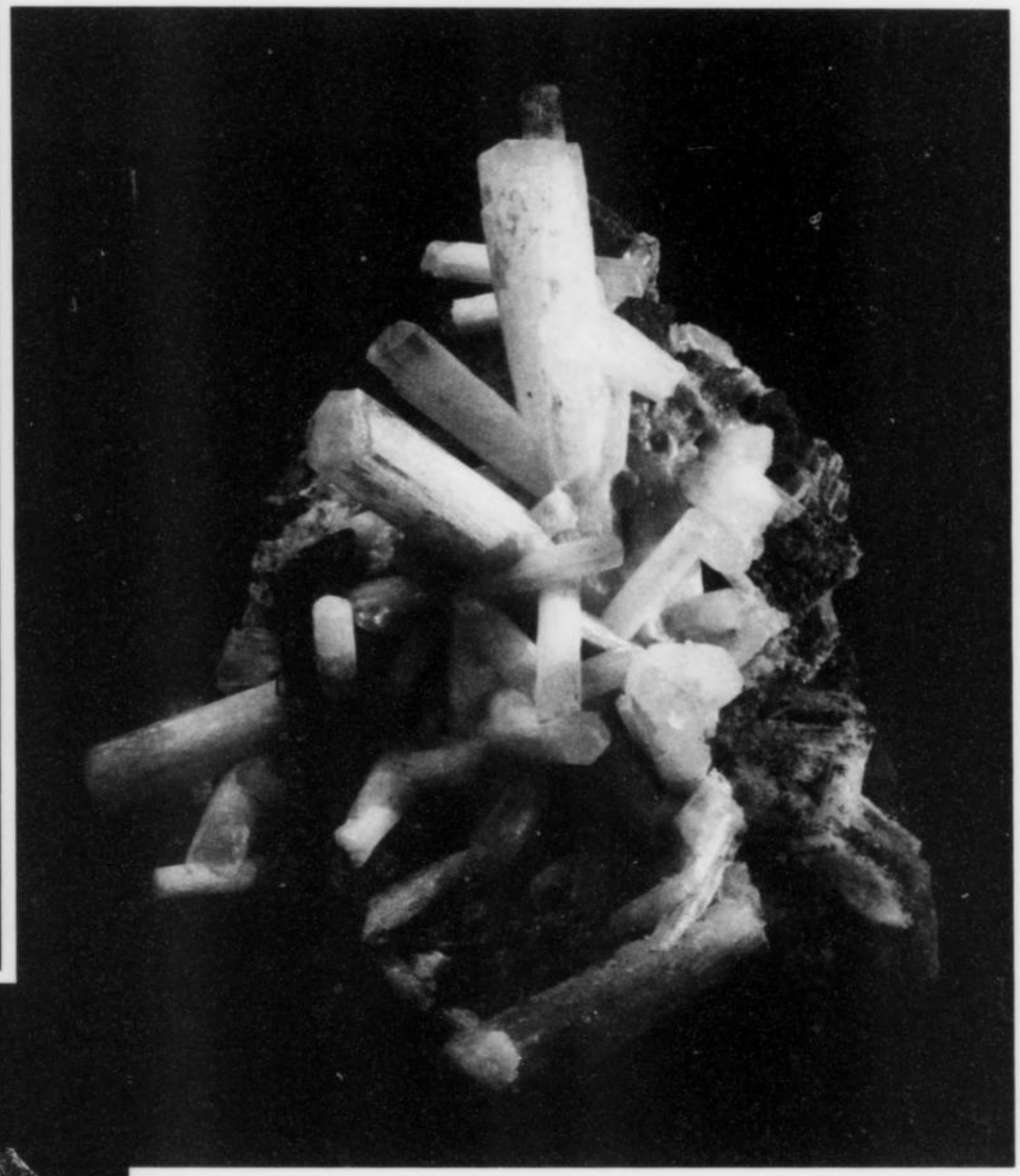
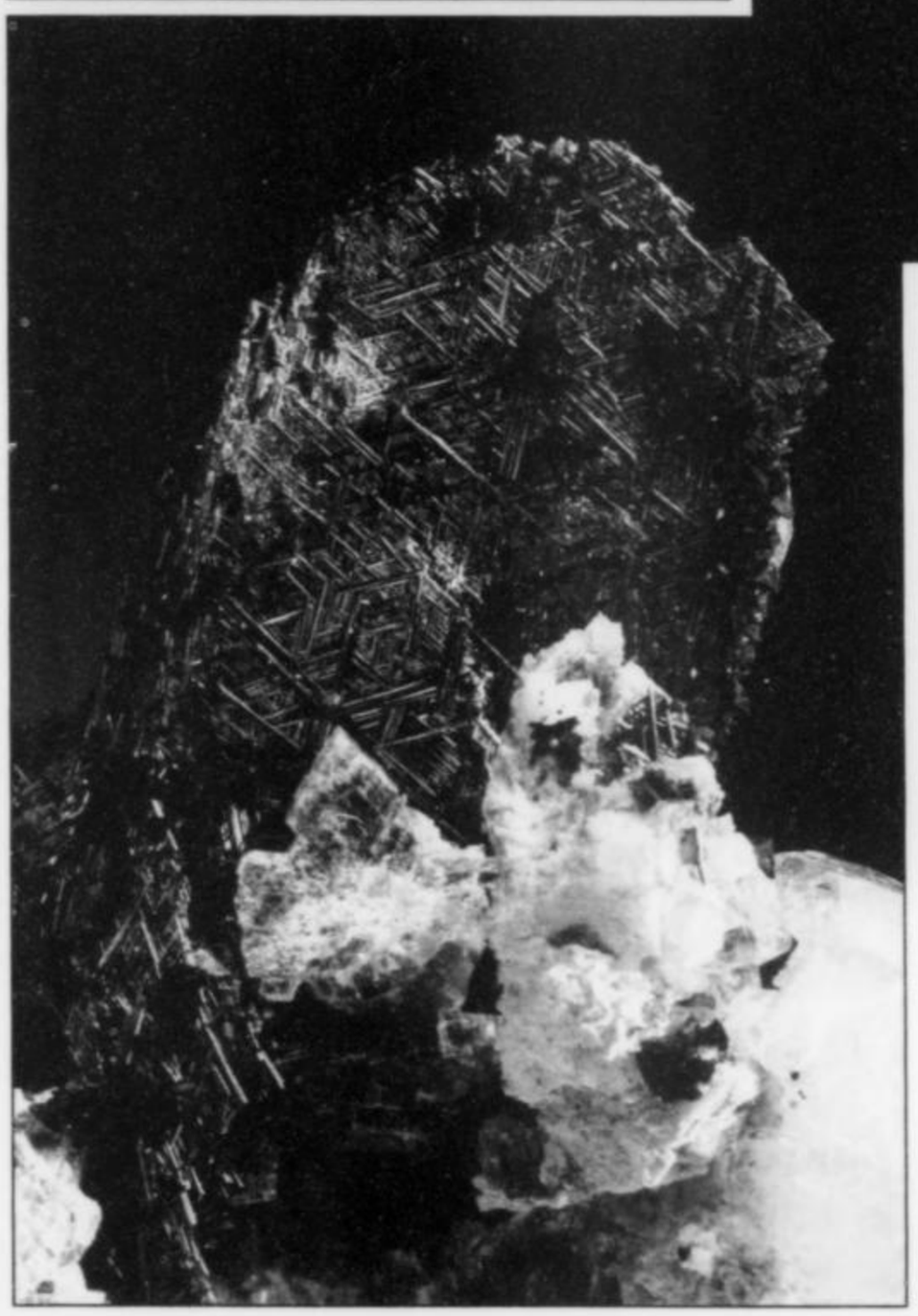


Figure 24. **Faden quartz, 5.5 cm, from Alchuri. Dudley Blauwet specimen; Jeff Scovil photo.**

Figure 25. **Scapolite crystals to 2 cm on matrix, 6.6 cm, from Alchuri. Bill and Carol Smith collection; Jeff Scovil photo.**





THE ALCHURI MINES

We arrived in Alchuri to see schoolchildren everywhere along the road, the boys in Western dark blue pants and blue and white checkered shirts and the girls in a blue shalwar-kameez with a white head covering. We had timed our arrival exactly right: the Schoolmaster Najaf appeared with a smile, having finished his daily duty.

"Where do you want to go?" he asked, and then named some options. We decided to go to a nearby titanite and epidote deposit which he claimed would lead us to an area where "red things" are found. I wondered excitedly whether this might be the triplite or perhaps the v‰yrenenite locality.

We continued down the valley for a kilometer or two from the school and then turned left on a rough jeep trail heading mostly in a northeasterly direction. I turned on my runner's GPS device and started to record the mileage, as we started to parallel a large water pipeline that is used for hydroelectric power generation.

Figure 26. **Reticulated rutile crystals, 5 cm (as shown), from Alchuri. Bill and Carol Smith collection; Jeff Scovil photo.**

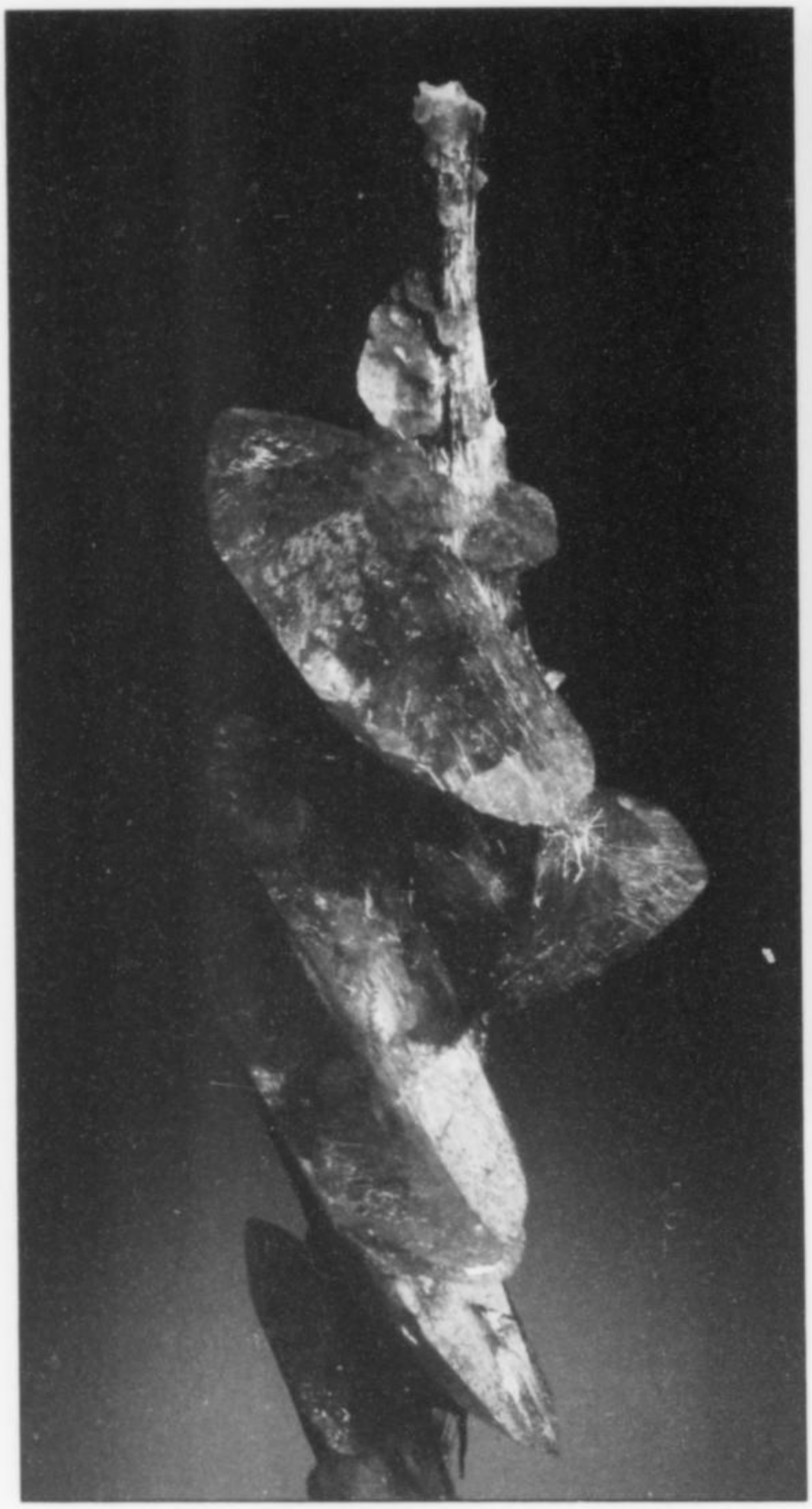


Figure 27. **Titanite crystals to 2 cm on actinolite, from Alchuri. Bill and Carol Smith collection.**

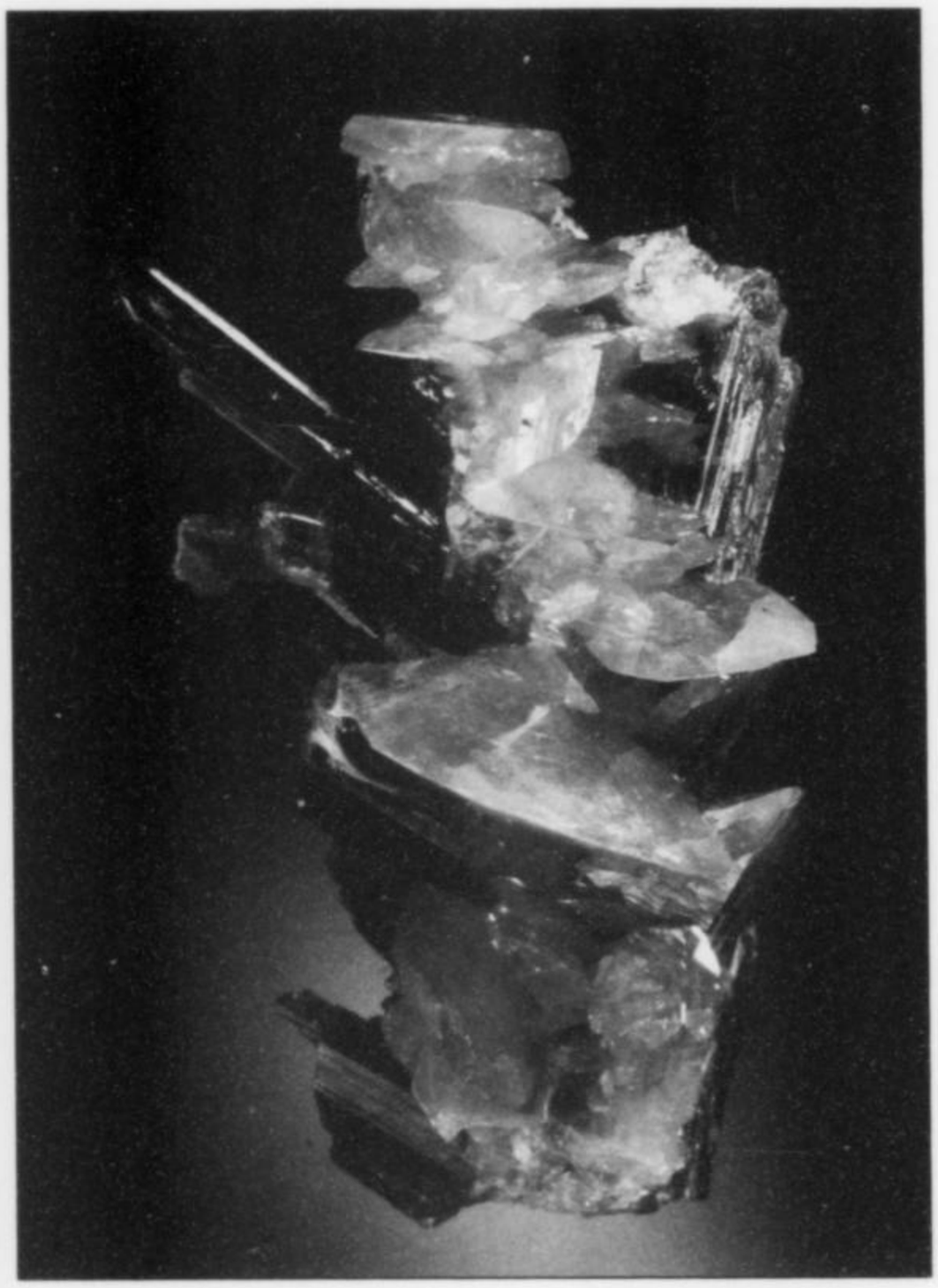


Figure 28. **Titanite crystals on clinozoisite, 5.2 cm, from Alchuri. Dave Bunk specimen; Jeff Scovil photo.**

Figure 29. **Titanite crystal, 6 cm, from Alchuri. Gene Meieran collection; Rob Lavinsky photo.**

Suddenly the track dramatically worsened and we were forced to stop, slightly less than 3 km from the main road. We surveyed the threatening sky and tried to decide what essentials to take with us. I stuffed my raincoat, two liters of water, and some snacks into my ancient day pack, faded and patched enough to look like the ones that the locals use; slung my digital camera around my neck; and packed my handicam into a white cloth bag. Master Najaf grabbed the day pack as my driver started to whine about guarding the jeep, an excuse to avoid a rigorous climb.

We followed a good path upward along the pipeline and at the first ridge line on the left we veered onto a faded trail, more appropriate for goats than humans. The trail steepened dramatically, and I could feel the strain in my calves as my heart rate increased to the level of a moderately hard run. Thanks to my running regimen I am in top physical shape, enough so that when the schoolmaster asked to take a short break I obliged him while not feeling the need myself.

We crossed over the ridge line, encountering a few sections steep enough to scare some adrenalin into my bloodstream, and emerged on a steep talus slope where we stopped and tried to select a route from several very faint trails leading up a very loose slope. I found

Figure 30. **Titanite crystal, 3 cm, from Alchuri. Gail snd James Spann collection; Rob Lavinsky photo.**

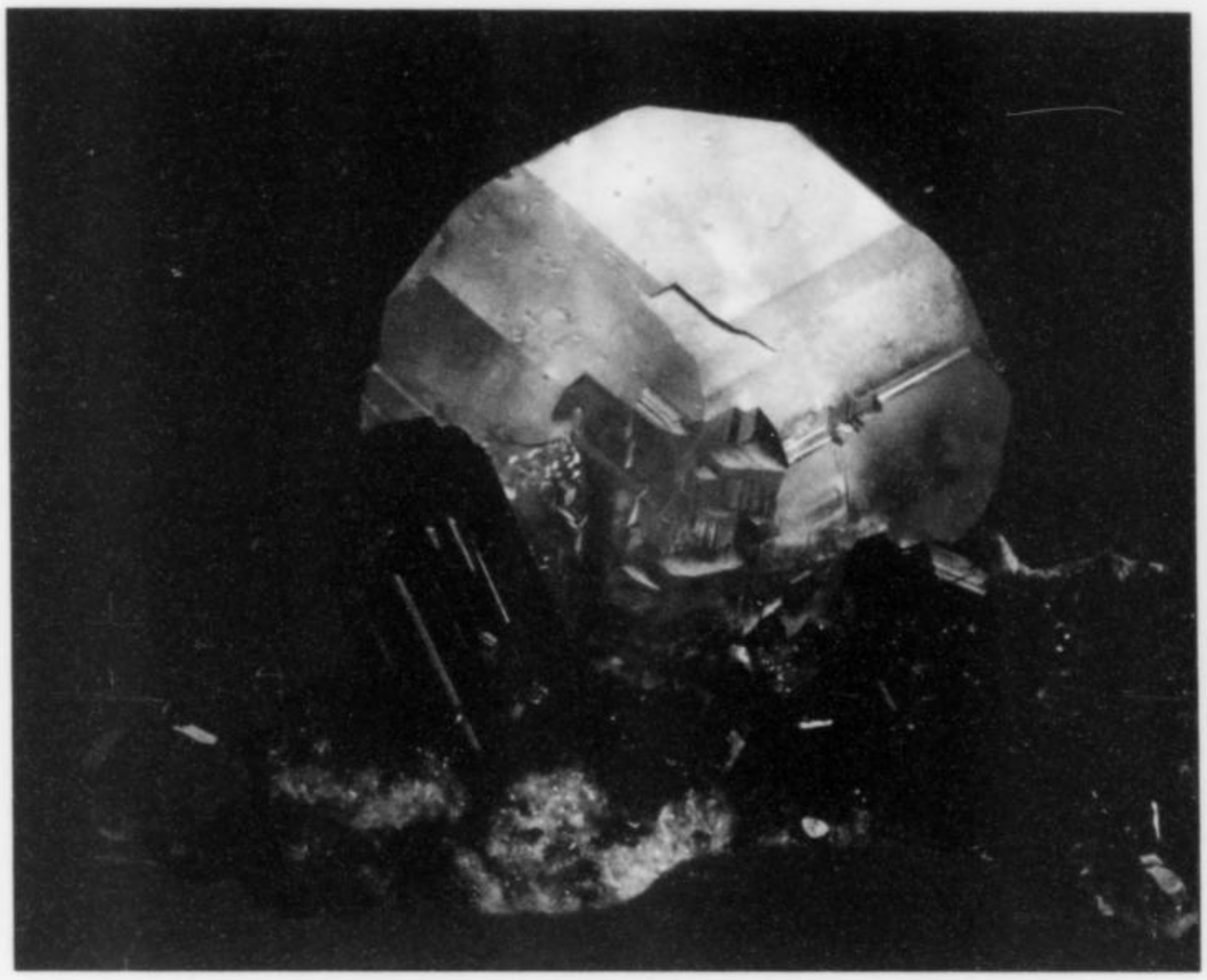


Figure 31. **Vesuvianite crystals with calcite, 5 cm, from Alchuri. Fine Minerals International specimen; Jeff Scovil photo.**

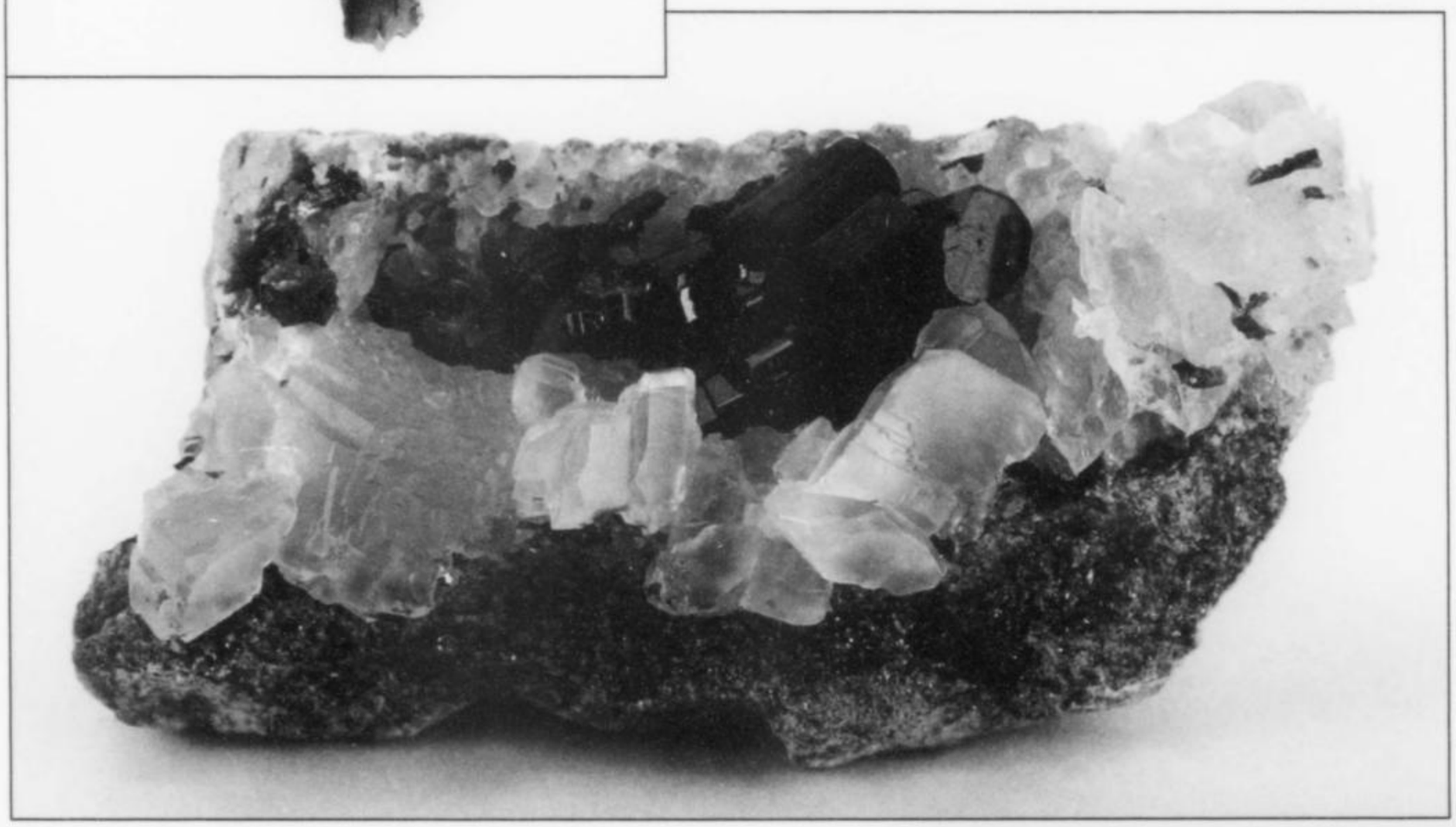


Figure 32. **Vesuvianite crystals to 1 cm with calcite, from Alchuri. Rob Lavinsky specimen and photo.**

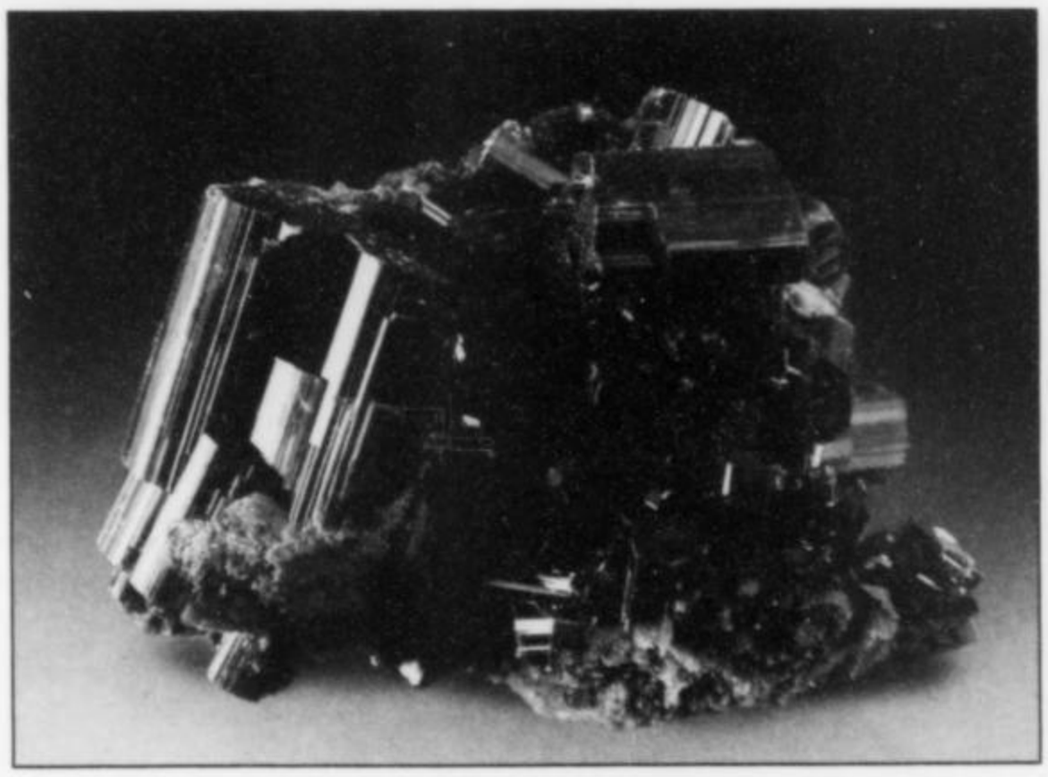


Figure 33. **Vesuvianite crystals to 2 cm, from Alchuri. Bill and Carol Smith collection; Kevin Dixon photo.**

myself using both hands along with my feet on the steeper sections and frightened myself enough to generate the right amount of adrenalin to power myself upward, barely noticing the darkening clouds and increasingly gusty winds.

The talus slope narrowed between two merging ridges and we attempted to work our way up the right hand side, only to cross horizontally to the left as the outline of the faint trails appeared to be more prominent there. We were squeezed into a V with an intimidating pinnacle to loop around on the left, while on the right

Figure 34. **Zoisite crystals to 1.6 cm, from Alchuri. Dudley Blauwet specimens; Wendell Wilson photo, 1993.**

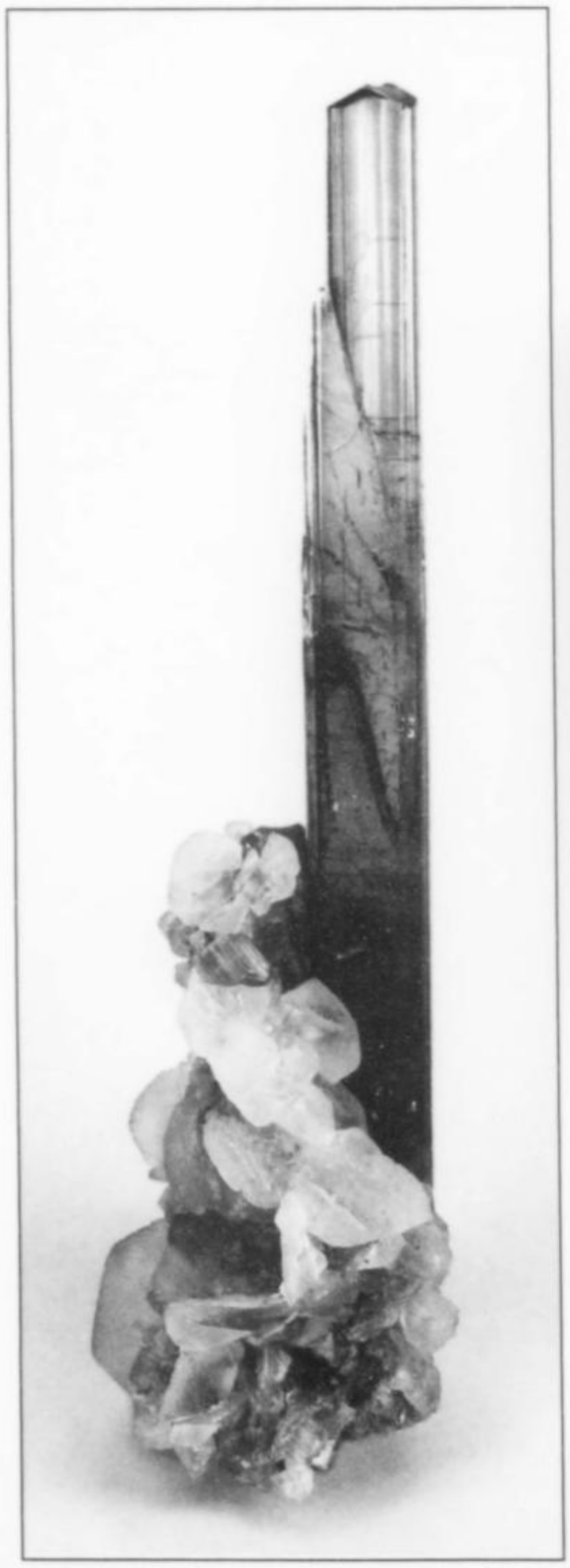


Figure 35. **Zoisite crystal, 1.5 cm, from Alchuri. Dudley Blauwet specimen; Wendell Wilson photo, 1993.**

Figure 36. **Zoisite crystals to 3.9 cm, from Alchuri. Dudley Blauwet specimens; Wendell Wilson photo, 1993.**

Figure 37. **Zoisite crystal, 12 cm, with calcite, from Alchuri. Rob Lavinsky specimen and photo.**

Figure 38. **From left to right: A young local miner, Master Najaf, my driver Shaji, and another local miner.**

Figure 39. **Digging in a pocket zone at Alchuri.**

we faced a high-angle slab, a class-five rock climb. We opted for the right for several reasons: the left route behind the pinnacle was not visible and was longer, with no guarantee of its being passable; the way to the right was direct, with the mining zone agonizingly close and the route on hard rock, not this cursed loose talus and sand where every hand and foot hold is suspect, and a fall risks serious injury or death.

"Next time I am bringing climbing equipment for safety," I ruefully thought to myself. It started to rain, which slickened the rock and also brought the possibility of lightning. My body was surging with adrenalin. I wondered whether I could have come halfway around the world and gotten to within 100 meters of my trip's goal, only to decide that it was not worth risking my life for several photos.

The schoolmaster was working his way up the rock, hand over hand, and I was shouting route instructions as he momentarily froze, petrified and unsure as to whether he should traverse right or left.

"*Bahut khatternak*"—"Very dangerous"—he nervously shouted, the whipping winds trailing his words and leaving his *kameez* flapping in the wind. Just as he neared the top, a miner appeared on the ridge line and shouted, indicating with his hands that this was not a good idea and conveying the message for us to climb down to the avalanche run-out far below.

Master Najaf descended slowly and carefully, reiterating the precarious nature of the climb. I was not feeling comfortable at all about the down climb, visualizing a head-over-heels tumble for hundreds of feet. We slowly made our way to the base of the southernmost ridge and were faced with the prospect of crossing the talus field on a very steep section to gain access to the other ridge line. I held my breath and then ran across the slope, each step breaking loose, but hoping that my momentum and speed would carry me across. It did, and just then a basketball-size boulder bounded down the avalanche field in front of us, unleashed by a mining operation on the second ridge to the north.

We edged onto the avalanche field carefully and the pitter-patter of small stones unnerved us and caused the three or four miners above to motion for us to come in close to the base of the ridge, where there was some protection from the falling debris and where there were handholds to aid our ascent.

We finally turned the corner and reached the north face of the ridge. Here we were exposed to potential rock falls directly from the west, but these were not likely, as nobody was working above us there. We moved on upward and then climbed diagonally to a point near the edge of the ridge crest, where a flat 25 by 25-cm step provided a moment to regroup and try to calm my wildly beating heart.

The view was dizzingly awesome, enough to inspire me to focus

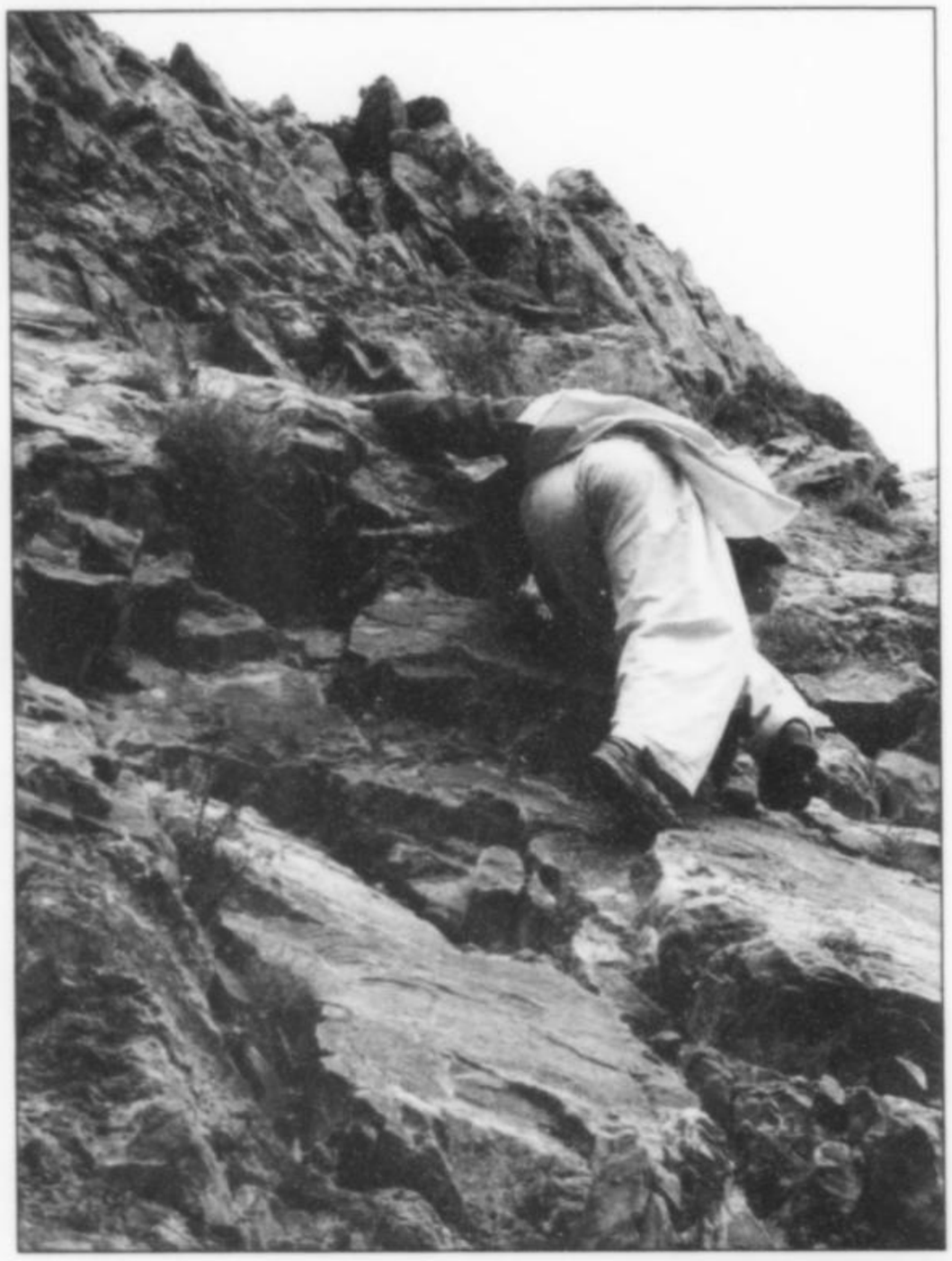
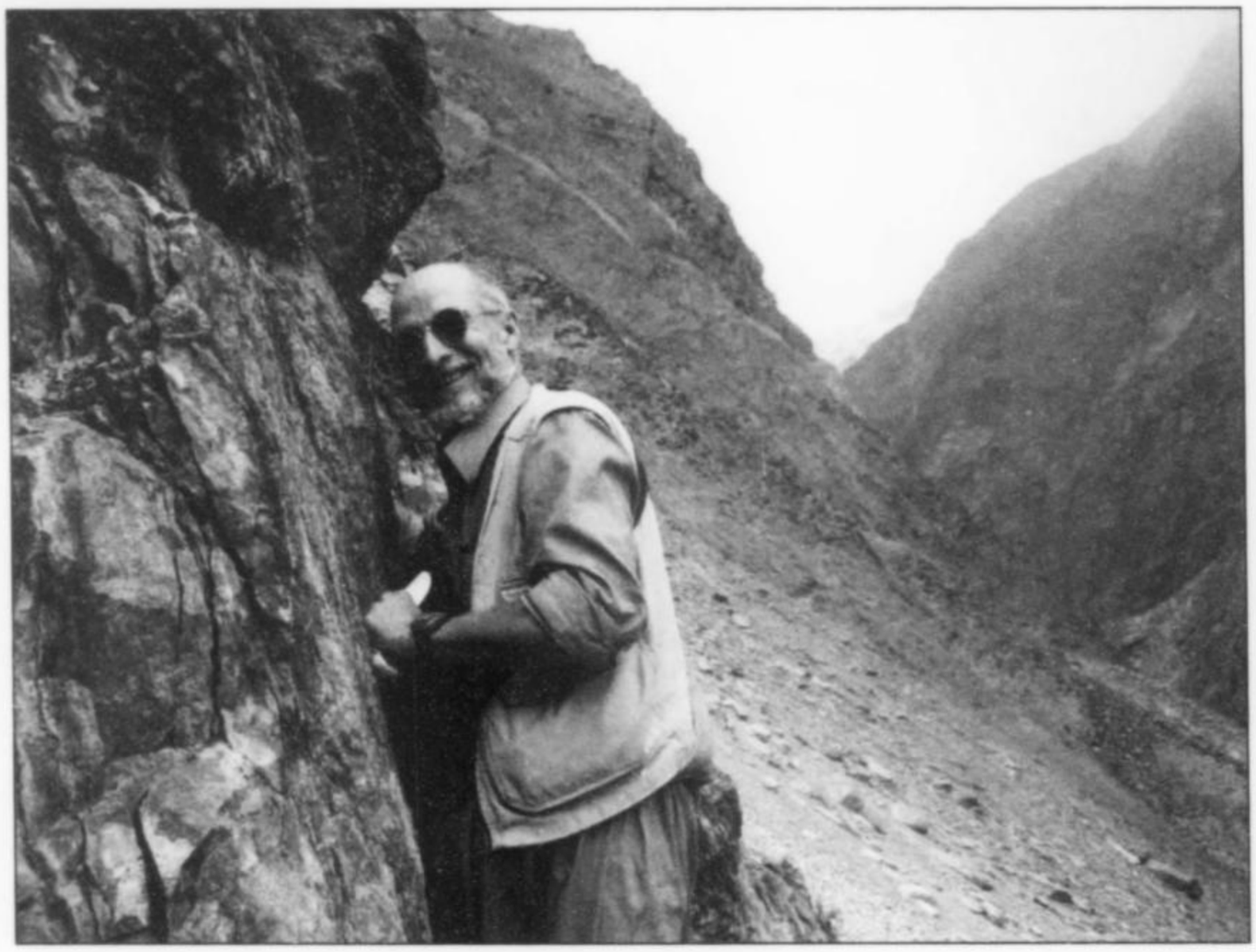


Figure 40. **Master Najaf negotiating the dangerous climb up to the Alchuri diggings.**

Figure 41. **The author, clinging to a cliff face below the workings; Alchuri Valley is visible in the distance.**



on the next section ahead and avoid looking downward. I moved, mostly horizontally now, across the crest of the ridge, grasping at every handhold in sight only to have almost every one dislodge with a slight pull. The entire ridge consisted of shattered rock. With only two or three meters to go before reaching the first excavated pockets I became too frightened to continue! I had traveled 12,000 miles to get to this point, and everything had worked out so far; I and my local guide had both the spare time and the correct season to venture up here while people were working the site. Being aware of the current tense political and religious problems that could prevent me from ever visiting here again, I knew that I had to make a move. Any article I could write about venturing to within 10 to 15 feet of an active mining site and stopping short would not be too impressive.

My nose was about 15 cm from the near-vertical face and I had about a 10-cm foothold for one of my feet. I had to swing across the corner with a potential drop to the avalanche field far below. I froze as the question again rose in my throbbing brain, "How far do I go? Where do I draw the line?"

The miner ahead of me sensed my unspoken dread and used an iron tool to scrape a small pad the size of the ball of my foot on the steep incline, then urged me to step there. I breathed deeply, swung my leg into space, and made the move—and I was finally at the excavation site!

The productive zone is about 3 to 4 meters across, running along the crest and to the south side of the ridge. The miners told me that in the past 12 years they have worked various portions of the zone for up to 2 kilometers up the ridge. The rock is a completely shattered, rust-colored, heavily iron-stained schist. Where I was standing it was so steep that the miners had worked it out nearly vertically, using gravity and a simple 60-cm iron rod, pointed on one end, and with a curved hook on the other. Master Najaf showed me how it is done, wedging the pointed end into a crack and easily dislodging a fist-sized chunk of schist with a simple flick of the wrist.

There was a newly opened, 10 by 20-cm pocket above me with visible 2.5-cm adularia crystals protruding from a very fine-textured green-gray clay, accompanied by tufts of green-blue tremolite resembling the local goat hair. My heart was still racing as I was half-squatting and leaning backward over the abyss, crammed into an area less than a meter and a half high. It was so awkward that I did not feel comfortable releasing either of my hands, both tightly grasped on tenuous holds, in order to take my camera from its bag to take a photo of the pocket.

The miners urged me to move onward, and once again I stepped around a scary corner, and moved upward to a second worked site.

Figure 42. **Working in the muddy, fractured rock surrounding a cleft pocket.**

Figure 43. **The main Alchuri workings ("Alchuri no. 1")—small, hand-dug pits running below the crest of a ridge.**

Figure 44. **A worked out cleft pocket at the Alchuri diggings.**

This one had been worked a bit deeper and more horizontally, allowing me to step inside and for the first time in about an hour feel somewhat secure. I pulled out my camera and took some photos, then removed my handicam from the cloth bag and recorded a few minutes, with my voice quavering and my hands shaking slightly, my body absolutely saturated with adrenalin.

Master Najaf informed me that this lower area has produced mostly epidote and rust-red titanite, along with adularia, and that about a kilometer further up the zone the root-beer-colored vesuvianite crystals (some over 2.5 cm long) had first been found in June of 2004. I then realized that these vesuvianites, and not triplite or v‰yrynenite, must be the "strange red minerals" that he had been talking about. Everyone has accepted that the latter two rare minerals were found in a phosphate pegmatite near Alchuri. The man from whom I had purchased them the previous June absolutely swore that he had bought them in that village and that the

continued on p. 536

Minerals from Alchuri

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INTRODUCTION

The following minerals have been informally reported from the Alchuri area, primarily by dealers and sources within Pakistan, and have been more or less confirmed by Dudley Blauwet, who remains the only Westerner to have actually visited the Alchuri workings. Unless a dealer buys specimens at Alchuri village, or from a Northern Area dealer who has bought minerals at the site, the locality information can be unreliable once it gets down to the main center in Peshawar, where virtually all foreign dealers do their buying.

In general the minerals reported from Alchuri form a coherent Alpine-cleft-type assemblage, except for the reported pegmatite phosphates triplite and väyrynenite, which are not actually from Alchuri. The only possible confusion is with the nearby Hashupi locality. The Hashupi (or Hashupa, in Urdu) Valley is about 3 to 4 km from the Alchuri Valley. Both run in a northeasterly direction from the villages of the same names, which are on the northern bank of the Shigar River. Both valleys drain a large mountain range between the Shigar and Braldu Valleys. The Alchuri and Hashupi mineral assemblages are similar; Hashupi tends to produce the very best of the transparent, darker epidotes, whereas Alchuri generally produces the zoisite and clinozoisite specimens, along with a larger variety of Alpine cleft minerals, including better fluorapatite, microcline, diopside and vesuvianite. (Blauwet, personal communication).

It is also interesting to note that Alchuri seems to be the faden capital of the mineral world, yielding faden crystals of quartz, fluorapatite, clinozoisite, orthoclase, titanite, zoisite and diopside. By inference, all of these species must therefore also be present as rock-forming minerals in the metamorphic country rocks of the area. (For more information on the formation of faden crystals see R. Peter Richards' 1990 article, "The origin of faden quartz.")

MINERALS

Actinolite $\square Ca_2(Mg,Fe^{2+})_5Si_8O_{22}(OH)_2$

Acicular actinolite crystals occur in pale green, felted masses to dark green semi-parallel clusters of coarse needles, and as inclusions in orthoclase, quartz, titanite, apatite and other species at Alchuri. Thick actinolite clusters often layer the host schists and many of the various species are often embedded within these masses.

Albite $NaAlSi_3O_8$

Blocky white crystals of albite occur with diopside, epidote and other species at Alchuri. Pericline-twin albites to 2.5 cm are sometimes associated with diopside, zoisite, clinozoisite and fluorapatite.

Aragonite $CaCO_3$

Aragonite is reported from Alchuri by Blauwet *et al.* (1997); it occurs as large rust-colored intergrown hexagonal prisms to 4.8 cm.

Barite $BaSO_4$

Barite is reported from Alchuri by Blauwet *et al.* (1997); it occurs as colorless, transparent crystals to 3 cm with byssolitic actinolite inclusions. (Identification analytically confirmed)

Calcite $CaCO_3$

Colorless, milky to transparent crystals of calcite up to 7.5 × 11.5 cm (2005) occur at Alchuri in blocky to flattened rhombohedral and thick tabular crystals. Actinolite, diopside, clinozoisite, epidote, titanite and vesuvianite are commonly associated.

Clinozoisite $Ca_2Al_3Si_3O_{12}$

Clinozoisite crystals from Alchuri are probably the finest known for the species. They are gemmy and emerald-green to pale tan to brown to red-brown in color, reflecting a variation in composition from relatively pure end-member crystals to compositions very near to the midpoint of the series with epidote. Very attractive, lustrous, prismatic, somewhat flattened crystals up to 8 or 9 cm are known (Blauwet, 2004).

Delicate specimens consisting of loose, picket-fence-like clusters of thin, transparent, pale brown to pale green bladed crystals to 7 cm long, 3 cm wide and only 1–2 mm thick were reported by Moore (1999, 471). Faden crystals are known, and parallel growth with multiple terminations is common. Fluorapatite crystals and well-formed white calcite crystals in flattened rhombohedral habits are sometimes associated.

In June 2005, several specimens were found with 1-cm clinozoisite crystals and translucent, tan-colored titanite crystals, and in October of the same year, clinozoisite with masses of reticulated rutile was found. In 2006 another clinozoisite pocket was opened; the best piece found there is a garnet, vesuvianite and 1-cm clinozoisite combination on a 5-cm calcite crystal.

Diopside $CaMgSi_2O_6$

Dark green chromium-rich diopside occurs at Alchuri in prismatic, lustrous, translucent to transparent pencil-like crystals to over 3 cm long. Crystals also occur in parallel growth, embedded in byssolitic actinolite, and commonly associated with calcite or clinozoisite. In June of 2005, a transparent 5-cm parallel-growth diopside with a distinctive faden inside was recovered, as well as another faden specimen measuring about 3 cm with a 2.5-cm translucent white fluorapatite attached.

Alchuri may be the actual locality for specimens reported in 1999 as coming from somewhere near the river town of Chamachhu, near Shengus; that find consisted of lustrous, deep green, well-terminated pencil-like crystals to 9 cm (Moore,

1999). However, the find attributed to Chamachhu might instead be from a high-altitude deposit in the Haramosh Mountains that is accessed by climbing the Chomo Lungma Glacier from Arondu in the upper Braldu River Valley. This route crosses the Haramosh Range and eventually ends up on the Indus side near Dassu, above the village of Hanuchal. This site has produced many bright green titanite crystals, some covered with chlorite and albite.

Dolomite $Ca,Mg(CO_3)_2$

White to yellow-brown dolomite in curved rhombohedral crystals to 4 cm occurs in clusters.

Epidote $Ca_2Al_2(Fe^{3+},Al)Si_3O_{12}(OH)$

Epidote forms attractive, lustrous, gemmy crystals to nearly 30 cm, showing the typical dark yellow-green color, in some cases implanted on dark green diopside with white orthoclase. A range of compositions apparently exists, from the iron-rich green crystals to root-beer-brown crystals that are close to the composition of clinozoisite.

Specimens of Alchuri epidote (sometimes mispelled *Aschudi*) began appearing on the mineral market in significant quantities in 1997. Transparent epidote crystals over 30 cm long were found in a little drainage valley near Alchuri in 2001–2002 (Blauwet, 2004)—perhaps the same find as reported from near the neighboring village of Hashupi in 2002. That find yielded 500 to 1,000 gemmy, lustrous, terminated epidote crystals to 8 cm and one to nearly 30 cm. Spectacular epidote crystal groups of lustrous, terminated prisms to 15 cm were collected at Alchuri in 2004

Ferro-axinite $Ca_2Fe^{2+}Al_2BO(OH)(Si_2O_7)_2$

Sharp, gemmy, purplish brown crystals of ferro-axinite to 10 cm, some with associated quartz and zoisite crystals, have been reported from Alchuri (Hammer and Weerth, 2004; Bernard and Hyršl, 2004).

Fluorapatite $Ca_5(PO_4)_3F$

Elongated, gemmy, very pale pink crystals of fluorapatite to more than 2.5 cm, unusual for exhibiting a faden line, have been found at Alchuri. In particular, in 2003 a pocket was opened that contained very pale pink, stacked, parallel-growth aggregates to 4 cm with a distinctive faden containing a hollow capillary tube inside; some specimens also exhibit nearly a 90-degree curve. White to colorless to pale yellow transparent crystals to more than 2.5 cm occur on druses of clinozoisite, and commonly on beds of byssolitic actinolite, and occasionally with diopside or epidote (2004).

Hematite α-Fe_2O_3

In Fall 2002, hematite was collected at Alchuri in dull, weathered rosettes to 2.5 cm. sprinkled with adularia "dust" on small adularia crystals.

Orthoclase $KAlSi_3O_8$

Orthoclase crystals of the white to transparent kind referred to as "adularia" occur at Alchuri in crystals to over 7 cm and in clusters to more than 15 cm. Complex penetration twins reach about 4 cm. The crystals are rather blocky, with striated faces and high luster. Elongated crystals to over 5 cm showing a faden line were found in 2004. Blackish green inclusions of chlorite fill some crystals. One 18-kg specimen found in November 2005 has a chlorite included adularia crystal 25 cm long and 15 × 15 cm across on massive yellow-white calcite. Earlier that year a very pale yellow, glassy, transparent, blocky prism measuring 4.5 by 3.5 cm was found.

Phenakite Be_2SiO_4

Phenakite was reported (but not described) from Alchuri by Bernard and Hyršl (2004); however, it is unlikely to have been found there, considering the geology.

Prehnite $Ca_2Al_2Si_3O_{10}(OH)_2$

Prehnite in small spheres to 5 mm on other minerals was reported from Alchuri by Blauwet (2004).

Quartz SiO_2

Colorless and transparent, prismatic/tapering quartz crystals to 7 cm, some doubly terminated, some with inclusions of dark green actinolite, occur in singles and clusters at Alchuri. In 2004 an excellent, pale smoky, 8-cm quartz gwindel was found, and several additional examples were found in 2006. Specimens of transparent, lustrous, heavily etched solution quartz to 12 cm across have been found in recent years. Also found this year were transparent, very lustrous quartz prisms to 5 cm on clusters of bright silvery muscovite crystals (to 2 cm) dusted with chloride.

Rutile TiO_2

Acicular rutile occurs at Alchuri as black to red-brown inclusions in transparent quartz crystals. In the fall of 2005, a number of specimens of lustrous, bright orange-red reticulated masses were found. One specimen (now in the Bill Smith collection) is a 13 × 15.5-cm specimen sprinkled with very dark brown 3-mm siderite rhombs, small adularia crystals, and some quartz crystals. Behind these are several reticulated masses of rutile needles, the largest patch measuring 4.8 cm across.

Scapolite group $3NaAlSi_3O_8{\cdot}NaCl$ ***to*** $3CaAl_2Si_2O_8{\cdot}CaCO_3$

Transparent to milky, prismatic, lustrous scapolite crystals to more than 2 cm have been found at Alchuri, some in clusters to more than 6 cm.

Siderite $Fe^{2+}CO_3$

Rhombohedral siderite crystals to nearly 1 cm occur at Alchuri with pale pink fluorapatite crystals. Single, isolated, rust-colored crystals to 3 cm have also been found. Other pockets (found in 2005) have yielded groups of small, stacked, parallel-growth "stalactites" to 7 cm, with transparent fluorapatite attached.

Titanite $CaTiSiO_5$

Alchuri has produced attractive, green, spear-point crystals and flattened twins of titanite to more than 2.5 cm. Some crystals occur on epidote crystals, and some on blocky white orthoclase crystals heavily included with actinolite. Pink crystals and pale yellow-brown to butterscotch-orange crystals to 3 cm, arranged in a "corkscrew" pattern, have also been found. Around 2004 some extremely thin wafer (1–2 mm thick) crystals were found, up to 3 cm long and a very pale green in color, some with fadens.

Vesuvianite $Ca_{19}(Al,Mg,Fe)_{13}Si_{18}O_{68}(O,OH,F)_{10}$

Vesuvianite crystals to over 2.5 cm occur at Alchuri in dark shades of brown and red-brown to black. Specimens were first recovered in the summer of 2004 and commonly have small white calcite crystals associated. In 2006 some small, lustrous, intensely red dodecahedral garnet crystals to 3 mm were found

associated with vesuvianite crystals. Another specimen shows a 1-cm orange garnet crystal (perhaps an Fe-rich grossular) attached to a 1.5-cm vesuvianite crystal.

Zircon $ZrSiO_4$

Zircon in rust-red crystals to 2.5 cm was reported from Alchuri by Blauwet (2004).

Zoisite $Ca_2Al_3Si_3O_{12}(OH)$

Attractive, lustrous, prismatic crystals of zoisite have been found at Alchuri in pale shades of green to grayish green, yellow-green to blue, and lavender. Sometimes all three colors are visible in the same crystal because of trichroism, whereas in others a dichroic change from yellow-brown to blue-green or from green to bluish gray is all that can be observed. In 2005, some thin flattened crystals to over 2.5 cm were found with distinctive fadens.

These are probably the world's finest crystals of the species, after the blue-purple crystals known as *tanzanite* from Tanzania. Crystals to 10 cm have been found, some of them doubly terminated. Associations include quartz, bladed white albite, and fine crystals of ferro-axinite.

Attributed to Alchuri

Triplite $(Mn^{2+},Fe^{2+})_2(PO_4)F$

Some extraordinary orange-red to rose-red gem crystals of triplite to 1.2 cm have been found in a phosphate pegmatite said to be located near Alchuri. However, Dudley Blauwet has traced their occurrence to the Namlook mine above the village of Dassu in the Braldu River Valley, so they are not from the Alchuri area.

The crystals are lustrous but irregular and etched, and most were sold for faceting rough, but a few uncut crystals survived. Identification has been confirmed by X-ray analyses at the Smithsonian Institution, by Skip Simmons at the University of New Orleans and the Gemological Institute of America.

Väyrynenite $MnBe(PO_4)(OH)$

A phosphate pegmatite said to be somewhere near Alchuri has occasionally produced gemmy, orange, prismatic crystals of the extremely rare species väyrynenite—the largest of which reach over 3 cm. These are the world's finest examples of the species.

The locality, however, remains uncertain and may instead be located in the Braldu River Valley—perhaps the Namlook mine (where the similar-appearing triplite crystals were found), or nearby Nyet, or perhaps Apo Ali Gund (Apaligun) farther up the valley. There may actually be several localities for the mineral, including an occurrence near Sassi in the Indus River Valley.

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miners had brought them down from above. When I questioned the local Alchuri people last year, they concurred that the "red" minerals had been found there, which seemed to confirm what I had heard about the locality. However, they had actually been referring to the reddish vesuvianites, not having seen either of the two rare red phosphates.

I had always had nagging doubts about pegmatite phosphates coming from Alchuri, because in the previous 12 years I had never seen any other minerals (such as aquamarine, tourmaline or topaz) from here that would be typical of such a pegmatite. It is also true that when the local dealers find new, rare things and learn that they are valuable, they will lie to no end to protect their source. Knowing that I travel to all of the mining areas recording location data, the last thing they want is to have me find the site and purchase directly from the local miners. Also, when I had purchased the v‰yrenenites the previous evening, the sellers had insisted that they had been found in the Braldu Valley, and when I pushed them hard saying that they had to have come from Alchuri as everyone else has said, they thoroughly disagreed. Everything that I had seen on this trip, and the fact that I had not seen any hint of a pegmatite in this area, now inspired a new goal: to uncover the true locality for the v‰yrynenite and triplite crystals.

I ventured into a third work site and handed my camera to Master Najar to photograph me edging around a corner, tightly clutching worthless holds. I shot some more photos and video, and then was urged to move to the next area. I saw the steepness and the lack of footholds across endless stretches of crumbling rock, and decided that I had had enough. I told the crew that it was time to go back. We reversed steps, this time with the miners occasionally lending me one hand, their other hands planted on their iron rods for support, and we worked our way back across the ridge and eased on down the north side onto the avalanche run-out. The miners indicated that the best way down was to cross the 100 meters of scree and then follow a faint trail down, paralleling a gully. They scurried across like goats, fearful of rock fall, and I finally drew up the nerve to race across myself, equally terrified, plunging and sliding on the unconsolidated rock and sand. I reached the opposite side and finally the fear of imminent danger subsided. I turned to take some photos, and the miners and Master Najaf pointed out the next ridge to the north, also on the west side of the valley, and indicated a whitish zone currently being worked and producing nice matrix diopsides on pericline- twinned albites, sometimes associated with zoisite and clinozoisite, and other pockets that have produced fine colorless to pale yellow, completely transparent apatite crystals. I decided to designate this area as "Alchuri ridge # 2 mine," and use "Alchuri ridge #1" for the site that I had just visited. Over the years, various other minerals have been found at these sites, but never particularly attributed to either ridge. These include calcite, quartz, rutile, siderite, gypsum, and even two samples of barite. Very often all of these minerals are

found in soft "beds" of fluffy blue-gray acicular tremolite, and equally these "fine hairs" are found as inclusions in many of the specimens.

The jeep driver had become concerned about our long absence, and had started to walk up the valley, his moving figure barely visible far below. We rapidly climbed down, gravity and adrenalin helping, and after meeting up with the driver I had the crew pose on a mound of dirt near the pipeline for one last photo.

We strolled leisurely to the jeep and returned to Alchuri, stopping at Master's Najaf's *godown* ("warehouse") to try to find some acceptable specimens to buy amidst a floor covered with mostly low-end material. He then offered me some select new varieties that had been purchased in the last day or so, and I chose a representative suite of fine Alpine cleft minerals: calcite with adularia, large diopsides on albite, epidote on calcite, well crystallized adularia with byssolite, and a single vesuvianite.

BACK TO CHUTRON

We said our goodbyes and made plans to visit the Hashupi deposit in the future, and we also arranged for another meeting in two days to inspect any new material that might be found. Shahji and I then headed back up the Shigar Valley, myself still stoked with adrenalin and ecstatic at actually getting to the site. We checked shops In Yuno and Haiderabad, but nothing exciting appeared there. So we turned left and crossed the ancient Bangla bridge (a few more new planks had been added that day to patch gaping holes), and returned to Chutron, arriving about two and a half hours after leaving Alchuri.

I emerged from the jeep utterly exhausted, the adrenalin spent and my body trashed. My forearms were aching from my panicky gripping of handholds, and my calves felt as though I had just finished a serious five-hour endurance race. I stumbled up to Amir Ullah and proudly proclaimed that I had made it to the mines, but it had been very dangerous. He showed a mix of fear and admiration, worried for my safety because of my known recklessness, and yet pleased to see me happy at having accomplished a goal.

I showed digital photos and video, and he agreed about the hazards. We were both simply glad that I had come back in one piece. He had been hit hard by the food poisoning or virus and complained of a stomach ache and extreme fatigue. I also realized that, considering the heavy athletic training that I had been doing, I should not have been feeling as exhausted as I was. I pulled up a chair on the grass to enjoy the cool weather and the approaching dusk, and nursed several cups of hot tea.

Momdali returned from a full day up the Basha Valley and showed me his sole purchase: some small but very well colored gem aquamarine crystals from Bien. This was the first time that I had heard of any minerals having been found at that village about 45 minutes up the valley from us on the opposite bank. I bought the entire small lot, planning to sell the good crystals and cut the rest into gemstones.

As we were finishing this deal, Amir Ullah was collecting a small mound of 10-rupee notes (worth about 17 cents each) and exchanging big notes with Akhmad, the guesthouse operator. I watched in fascination as the retired army officer spread the word in his native village that a wealthy donor had arrived. Scores of children, some as young as three, arrived and queued into line, cautious, fearful, and anxious at this strange opportunity as the salt-and-pepper-haired Pathan handed each of them a single note at a time.

I grabbed my camera and then my camcorder, recording the faces of the innocents, enthralled by the ongoing scene. I was able to film them unnoticed, their actions natural, their faces a mixture of dozens of emotions; soon I had a series of wonderful shots of native people. I managed to film some of the elders and then watch their astonished faces as I replayed the video, with some of the younger adults chiding them about how I had captured their spirit. This was a fairly common superstition that I encountered in my early travels to remote mountainous regions of Asia: the belief that a camera photo would capture their souls made many older folks reluctant to be filmed. It is a belief that I do not encounter very often anymore.

Dusk arrived and I hungrily awaited dinner, not having eaten much that day. Our mixed vegetable curry arrived and we devoured it, scooping it up with wholegrain *chappatis*, using our hands. Shahji then took on the job of cutting ripe mangos into pieces, though the large seeds inside made it tedious. We gobbled our sweet juicy dessert down faster than it had taken to prepare, and then were told that we would have to move out of the new building around 6:30 a.m. the following morning, as the government building inspector was due shortly thereafter to complete the final inspection.

I took a hot bath and then Amir Ullah and I retired early. Again both of us had terrible night sleeps, for reasons unknown. We talked the next morning about my endless tossing and turning, which had been observed by my friend all night as he was also lying sleepless across the room. We discussed the possibilities: was it the illness that both of us were suffering? Or was the building oriented improperly, with consequent bad *feng shui*? We used this discussion to vent our irritation at the guesthouse operator for forcing us to move, telling him that we would gladly do so as the building was haunted by ghosts, who kept shaking me awake all night, refusing to allow me to sleep. When the jeep driver heard this his eyes opened wide with fear and I could sense his skin crawling. A few years before, he had spent one full night sleeping in the jeep, believing a spirit would not pass through the metal doors, after I had told him stories of the strange sounds coming from the ceiling and of this place being haunted. I told Akhmad the only recourse was to tear the new building down and start all over, and of course he was not happy to hear this.

After moving our luggage to the old but familiar guesthouse, I did a long, slow run to Tisar, encountering a young girl and her grandmother herding goats and sheep; they were frightened to see a stranger doing such an unusual ritual. The rest of the local people have seen me enough over the years that they have come to accept me as a weird but harmless mystic, and so they are usually cordial, rather than wary and suspicious of me as they had been at first.

After a breakfast of leftover curry with fresh eggs and bread, Shahji and I climbed into the jeep and prepared for a long day on the road, intending to travel as far as Apo Ali Gun (Apaligun) and maybe even up to the Ho Nala and the remote village of Chhappu, which I have visited four or five times over the past 15 years. But this journey had taken on a new mission: finding the source of the recently found v‰yrynenite and triplite specimens. Like Stanley and Livingstone, with their obsession about finding the source of the Nile River, my overwhelming obsession about correctly determining mineral localities for various species in these remote regions of the Karakorams was now sending me on a new voyage of discovery. A lucky break during a chance encounter in the next few hours proved to be the key to unraveling the mystery.

THE ELUSIVE TRIPLITE AND V*f*RYNENITE

We drove into the bright morning sunlight and bounced down the trail to Tisar, crossing the vast sand expanse of the lower Basha to return to Haiderabad. Nothing of interest had appeared, so we

quickly headed up the Braldu to Baha. The man with the overpriced aquamarine whom we had seen several nights before was absent, so we relayed a message to one of his younger brothers that we would return later that afternoon.

We drove the short distance up to the military checkpoint, got out and strolled up to the cement-block headquarters. I looked for, but did not see, the sergeant with whom I had made the arrangement for a day-long pass to the upper valley in exchange for a copy of the *Mineralogical Record* article on Pakistan that I had written with Bill and Carol Smith in 1997. I was very concerned, but the new officer in charge had seen the article and had been told to allow me to proceed. We disagreed on the time limit: he wanted to give me two hours, while I was expecting 8 or 9 hours. We compromised at six, and I happily returned to the jeep and ordered Shaji to head to Dassu.

We rumbled up the road past Teston and through most of Dassu, stopping at a small cluster of dilapidated shops near the village's eastern end, which served as the local mineral market. We inquired about mineral specimens and were told that some new things were available, then were invited to come inside one of the shops. The dealer unwrapped some garnets, one a multi-crystal specimen on nice microcline. I guessed them to be from Apaligun (Apo Ali Gun), but was told that they were found at a village called Seydar, near the Ho Nala, which is about 5 km from Apaligun, but across the Braldu River on the northern side and slightly further eastward.

He then unwrapped several dirty, pale lime-green hydroxyl-herderite specimens, with lightly etched crystals attached to a small feldspar matrix. There were also a few mediocre green fluorites. I asked if the pieces were from Chhappu across from the Ho Nala, where I had purchased some excellent hydroxyl-herderites in the past. But he indicated that they were local, and I prodded him for more information.

"They are from the Kandahar mine, just across the river from us," was his response.

As if to back him up, a short time later we heard the dull rumble of a dynamite blast echoing off the valley cliffs behind the shop. He then unwrapped several other specimens in the dim light of a gas flame in the darkened back room (this was the best alternative for lighting, in the absence of electricity in the Braldu Valley). I squinted at the nondescript rock and then held back my excitement. It appeared to be a triplite!

I focused my Minimag flashlight on the piece for a better look and saw a large but totally fractured and broken specimen of orange-brown triplite that was in a very black manganese oxide matrix, virtually identical to the matrix in a specimen bearing a flawless gem nodule from which I had had a 7-carat gemstone faceted in 2004. An analysis of that earlier specimen by Skip Simmons of the University of New Orleans showed an unusually high percentage of manganese, which probably accounts for the intense orange color with no brownish tones.

I immediately asked the dealer (in Urdu) if the specimen had come from the Kandahar mine, which obviously was a phosphate-rich pegmatite . To my surprise, he responded negatively. Well, where was it from then?

"Dassu," he replied laconically, with a nasal slur.

"Which area of Dassu?" I inquired.

"Namlook." He explained that this was a mine above the north side of the village, on the towering cliffs that rose steeply above us. He added that it was an eight-and-a-half to nine-hour walk one way, even for the strong local people.

How fortuitous was this stop! Only one day before I had determined that the triplite could not have come from Alchuri, as everyone had believed. I had thought that it might take years to identify the correct locality, and I had stumbled upon the information in less than a day, with a miner knowing the exact location to boot!

I negotiated the price on the garnets and hydroxyl-herderites, as well as the triplite, which I was going to keep as a reference specimen (as it was too shattered to sell to a collector).

We emerged from the dark hovel, squinting in the high- altitude sunlight, just in time to hear another blast and see the subsequent large plume of dust that rose directly across the Braldu from the cliff on the opposite side. I photographed the plume, which was a great indication of the actual site, because the steep canyon walls often echoed the sound of a blast so much that it was sometimes hard to place the origin. The locals declared that the mine was considered to be located in Baha, even though it was much closer to Dassu; the fact that it's on the same side of the river as Baha was the determining factor.

I was incredibly elated as I climbed into the jeep. Another one of life's mysteries had been solved, with surprising ease and speed. We jeeped the short distance up the road to the Nyet turnoff, and the rebuilt engine of the jeep powered us up the very steep and dusty trail. We parked at the base of the village and climbed upwards, where we spent the next seven and a half hours going from house to house purchasing various mineral specimens, virtually all of which had been found in the Braldu Valley.

As the afternoon shadows lengthened an old friend from Nyet appeared at one of the houses, having just returned from Apaligun, gasping for breath after the steep climb. (He was an overweight smoker.) The mineral business has been kind to him in recent years, judging from his bountiful girth and his upgrade from a motor scooter to a jeep. I had spent so much time looking and negotiating in Nyet that I had virtually no time left to travel up to Apaligun. Since he had just returned from there, I inquired about the availability of minerals and his response was *kutch bhi Nai* ("some is not," meaning nothing available).

He started to negotiate with my friend on a lot of aquamarines on which I had made an offer, and I listened carefully, as I had heard enough Balti to pick up some of the numbers. I was surprised that his offer was virtually the same as mine and that the locals would often buy one lot and resell it in a day or two at only a 5 or 10% mark-up.

My friend was not able to reach an agreement with him for the aquamarine. The man then turned toward me and reached into an inner vest and pulled out two very small items wrapped in scraps of newspaper. He unwrapped them, rolled each into his extended palm and asked if I was interested.

V‰yrynenites! My excitement was tempered by the fact that they were not nearly the quality of the two that I had purchased two days earlier. One was covered with that pesky, hard-to-remove manganese oxide and the other looked good until closer inspection revealed it to be half of a cleaved crystal. The second one was gemmy enough to cut, which made it worth pursuing.

The owner knew that I had purchased two specimens of the same species a few days before—the sellers were there in the room with us. I was not sure if he had been the owner of the previous two pieces, the other men perhaps having sold them for him. I asked the price and it was unrealistically high. It was the exact price that I had paid for the two superior pieces. I tried my best and used every tactic that I knew to get him to budge on the price, but he refused. I finally gave up, as we both became very stubborn—I did not want to set a precedent at the source by paying an exorbitant price for mediocre examples of rarities.

I quizzed him relentlessly about the location for the v‰yrynenite, asking him repeatedly if they were from Alchuri, or various other locales, but he insisted that they had been found above the village where I now sat, Nyet. It could have been true, as the first two that

Figure 45. **Triplite crystal, 1 cm, purportedly from Alchuri but actually from the Namlook mine, Braldu River Valley. Rob Lavinsky specimen; Jeff Scovil photo.**

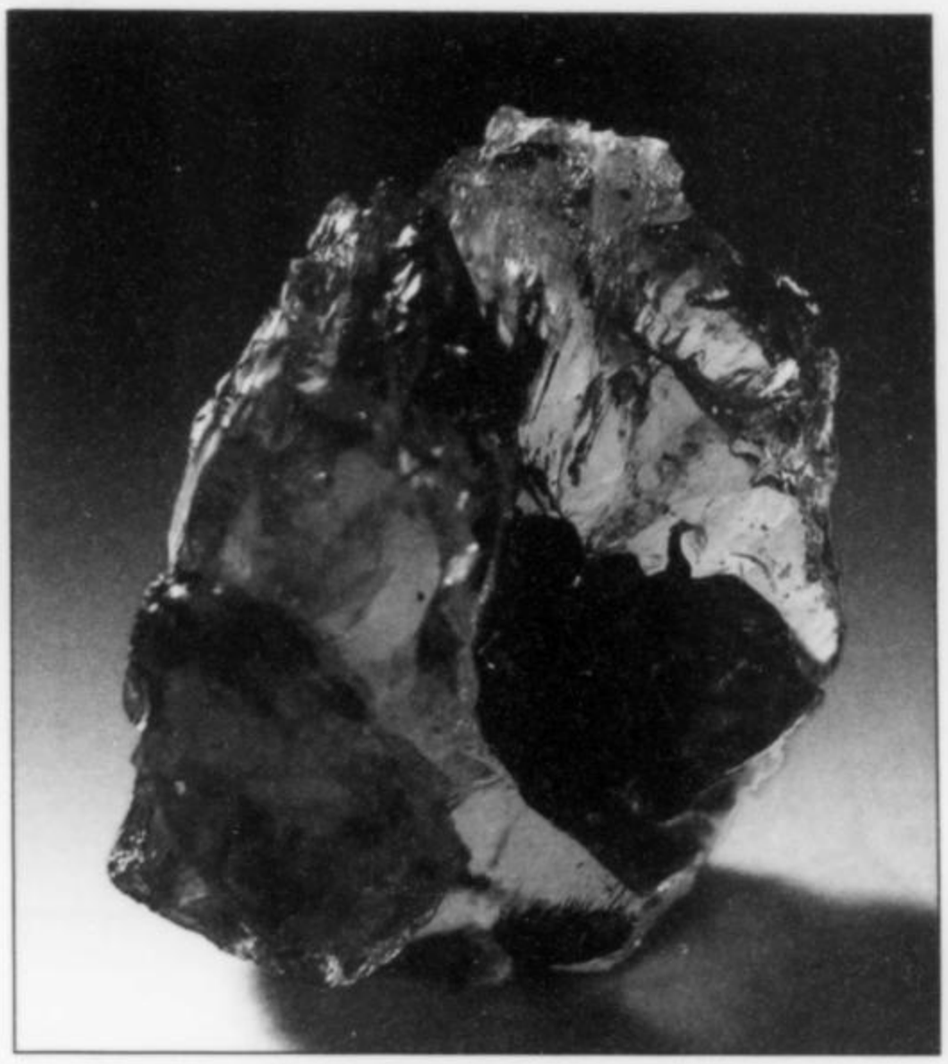

Figure 46. **Triplite crystal, 1 cm, purportedly from Alchuri but actually from the Namlook mine, Braldu River Valley. Rob Lavinsky specimen; Jeff Scovil photo.**

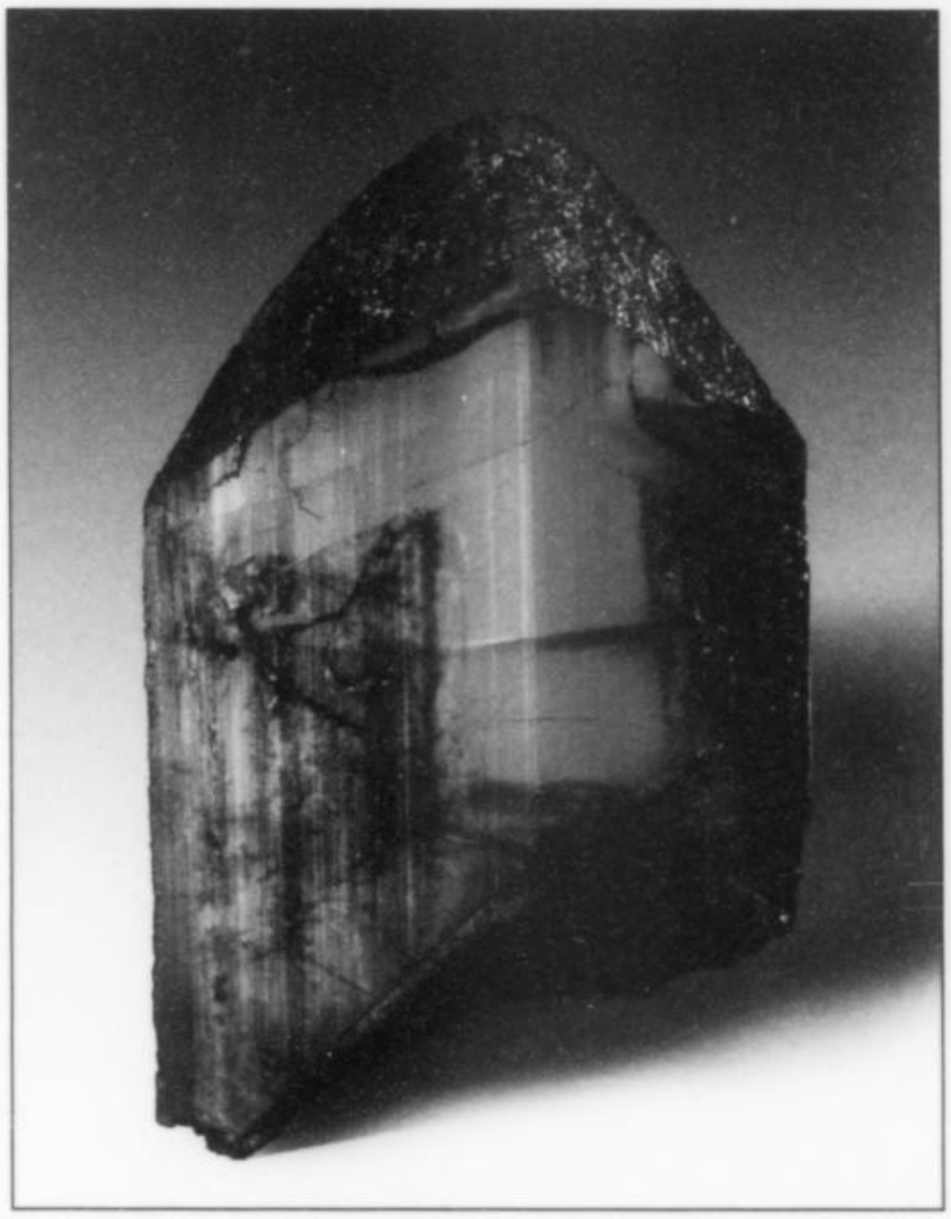

Figure 48. **Väyrynenite crystal, 3.1 cm, purportedly from Alchuri but probably from the Braldu River Valley. Rob Lavinsky specimen; Jeff Scovil photo.**

Figure 47. **Väyrynenite crystal, 1 cm, purportedly from Alchuri but probably from the Braldu River Valley. Dudley Blauwet specimen; Jeff Scovil photo.**

I had purchased also were said to have been from there. But I had sneaking suspicions that he was not being forthright, particularly since he had just returned from upriver at Apaligun; it seemed probable that he was hiding the source of something new and very valuable.

I left the house frustrated, but consoled myself that I had not damaged the local market. Nowadays, though, it seems that there are a number of Western (and even local) dealers who either do not care or actually encourage overpayment, under the assumption that if they pay top dollar, they will always get the best specimens. The usual result is that neither they nor anyone else can then pay the new, suddenly higher local price.

We left the village of Nyet, the sun drooping low toward the massive mountain range to the west. A quick stop in Dassu to purchase several more specimens delayed us more. I started to worry about how to deal with the officers at the checkpoint now that I was well over two hours late. We rolled up to the wooden pole barricade and I jumped out and walked quickly up to the office. The young sergeant who had initially given me permission to travel two days previously, but who had been absent in the morning, glared at me as I approached and said curtly, "You are very, very, very, very late," lecturing me like a teacher admonishing

a young schoolboy. I put on my best young school boy "aw shucks" face and replied, "I am very, very, very, very sorry." He continued to lecture as I continued to apologize until he finally returned my passport and told me that I was free to go. What else could he do?

One last stop in Baha and we finally headed home to Chutron, the coolness of the vast mountains flowing downward in the daily convection currents with the arrival of sunset. This moment also signaled the time for evening prayers, so Shaji stopped the jeep and provided me with a great photo opportunity to film a solitary man at prayer on his knees on the vast broad sandy expanse of the Basha basin with towering mountains aglow in the background.

The following day I made a trip up the Basha and completed another very dangerous exploration, this time to the Doko emerald mine, where abject fear left me literally shaking from the adrenalin surge (but that story must be saved for a future article).

On Saturday, June 18th, we packed the jeep for our return to Skardu. I was wholly satisfied with my mineral purchases, thrilled to have visited and photographed two different mining sites, and ecstatic over finding the source of the triplite and at least narrowing down the sources of the v‰yrynenite. Little had I known that a lucky encounter in Skardu, of all places, would add another piece to the v‰yrynenite puzzle.

We drove the 45 minutes back to Haiderabad on a cloudy, calm morning, where we purchased some nice "bic pen" terminated aquamarines mined at Yuno, along with the best aquamarine specimen of the trip: a fine-colored, thumb-thick, 8-cm prism with a second crystal near the base, all on a small piece of very white feldspar. The negotiations were so difficult that we actually drove away without the piece three times. But I was reluctant to leave it, and the owner wanted a sale, and this cat-and-mouse psychological game continued until an agreement was reached.

We bounced back to Skardu with the heat increasing as the clouds parted and the elevation decreased. Upon arrival I was swamped by local dealers, all wanting to show me their goods, knowing that I was leaving the following morning. By 10 p.m. I was exhausted after a 17-hour day, and frustrated at having been offered mediocre minerals at absurd prices.

An old friend had been patiently waiting for hours, and I finally turned to him and tried to be cordial. He reached into his vest pocket and pulled out two very small paper-wrapped objects and opened them carefully. My fatigue vanished: the pieces were the same two v‰yrynenites which I had seen in Nyet several days before!

I immediately explained that I had seen the pieces and had made an offer. I asked the price and it was 30% higher than my last offer. I told him what my price had been and he acknowledged that he had purchased the specimens for exactly that amount. The original owner had finally decided to sell to him at the exact price that I had offered. The new owner then agreed to allow me to purchase the pieces at the price the original owner had said was his very last price. This allowed my Skardu friend to make a 20 % profit, established a price appropriate for a dealer in Skardu, and left the pieces in my hand—the best of all worlds.

I immediately quizzed him about the locality. I told him that everyone had spoken of Nyet as the source, but he disagreed. Even though he did not know the name of the mineral, he stated that he had purchased several similar items during the past year from a relative who was a miner, and that man had claimed that he had found them a few kilometers up the road from Apaligun in the upper Braldu Valley. My earlier suspicions that the original owner may have purchased them in Apaligun now seemed plausible.

He then conceded that it was possible that there could be *two* locations producing similar specimens, and the Namlook triplite locality might be a third. So the location search has narrowed to several possibilities, all of them in the Braldu Valley.

It should be noted, however, that about a decade ago some v‰yryenites were found at an entirely different location: a mine above Sassi, on the Gilgit-Skardu Road, probably near the Ishkapul Glacier. This site is a good ten-hour jeep ride from the Braldu locations. Interestingly, around that same time, Kevin Ringer acquired and had faceted a 2-carat orange-pink gemstone from the Sassi locality. An analysis by Carl Francis at Harvard showed it to be zwieselite, $(Fe^{2+}, Mn^{2+})_2 (PO_4)F$, the very rare iron end-member of a series with triplite.

We were scheduled to fly out the following morning, but the weather was not cooperating; lofty cumulus clouds were building as we headed toward the airport. Shortly after our arrival there, the flight was canceled, so we dejectedly returned to the hotel to wait another day, not wanting to chance our luck on the dangerous road through Chilas. The delay proved to be a blessing in disguise, as Master Najaf from Alchuri arrived later that morning with fresh material found very close to where I had climbed for the photographs. This consisted of one lot of dark greenish brown epidote crystals on a very fragile matrix of string-like crystals of calcite (or perhaps some other carbonate) that appeared to have formed after or around byssolite needles, resembling a mound of thin spaghetti. I liked their appearance, but was afraid of their fragility. I purchased the lot anyway, mostly because Master Najaf had risked his life to take me to the Alchuri mines and I owed him a favor. Sure enough, three or four of the pieces disintegrated during shipping, but one very nice specimen survived intact to be added to Bill and Carol Smith's collection.

The following morning dawned similar to the previous day, with uncertain weather. Our friends trickled into the hotel room to give their assurances that the flight would arrive and depart, and then we said our goodbyes and left for the airport, necks craning to look out of the windows of the jeep, surveying the clouds to the northwest. The plane did arrive and we boarded with a sense of relief, knowing that a 45-minute flight was far preferable to a dangerous 20-hour drive .

Again another successful and rewarding trip to the Karakorams had been completed. Many people in Peshawar had warned me not to go, or had insisted that making the trip was impossible, or would not prove worthwhile. Yet I traveled without problems, purchased a fine assortment of minerals, photographed two mines that had never been visited by foreigners before, discovered the exact location for the triplites, and determined that the v‰yrynenites were definitely not from Alchuri, but from several possible sites in the Braldu Valley. I was blessed with good luck and good weather. The road goes on forever, and if one continuously travels along it, sometimes everything clicks!

ACKNOWLEDGMENTS

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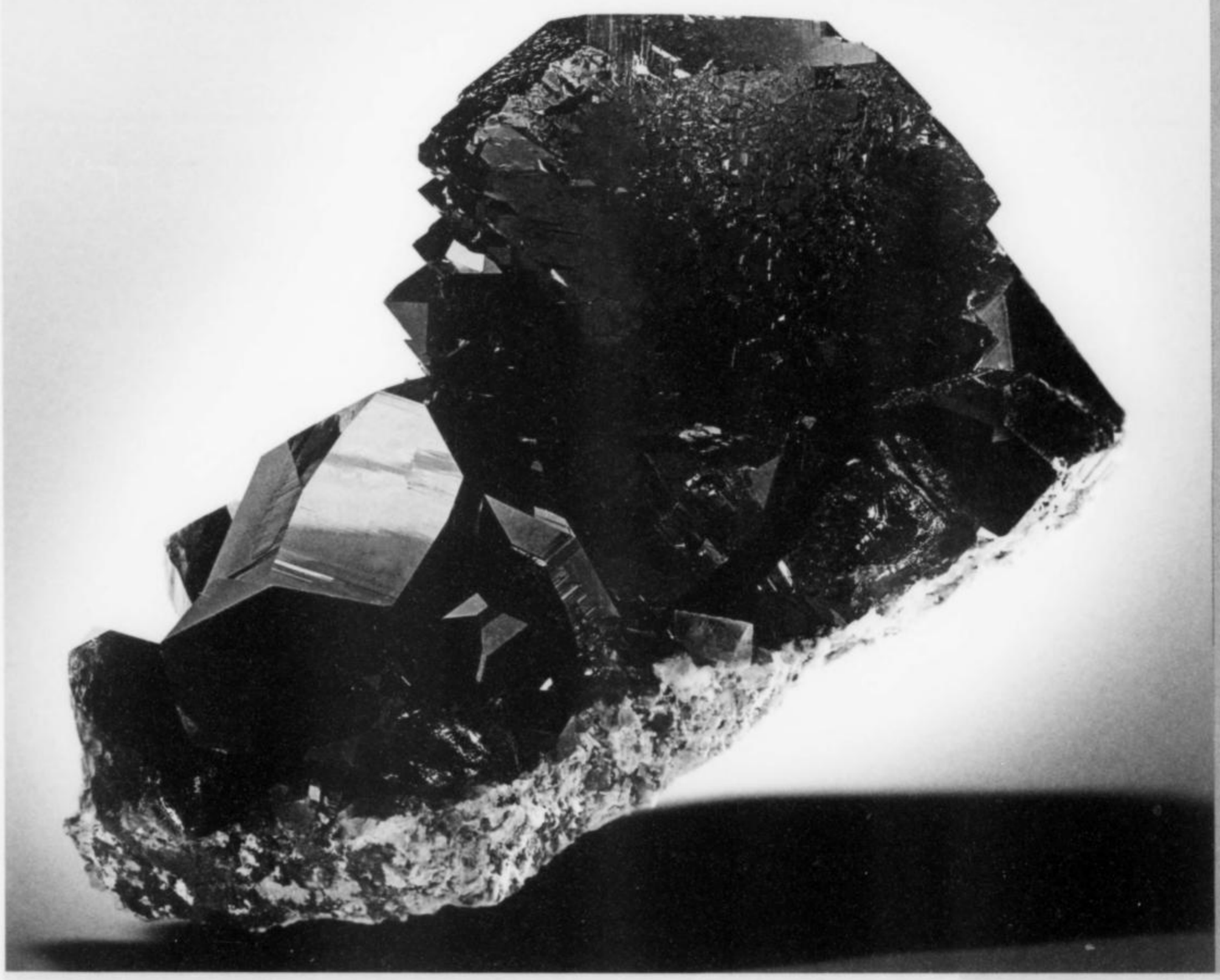

Smoky Quartz Gwindel, Cavradi Gorge,
St. Gotthard, Switzerland; 6 inches wide.

Stuart Wilensky photo.

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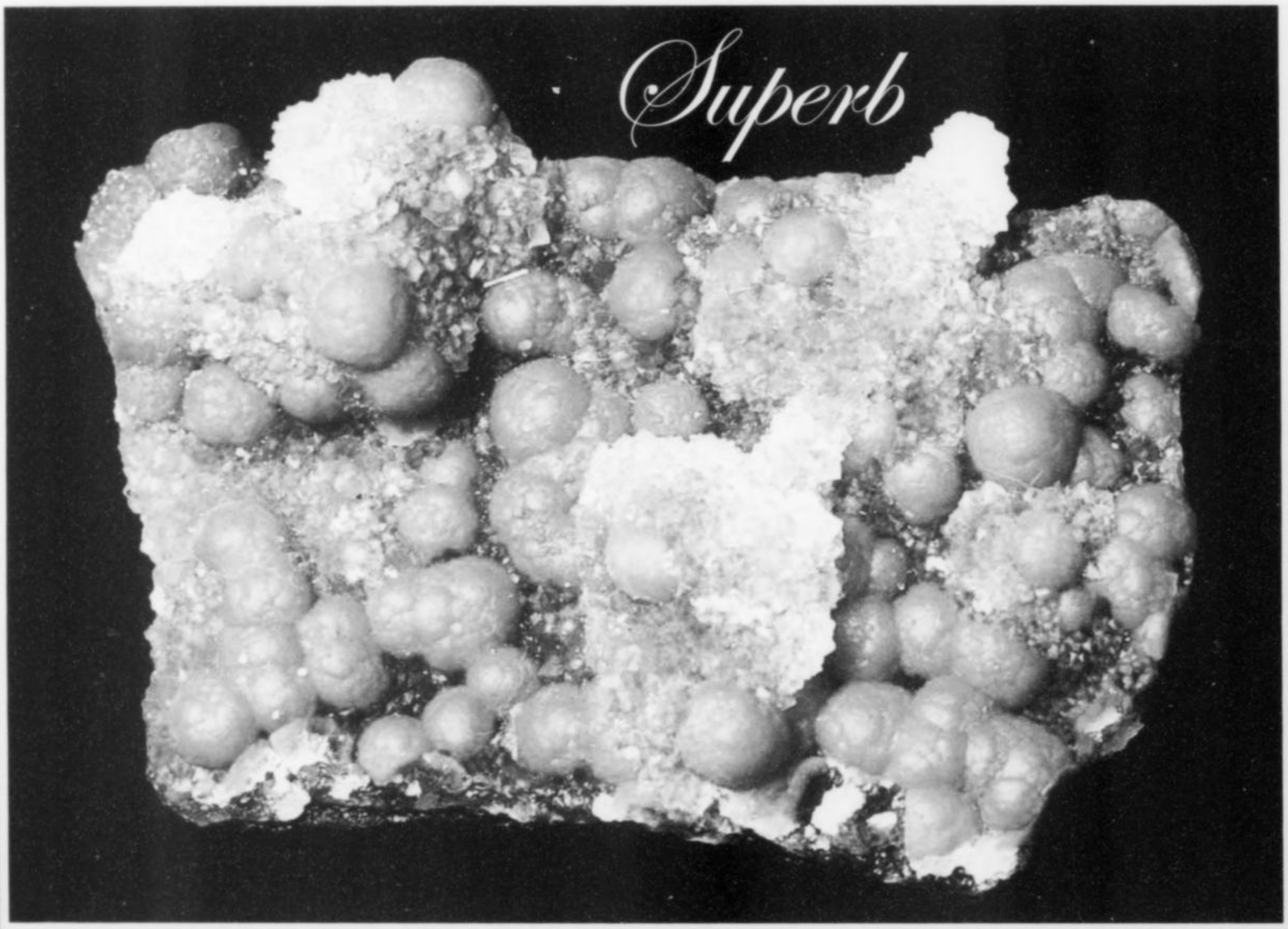

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The Honorable

GEORGE KNOX

(1765–1827)

Parliamentarian and Mineral Collector: His Collections in Trinity College, Dublin, Ireland

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The mineralogical collections of Trinity College, Dublin, Ireland date from the late 1700's. One important collection, acquired in 1827, is that assembled by the Honorable George Knox (1765–1827), one-time Member of Parliament in Dublin and London. His collection contains Irish, European and American specimens. Knox's catalogs contain precise descriptions of specimens and of the physical properties of mineral groups. The catalogs are important, as they outline Knox's own arrangement of the collection, which is similar to that of Werner.

INTRODUCTION

The University of Dublin was founded in 1592 with one constituent college: Trinity College. The Dublin University Museum was founded in 1777 to house Polynesian artifacts collected during the voyages of Captain James Cook (Ball, 1853; McDowell and Webb, 1982). The driving force behind its establishment is thought to have been Rev. William Hamilton (1755–1797), one-time Fellow of the University, who is perhaps better known for his geological observations of the Giant's Causeway, and his arguments that these basalts are of igneous origin (Hamilton, 1786).

The Geological Museum in its present form dates from 1857, when the Dublin University Museum was subdivided into a number of smaller units. For nearly a century the Geological Museum occupied a large room in the building constructed for the University Museum at Trinity College. In 1953 this large room was subdivided and converted into geological laboratories, and the collections were moved to a smaller room nearby, where the Geological Museum is presently situated (Gill, 1956).

The Geological Museum is best regarded as a research and teaching museum, and its collections are displayed for the benefit of university students, schoolchildren and the general public. Material from the Museum is utilized in undergraduate teaching programs and is frequently borrowed for academic research. A comprehensive account of the history of the Geological Museum and its holdings is given in Wyse Jackson (1992).

This article briefly outlines the historical development of the Geological Museum and the origins, scope and extent of its collections, and focuses on the 18th-century mineralogical collection of the Honorable George Knox.

ACQUISITION OF THE TRINITY COLLEGE COLLECTIONS

Within a decade of its founding the Museum had acquired some geological material, notably fish fossils from Monte Bolca, Italy, collected by a Dublin cleric, George Graydon (1753–1803) in 1794 (Graydon, 1794; Vaccari and Wyse Jackson, 1995). By 1807 the Museum housed a collection of 1089 minerals, some petrological

Figure 1. **Dublin University Museum in 1819 (from Taylor, 1819).**

specimens, including rocks from Vesuvius also gathered by Graydon, and some fossils (Stokes, 1807).

For nearly 70 years following 1780 the Museum had no permanent curator, although Whitley Stokes, a lecturer in natural history whose political activity brought him into conflict with the University authorities, was responsible for the collections from 1816 until 1844. Few important collections were added to the Museum during this period, with the exception of the large Knox mineral collection, and some Silurian and Jurassic fossils presented by John Phillips (1800–1874), who served in 1844–1845 as the first Professor of Geology at the University.

The welfare of the Museum improved through the efforts of Robert Ball (1802–1857), a noted naturalist who in April 1844 was appointed the Museum's first full-time director; at the same time, responsibility for the geological and mineralogical collections was entrusted to the incumbent professors of Geology and Mineralogy respectively.

Ball encouraged many geologists and naturalists (including the Earl of Enniskillen, Thomas Oldham, Sir Richard Griffith, Joseph Bette Jukes, Baron Cuvier, and J. D. Hooker) to donate geological material (Ball, 1846, 1847, 1848, 1853). He also arranged for the entire museum of the peripatetic Geological Society of Dublin (later the Royal Geological Society of Ireland) to be housed at Trinity College (Herries Davies, 1965). This collection was composed of Irish Carboniferous invertebrates, Jurassic ichthyosaurs, gastropods from the Pleistocene of Italy, a collection of volcanic and other rocks from continental Europe, zeolite minerals from the basalt of County Antrim, and some Irish rocks (M'Coy, 1841; Ball, 1848).

In 1857 the Museum collections were dispersed throughout the College campus: most of them, including the geological collections, were housed in a new Museum building erected for the purpose between 1854 and 1857 at a cost of 24,000 guineas. The hallway of this building contains columns and balustrades of nearly a dozen Irish marbles and elaborate floral and faunal decorative carvings.

Responsibility for the new Museum fell to James Apjohn (1796–1886), who held two chairs in Chemistry at the University and was Professor of Mineralogy from 1845 to 1881, and to Samuel Haughton (1821–1897), Professor of Geology from 1851 to 1881. It was a period of sparse acquisition by the Museum: specimens of particular interest include a collection of rocks from Napoleon's island prison of St. Helena; a collection of lavas from various eruptions of Vesuvius; and the main mass of the Dundrum meteorite, which fell in central Ireland in 1865.

In the 1950's the Museum and its holdings were radically affected by a rationalization program. Space for teaching was required, and the Museum was removed to a room one-third of its former size. In addition, a number (probably considerable) of specimens were discarded; it is evident that these unfortunately included many specimens of immense historical interest.

Many specimens were incorporated into teaching collections, and labels were removed, making it difficult to work out the specimens' provenance and history. It was fortunate that the old handwritten catalogs were not also discarded.

The postgraduate research program initiated in the 1960's has led to a rapid increase in the holdings of the Geological Museum. Most recent accessions are micropaleontological, but some macropaleontological, petrological and occasional mineralogical material continues to find its way into the Museum collections. Occasionally specimens are purchased from mineral dealers: a number of meteorites were acquired in this way in 1990 and 1991.

At present the Geological Museum contains approximately 72,000 specimens. These holdings include 7,000 mineralogical specimens, 15,000 petrological specimens, and about 50,000 paleontological specimens. Approximately 60% of the specimens are adequately curated. Systematic cataloging of the collections only began in the early 1960's. The Museum archives contain a number of early 19th-century handwritten catalogs of certain named collections: those of George Knox, Rev. George Graydon, and Robert Mallet (1810–1881)—the seismologist whose collection of Italian volcanic material is largely lost (Wyse Jackson, 1998). Unfortunately, it is now very difficult to correlate entries in these catalogs with extant specimens. In the near future the storage of the geological collections will be reorganized into a more systematic scheme than that previously employed; archival catalogs will be checked and specimens correlated with them.

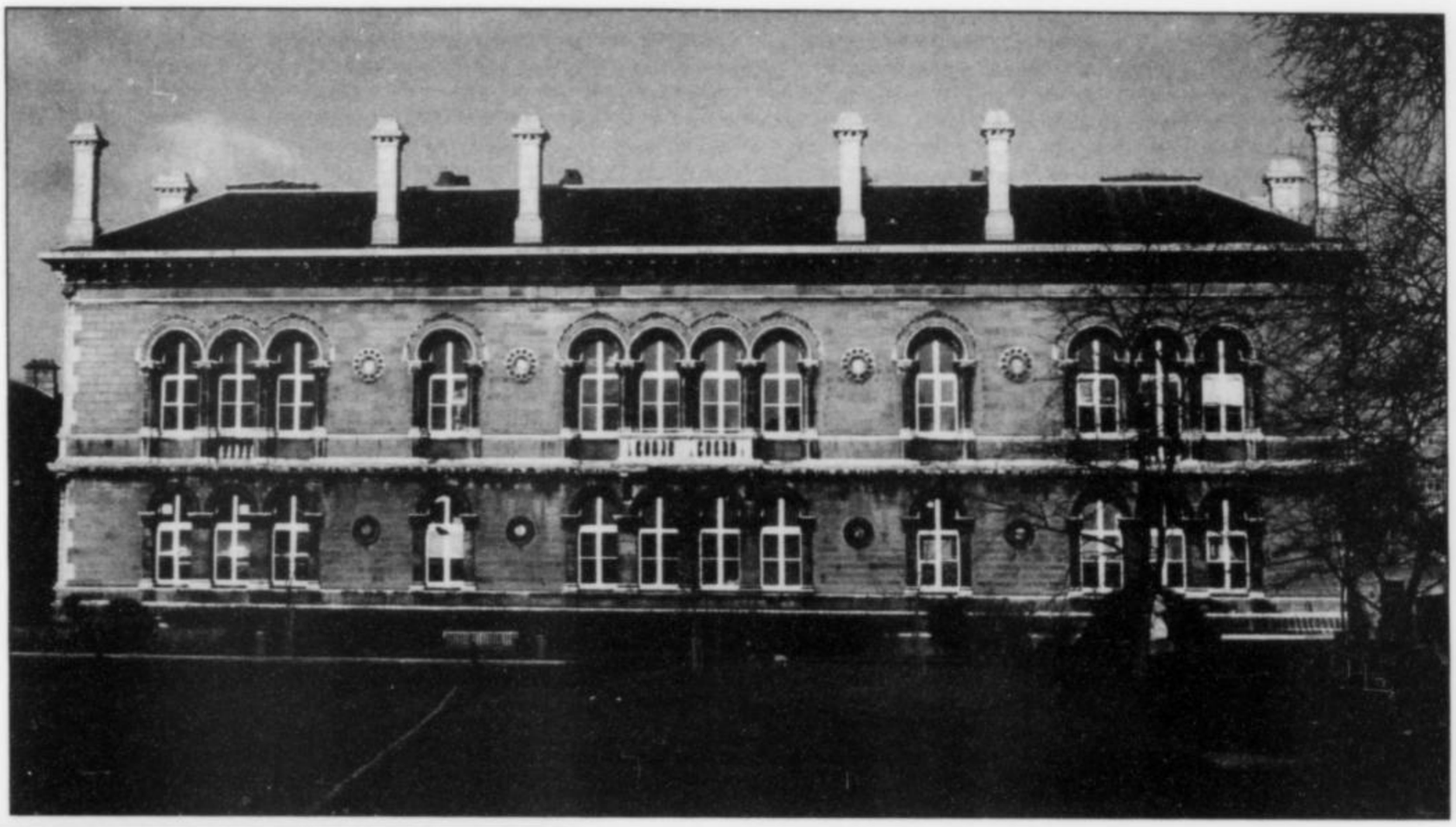


Figure 2. **Museum Building, Trinity College, Dublin. The present Geological Museum is situated on the upper floor on the right-hand side of the building. Declan Burke photograph.**

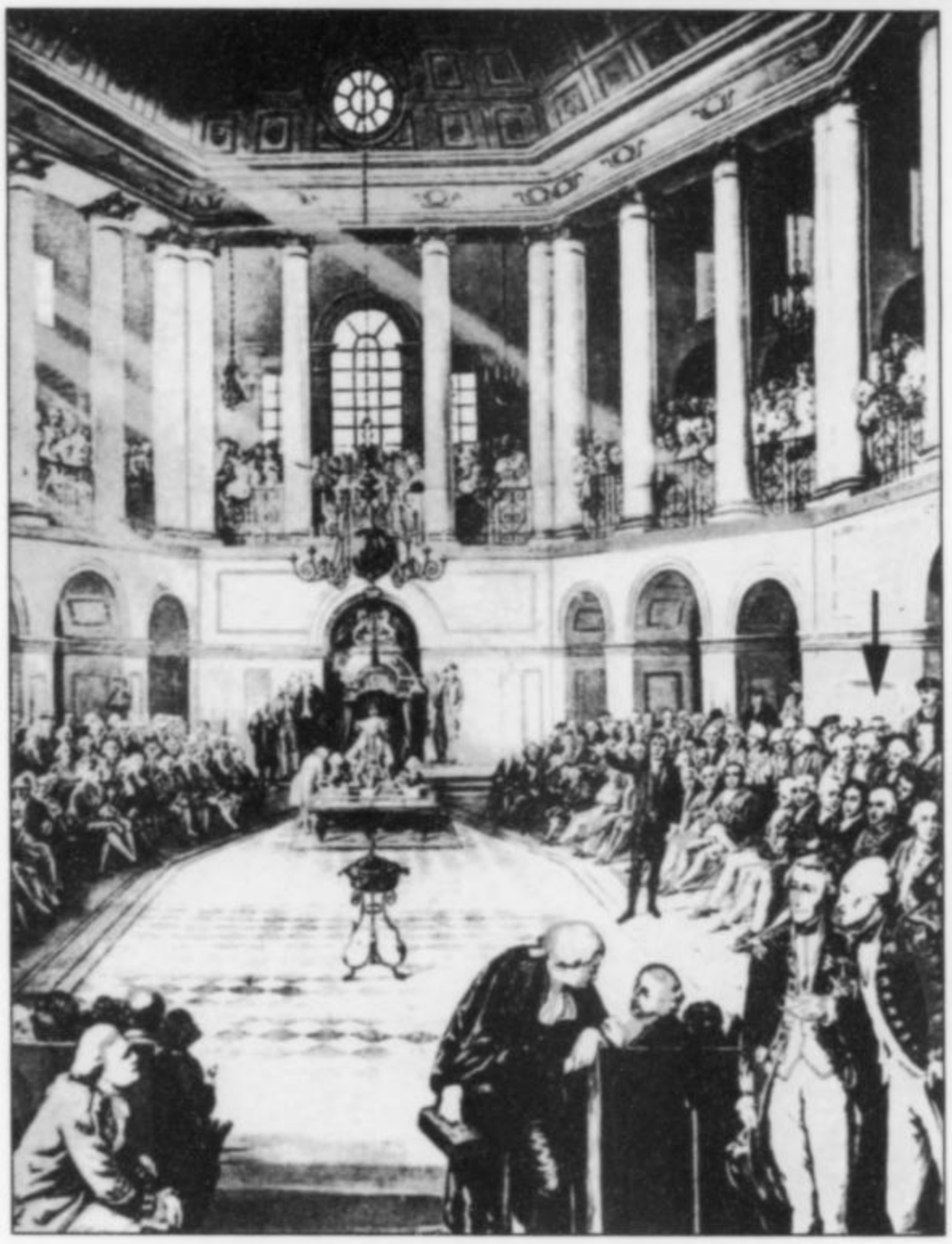


Figure 3. **View of the Irish House of Commons in 1790 (reproduced from Maxwell, 1956). George Knox (arrow) is seated first on the right in the back row.**

GEORGE KNOX: PARLIAMENTARIAN AND MINERAL COLLECTOR

The Honorable George Knox (1765–1827), one-time Member of Parliament for Dublin University, was a member of a wealthy family which held considerable estates in Dungannon, County Tyrone. He was the fifth son of Thomas Knox, a Member of the Irish Parliament for Dungannon, who was later Baron Wells and then Viscount Northland. Thomas' sons gained high offices: Major-General John Knox (1758–1800) was also Member of Parliament for Dungannon and later became Governor of Jamaica; two other sons, William Knox (1762–1831) and Edmund Knox (1773–1849), became bishops of Derry and Limerick respectively (Burke, 1849), William succeeding Frederick Hervey, Earl of Bristol (1730–1803), the noted amateur vulcanologist and builder of large houses.

Knox trained as a barrister at Lincoln's Inn, London, and was later called to the Irish Bar (Keane *et al.*, 1982). He received two honorary degrees in law, D.C.L. from Oxford (Foster, 1888) and LL. D. from Dublin (Todd, 1869). While in London he became a close friend of Theobald Wolfe Tone, and was a godfather to his son. Tone later organized an insurrection, with French aid, against the British authorities in 1798, and committed suicide after its failure. Prior to 1798 Knox had encouraged Tone to leave Ireland with his family, as his political activities were considered dangerous (Elliott, 1989).

Knox married twice and outlived both of his wives. He had five sons and one daughter (Burke, 1849). He lived at 8 Merrion Square East, a fashionable part of Dublin—probably, like many parliamentarians, he was well off. He served in the Irish Parliament as Member for the Borough of Dungannon from 1790 to 1797, and as Member for Dublin University from 1797 until the Act of Union of 1800 (Foster, 1888). He is noteworthy as an early campaigner for Catholic emancipation, which would have enfranchised the (Roman Catholic) majority of Ireland's population. Limited measures were passed in 1793 (Johnston, 1957), but Knox's motion that Roman Catholics should be eligible to sit in Parliament was thrown out (Elliott, 1989). Full emancipation came in 1829.

In the late 1790's the Irish Parliament was thrown into controversy over the attempts to disband it and create a union of the Dublin and London parliaments. Knox was opposed to the measure and resigned a government position in 1799 on account of it (Ingram, 1887; Malcolmson, 1978). The Act of Union was passed in 1800 and the Dublin Parliament was abolished; nevertheless Knox continued to serve as University Member to the Westminster Parliament in London until 1807, when he lost his seat in the general election of that year. Knox was also returned as Member for Dungannon in 1801

and 1805 by his father, in case he failed to be elected by the University. During his period in London he was restored to favor and was appointed a Lord of the Treasury and a Privy Councillor (Ingram, 1887). Knox retired from Parliament in 1807, after which he served for two years as a Commissioner of Customs, receiving an annual pension of £400. In 1809 he was granted a pension of £800 per annum for life (Aspinall, 1986), and died at Velletri in Italy on June 13, 1827, after an accident involving a carriage.

Why Knox served the University of Dublin in Parliament is something of a mystery, as prior to 1797 his only connections with the College were that he was suggested as a possible Provost (Head of the College) in 1792 (Aspinall, 1986), and that he was conferred with an honorary degree of Doctorate of Law in 1795. Perhaps it was because of his service in Parliament that his mineral collection found its way into the College Museum.

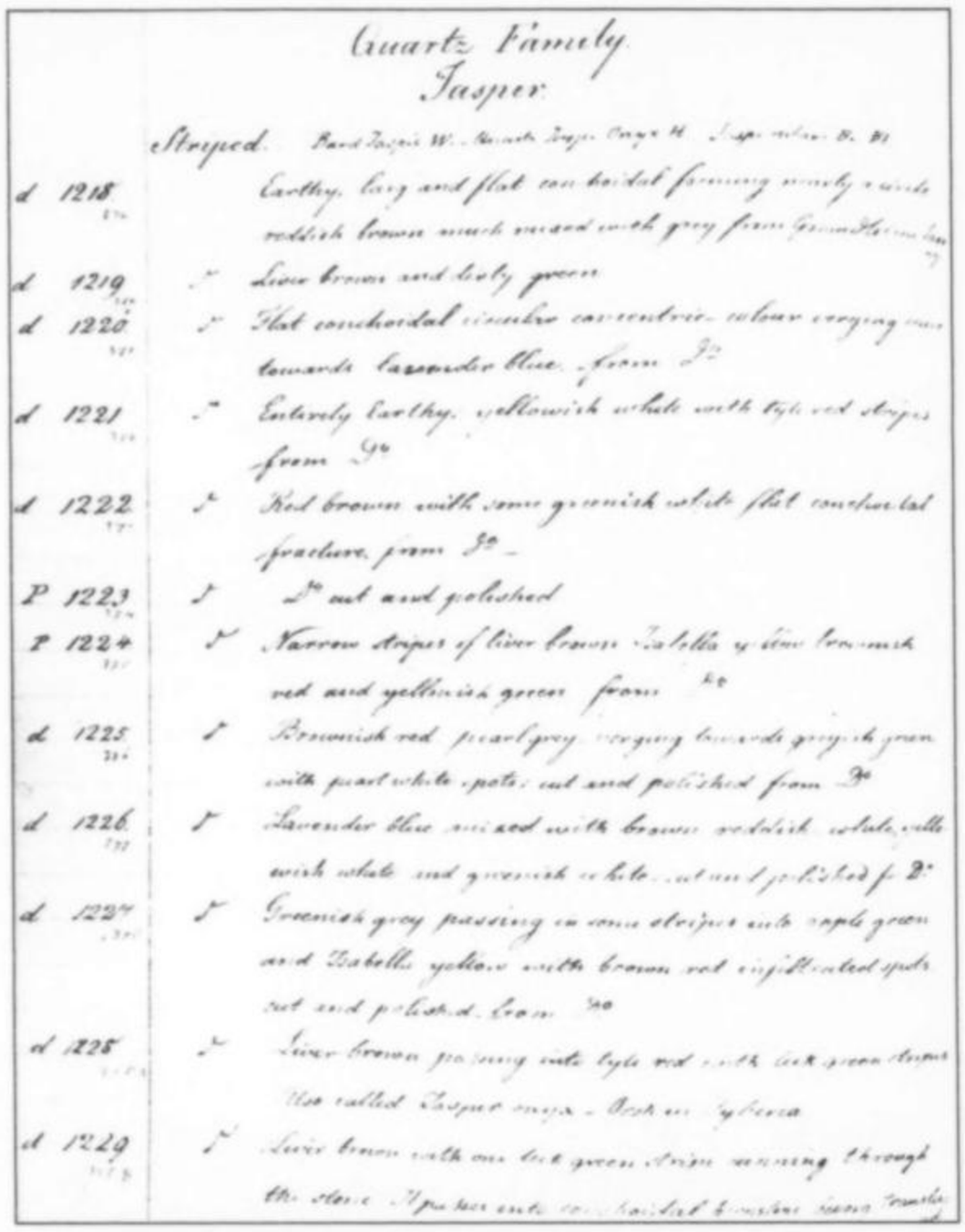
Toward the end of the 1700's Knox became active in scientific circles in Dublin and London and was a close friend of the mineralogist Sir Charles Lewis Giesecke (1761–1833) (Wyse Jackson, 1996). Knox was elected a member of the Royal Society of London in 1802, and was a member of the Royal Irish Academy, the Dublin Society (Vice-President from 1820 to 1827), and the Kirwanian Society (President). The Kirwanian Society was established in 1812 to further the ideas of Richard Kirwan and to carry out mineralogical studies (McLaughlin, 1954). However, membership never rose above 77 and the Society disappeared after 1818. Knox contributed two papers to the Society: the first, on fiorin grass (a variety of *Agrostis stolonifera*—creeping bent-grass), was read on March 21, 1813, but was never published, while the second, which outlined the mineralogy of County Dublin for "scientific travelers," appeared long after the Society's demise (Knox, 1826). In it Knox listed 43 mineral species and gave reasonably precise locality details for prospective collectors.

Knox was interested in analytical methods in mineralogy and carried out many experiments in the laboratories of the Royal Dublin Society. His results appeared in three papers: on the Calp Limestone of the Dublin region (Knox, 1802); on "pitchstone" from Newry, County Down (Knox, 1822); and on bitumen in rocks (Knox, 1823). In the first paper, published by the Royal Irish Academy, Knox described the distribution of the Lower Carboniferous argillaceous Calp Limstone, and gave an analysis of it. Calp limestone was widely used as a building stone in Dublin until the late 18th century. The meaning of the word "calp," first formally used by Kirwan (1794), is unknown; it may have been used earlier as a quarrying term (Marchant and Sevastopulo, 1980).

In the second paper (1822), Knox outlined to the Royal Society of London his experimental methods in deriving bitumen from three different pitchstones. He distilled crushed stone to derive bitumen or bitumenous water, and an artificial pumice. He expanded this research by analyzing 28 rocks and minerals for bitumen (Knox, 1823), and found that iron-bearing clays contained up to 18% bitumenous water, while obsidian, tourmaline, augite and hornblende were nearly devoid of bitumen. Concluding this work, Knox argued that previous mineral analyses were unreliable unless the rock or mineral had been distilled and the distillate analyzed. And he postulated that the so-called "Floetz" rocks (flat, stratified, fossiliferous rocks and associated basalts) of Werner were the chief source of the ejected volcanic rocks.

THE KNOX MINERAL COLLECTION

The Knox mineral collection was purchased by the University of Dublin for £500, a considerable sum at the time (Apjohn, 1850). The date of the purchase is unclear: Apjohn (1850) gives 1823, while Giesecke (1832) states that the collection was purchased for the Museum "after his [Knox's] lamented death"—Knox died in



Quartz Family
Jasper

Striped. Red Jasper W. Riband Jasper Orng H Jasper white B. Pl

d 1218 Earthy, lazy and flat conchoidal forming nearly a wide reddish brown much mixed with grey from Germ[an]stone [illegible]

d 1219 " Liver brown and dirty green

d 1220 " Flat conchoidal fracture colour verging towards lavender blue from Jo

d 1221 " Entirely Earthy, yellowish white with dyke red stripes from Jo

d 1222 " Red brown with some greenish white flat conchoidal fracture from Jo

P 1223 " Do cut and polished

P 1224 " Narrow stripes of liver brown Isabella & dirty brownish red and yellowish green from Do

d 1225 " Brownish red pearl grey verging towards greyish green with pearl white spots cut and polished from Do

d 1226 " Lavender blue mixed with brown reddish white veins with white and greenish white cut and polished fr Do

d 1227 " Greenish grey passing in some stripes into apple green and Isabella yellow with brown red crystallized spots cut and polished from Do

d 1228 " Liver brown passing into dyke red with dark green stripes Also called Jasper onyx - Both on Sybrook

d 1229 " Liver brown with one dark green stripe running through the stone Specimens cut and polished & mostly [illegible]

Figure 4. **Page of Knox Catalog Number 3 with entry for "Riband Jasper," number P1224 [TC.M2906].**

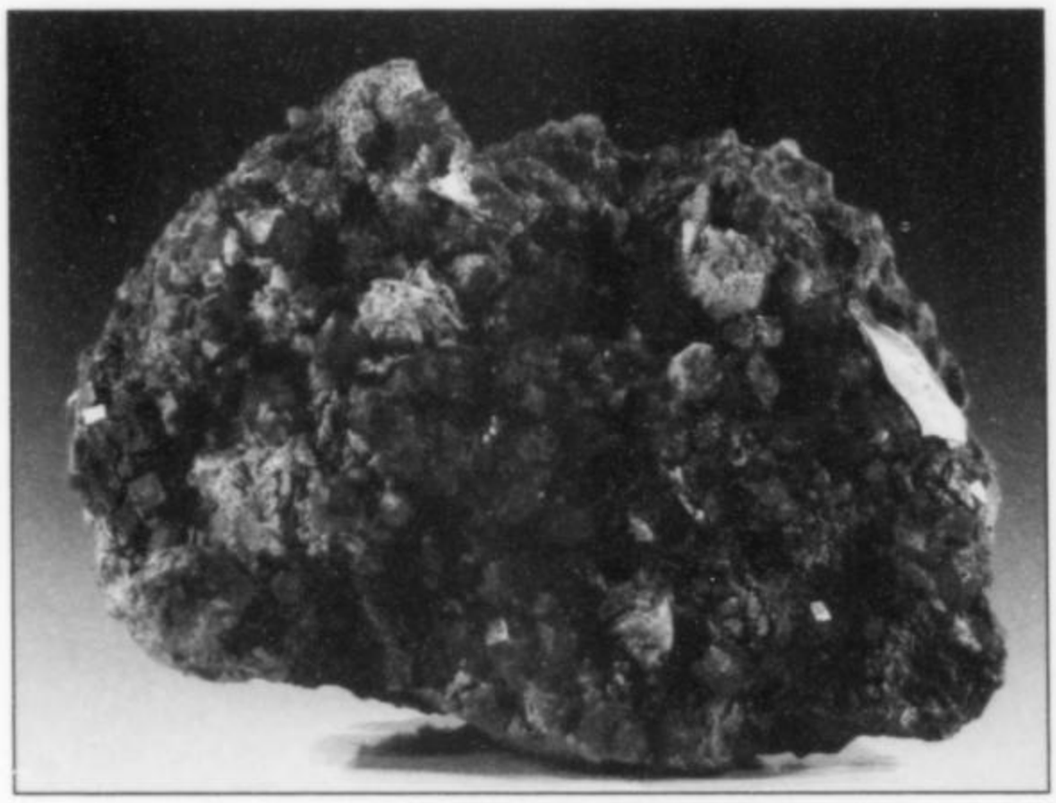


Figure 5. **"Aplome" variety of andradite crystal group, 8 cm, from Breitenbrünn, Saxony, Germany. G. Knox collection, TCD.M3706; Declan Burke photo.**

1827. Unfortunately the minutes of the College Board for the years 1823–1830 do not clear this matter up, as they contain no mention of the collection. However, contained in the present holdings of the Museum are beryl specimens collected in the Mourne Mountains of County Down, probably in 1824 or 1825 (Giesecke, 1825b). It seems probable that the Knox collection was acquired after George Knox's death. Indeed, one would wonder why a zealous collector would sell his collection except for the money, and Knox was a man of some means who probably had no need of additional funds.

It is unclear how many specimens were purchased by the College. A list at the beginning of the first catalog states that the Knox

***Table 1.* Arrangement of the Knox Mineralogical Collection.**

Class 1. Earthy Substances [1498 specimens], containing eight genera:

i. Diamond Genus
ii. Zircon Genus
iii. Silica Genus
iv. Clay Genus
v. Talc Genus
vi. Lime Genus
vii. Yttria Genus
viii Hallite Genus

Class 2. Salts [26 specimens], containing five genera:

i. Carbonatic Genus
ii. Boratic Genus
iii. Nitric Genus
iv. Muniatic Genus
v. Sulphuric Genus

Class 3. Inflammables [63 specimens]

These are not listed in the catalogs.

Class 4. Metallic Substances [687 specimens], containing 28 genera:

i. Platina
ii. Iridium
iii. Osmium
iv. Rhodium
v. Palladium
vi. Gold
vii. Mercury
viii. Silver
ix. Copper
x. Iron
xi. Lead
xii. Tin
xiii. Bismuth
xiv. Zinc
xv. Cadmium
xvi. Antimony
xvii. Tellurium
xviii. Selenium
xix. Manganese
xx. Nickel
xxi. Cobalt
xxii. Arsenic
xxiii. Molybdena
xxiv. Uranium
xxv. Scheelium
xxvi. Titanium
xxvii. Cromium
xxviii. Cerium

Class 5. Colors [124 specimens]

These are not listed in the catalogs.

***Figure 6.* Beryl crystals in quartz, 7.5 cm, from Ravenstein, Siberia, Russia. G. Knox collection, TCD.M3586; Declan Burke photo.**

collection numbered 2,398 specimens. However, considering that a catalog of the Museum's minerals produced by Stokes (1818) five years prior to the Knox collection purchase lists 1,204 specimens, and the museum catalog produced by Apjohn in 1850 lists only 1,991 specimens, the number of mineral specimens purchased from the Knox collection may not have been greater than 600. In addition, Giesecke and Sir Richard Griffith donated minerals to the Museum in the years between the publication of the two catalogs.

Accompanying the Knox collection were three large catalogs in Knox's handwriting containing precise descriptions of specimens, locality details, and information about the physical properties of the mineral groups in general. The catalogs were compiled at various times; the first was made after 1814, the second (watermarked 1820) is a copy of the first; and the third (watermarked 1823) contains most of the information in the earlier two.

Examination of Knox's catalogs reveals that many specimens were collected in the Americas (particularly the British colonies of

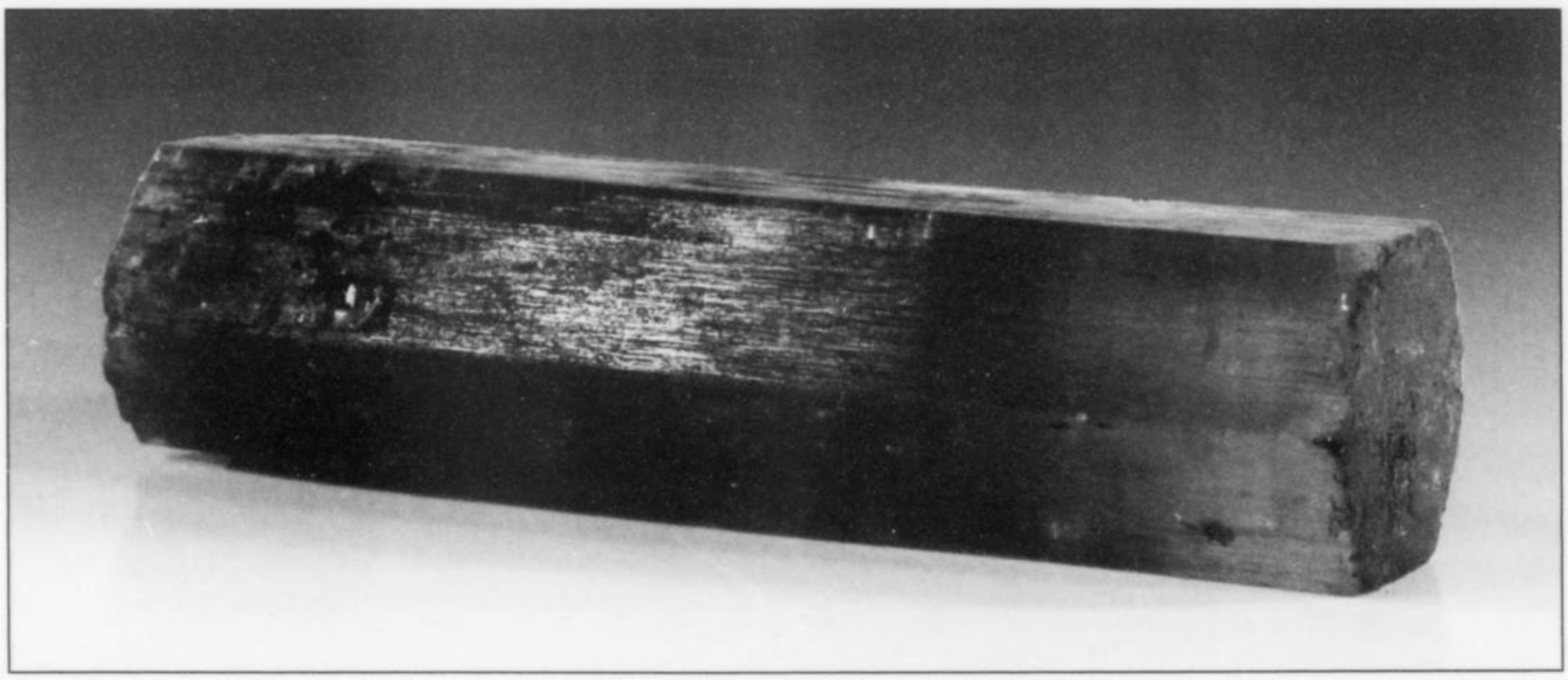


***Figure 7.* Aquamarine beryl crystal, 5.1 cm, locality unknown. G. Knox collection, TCD.M5555; Declan Burke photo.**

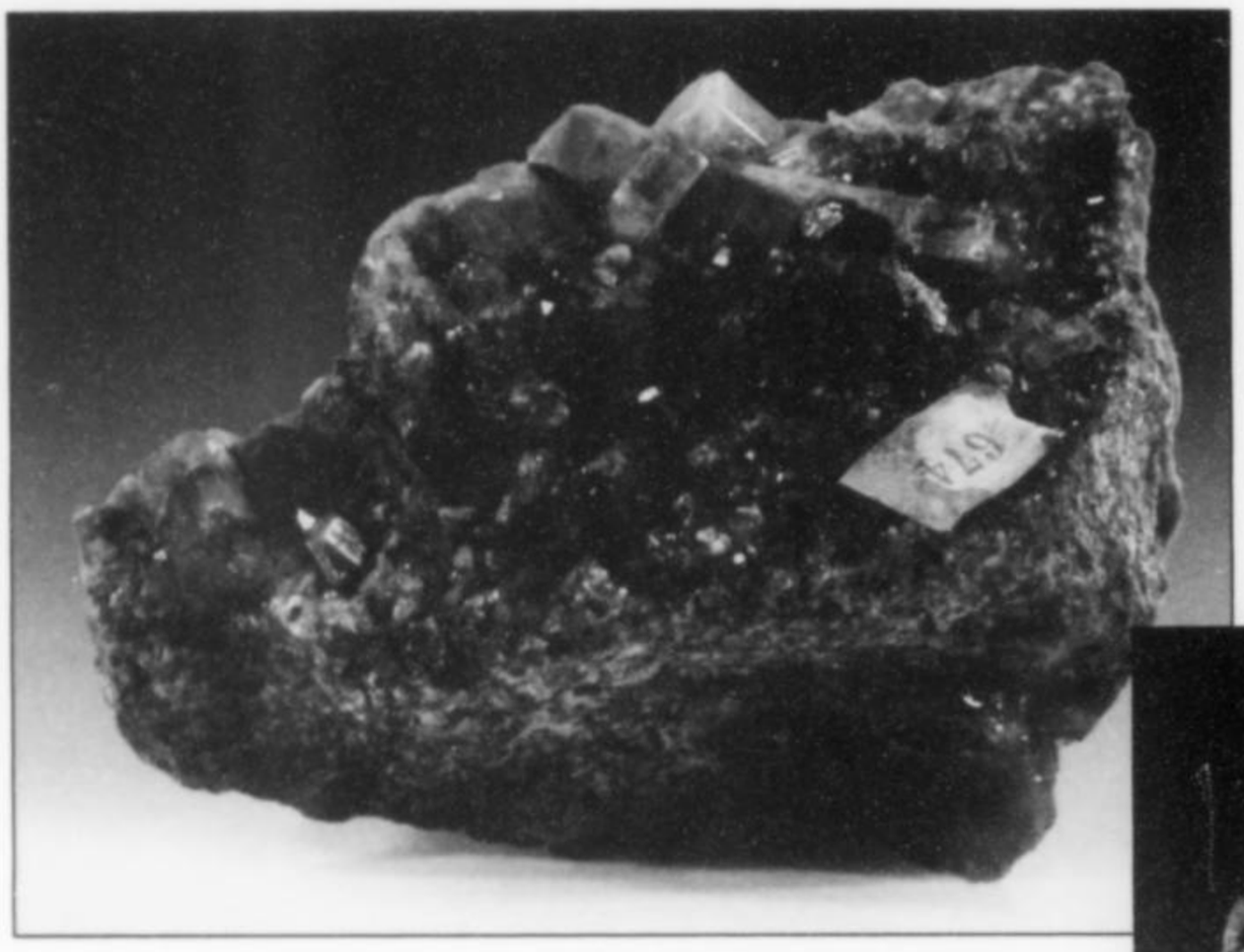
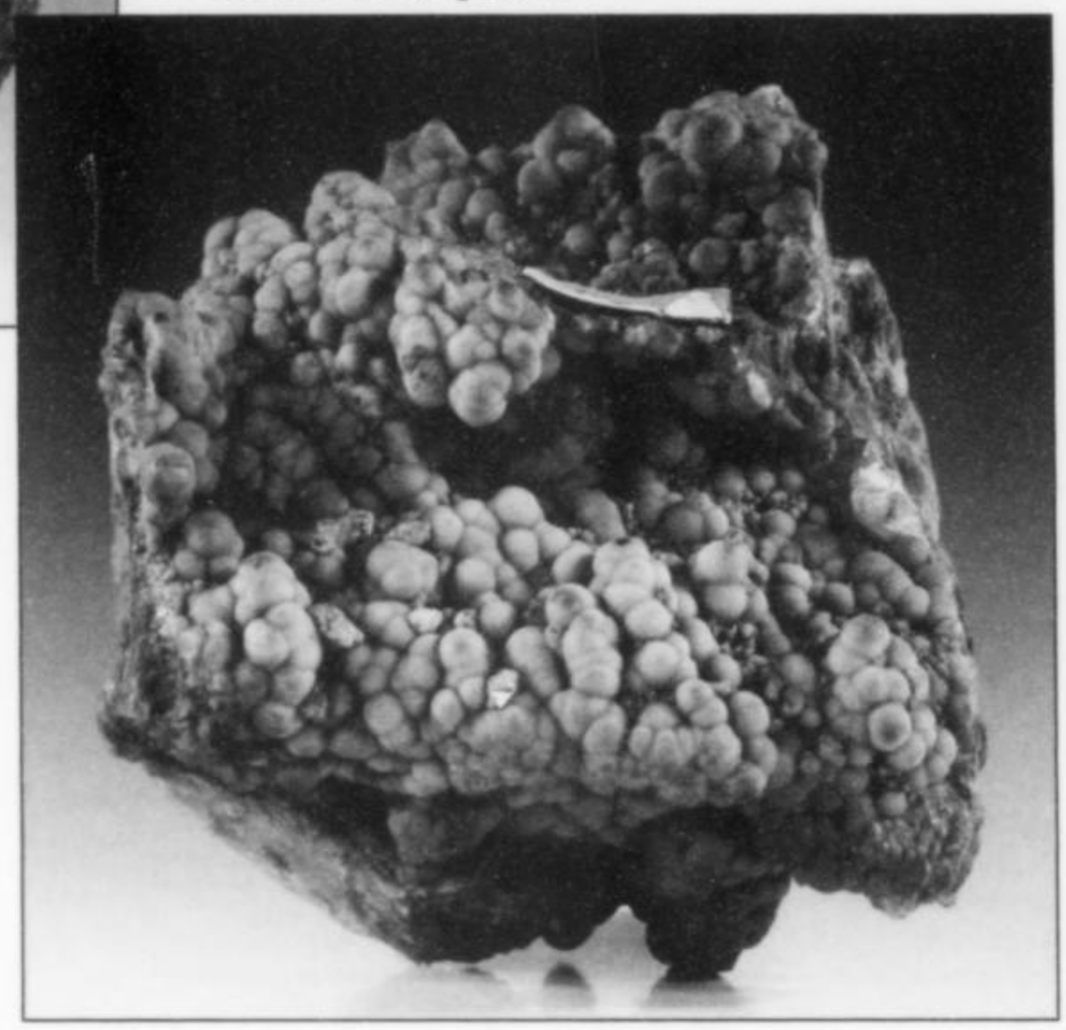


Figure 8. **Aquamarine beryl in smoky quartz, 8 cm, from the Mourne Mountains, County Down, Ireland. G. Knox collection, TCD.M1548; Declan Burke photo.**

Figure 9. **"Botryolite" variety of datolite, 5.5 cm, locality unknown. G. Knox collection, TCD.M4787; Declan Burke photo.**



the Caribbean), Brazil, Scandinavia, Siberia, Greenland and Saxony. No doubt Knox's older brother John, the Governor of Jamaica, collected or otherwise assisted in the acquisition of many of the Caribbean specimens, and a note in one of the catalogs indicated that some specimens from Greenland were given to Knox by Giesecke. A reasonable number were from Britain and Ireland, the Irish localities including the Giant's Causeway (Giesecke, 1825a), County Down (Giesecke, 1825b) and Dublin (Knox, 1826).

As a member of the Royal Irish Academy, Knox would have known Richard Kirwan (1733–1812), the prominent irish mineralogist and chemist; indeed the two men received their honorary degrees in Law within a year of each other. It is possible that Kirwan encouraged Knox, and may have advised on the arrangement of the collection, as the catalogs are laid out according to Wernerian principles which Kirwan promoted.

Specimens are placed into five classes (Table 1). The arrangement corresponds closely to the scheme laid out in Abraham

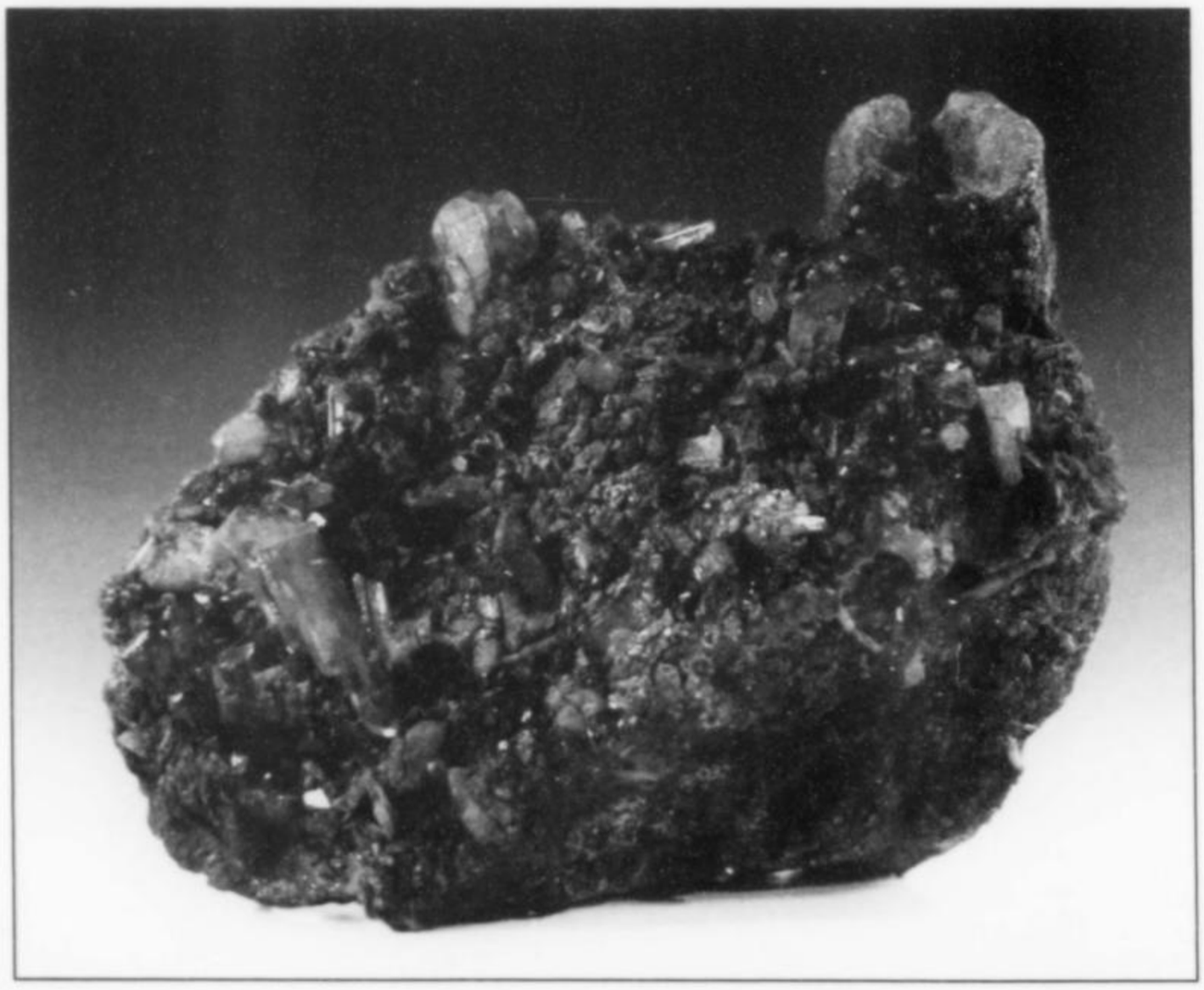


Figure 10. **Diopside and grossular crystal group, 8 cm, locality unknown. G. Knox collection, TCD.M3517; Declan Burke photo.**

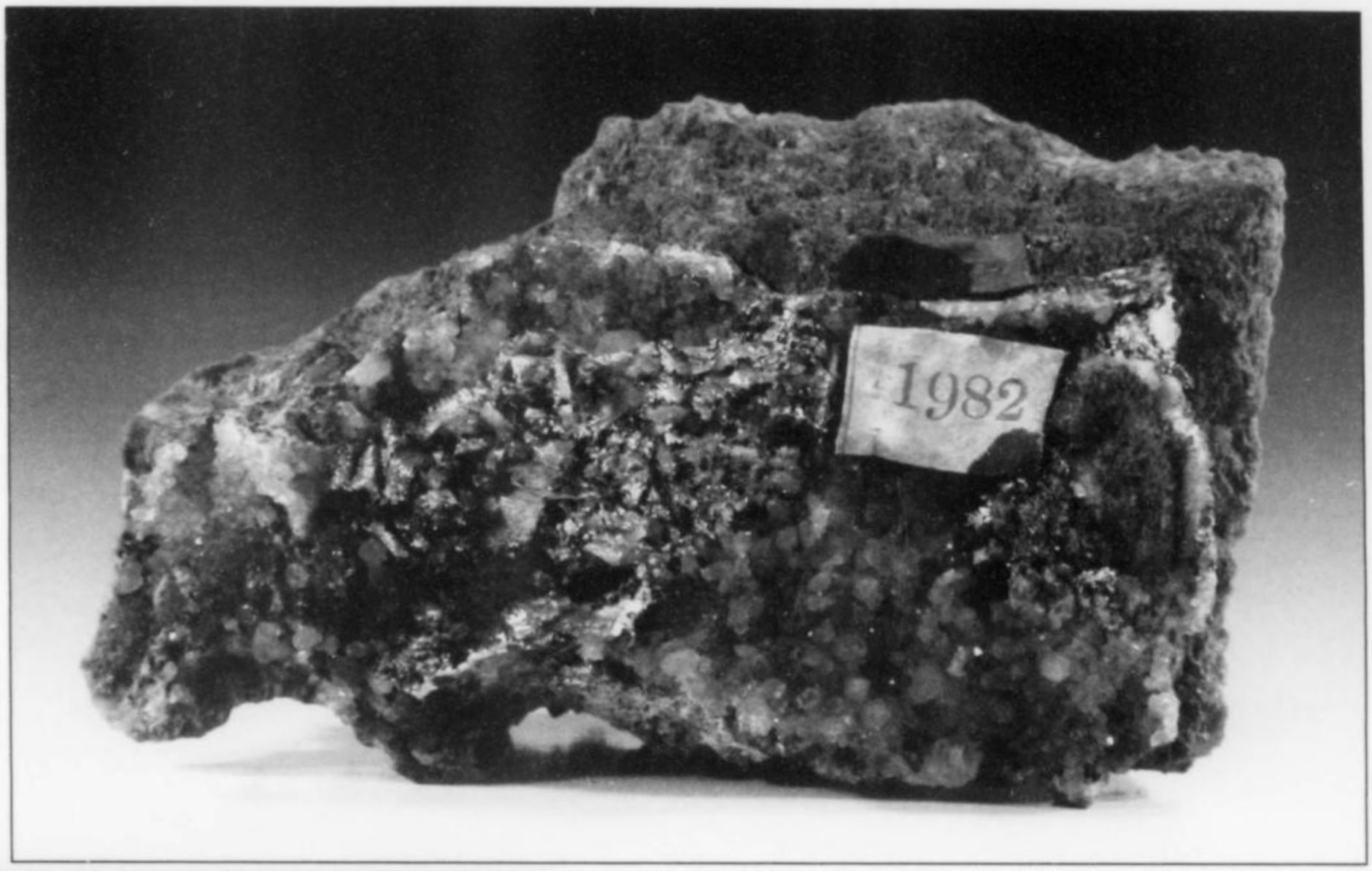


Figure 11. **Gold on quartz, 6.6 cm, from Koespatack mine, Transylvania. G. Knox collection, TCD.M1425; Declan Burke photo.**

Figure 12. **Graphite, 5.5 cm, from Borrowdale, Cumbria, England. G. Knox collection, TCD.M1959; Declan Burke photo.**

Gottlob Werner's *Letztes Mineral-System* (1817), with a few exceptions: to Class 1 is added the genus *Yttria*, while Werner's genera called *Barite* and *Strontian* are reduced to familial level; in Class 4 the number of genera is greater (28, as against Werner's 22). Knox may have been the author of these modifications, but this is not stated in the catalogs. The constituents of Knox's 5th Class—*Colors*—are unlisted, but may be related to categories in Werner's *Nomenclature of Colors* (1814).

In 1850 Knox's mineral collection was incorporated with the Museum's pre-existing mineral collections by James Apjohn, who compiled a catalog of the complete mineral holdings of the College in 1850. The specimens listed in this catalog are today distinguished by small printed red numbers. Knox's specimens have distinctive handwritten labels bearing a number code corresponding to entries in his catalog. Sadly, many of these labels were removed in the past. Nevertheless it should be possible to recognize much of Knox's material.

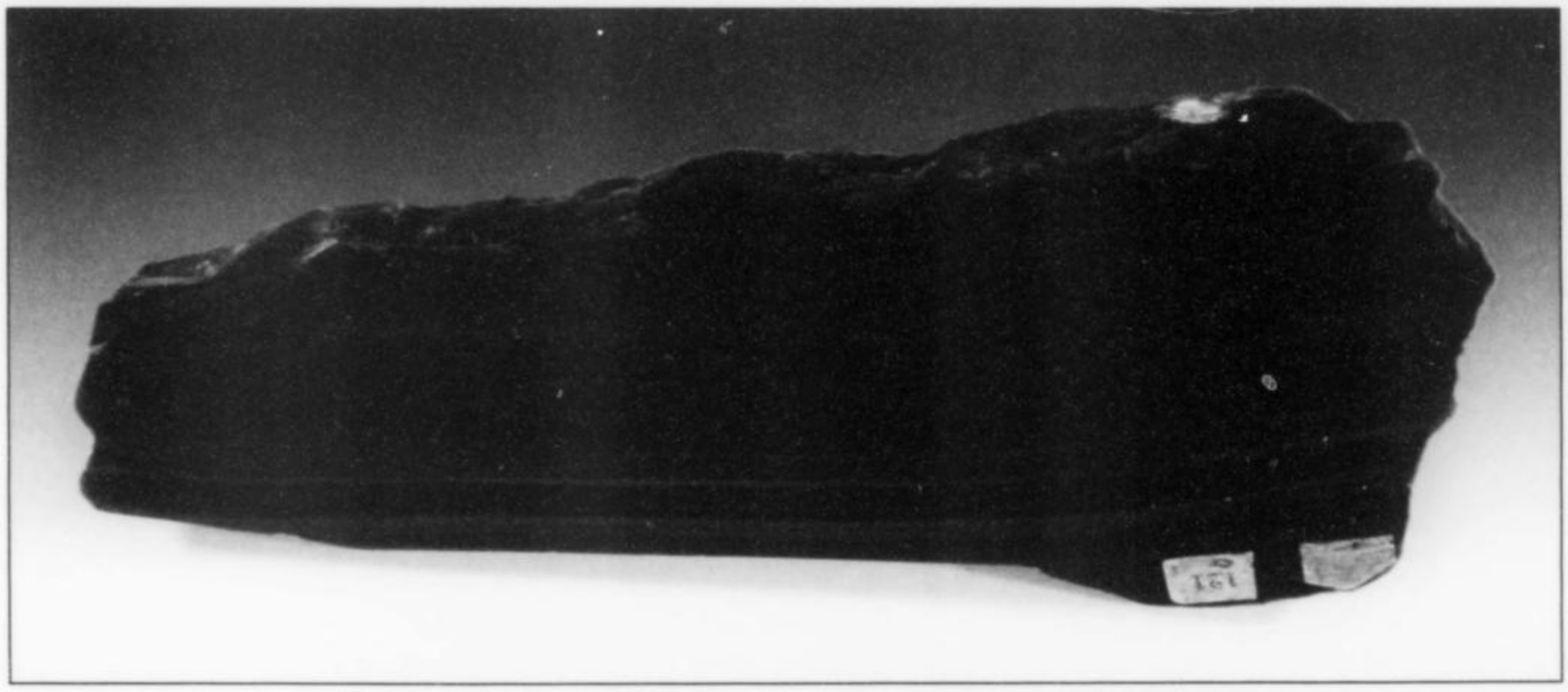


Figure 13. **"Riband jasper" displaying alternating leek-green and brownish red layers, 17.5 cm, from Saxony, Germany. G. Knox collection, TCD.M2906; Declan Burke photo.**

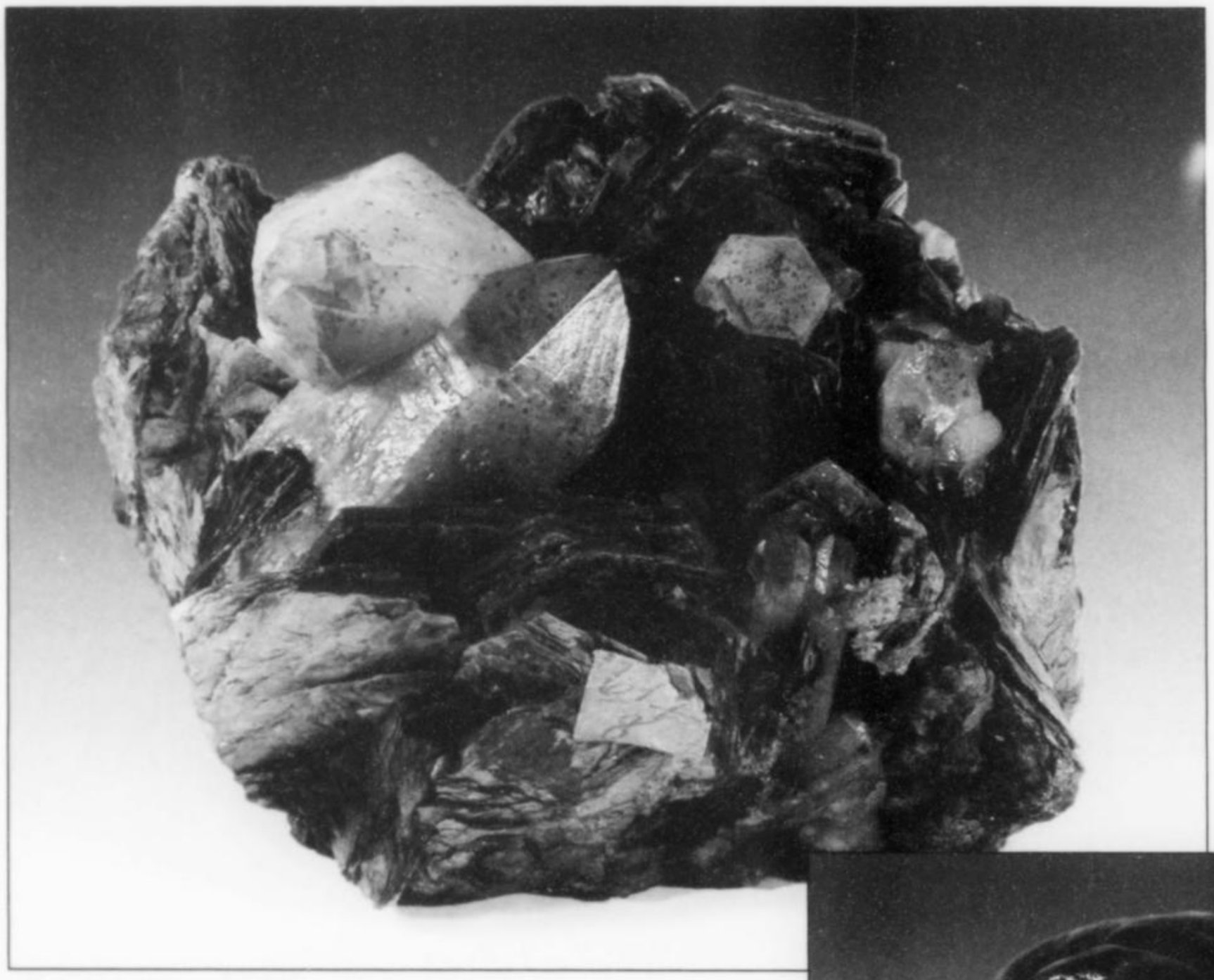


Figure 14. **Muscovite and quartz, 8.5 cm, from Schlaggenwald, Bohemia, Germany [Slavkov, Bohemia, Czech Republic]. G. Knox collection, TCD.M3938; Declan Burke photo.**

Figure 15. **Pyrite, 7 cm, from County Dublin, Ireland. G. Knox collection, TCD.M2356; Declan Burke photo.**

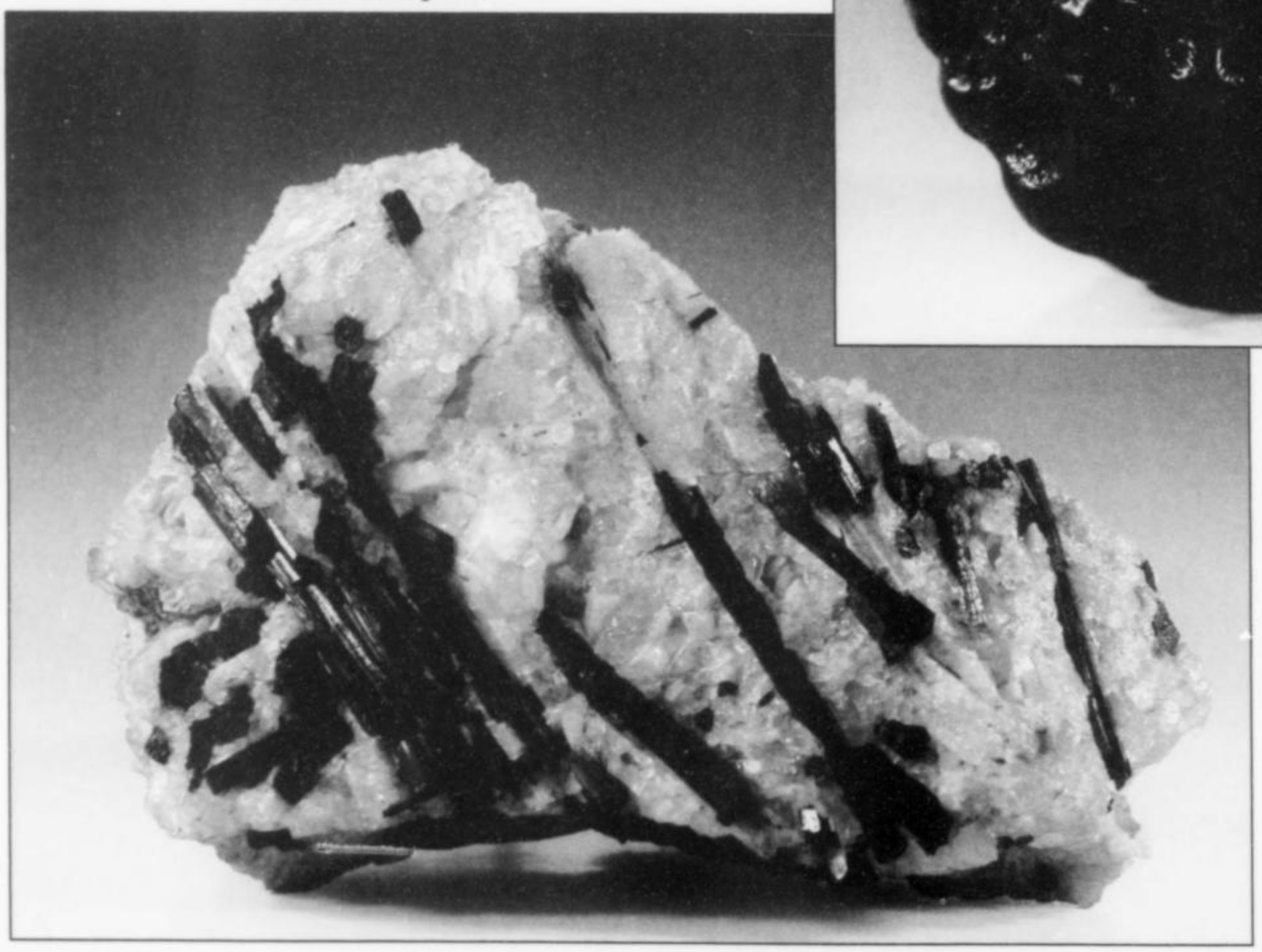


Figure 16. **Tourmaline crystals in granular quartz, 9.5 cm, from Abo, Finland. G. Knox collection, TCD.M4832; Declan Burke photo.**

CONCLUSION

The Knox collection, hitherto largely unknown outside of Trinity College, is important in terms of size and documentation, and in these senses it compares favorably with other mineralogical collections of the 1700's, and illustrates minor modifications of Werner's classification of minerals.

It is widely known that a small number of geologists in Ireland were at the forefront of the Neptunist-Vulcanist debate: men such as Kirwan and William Richardson (1740–1820) for the former, and Hamilton and Hervey for the latter, all took active roles. Although it is unclear what Knox's views were, it is probable that he sided with the Neptunists, given his involvement with the Kirwanian Society. This is the first piece of evidence of potential parliamentary input to the Neptunist-Vulcanist debate!

ACKNOWLEDGMENTS

I am grateful to Ezio Vaccari, Professor Gordon Herries Davies and Beryl Hamilton for discussions concerning George Knox and aspects of this paper. The Earl of Ranfurly kindly supplied some biographical information about Knox. With typical skill Declan Burke photographed the mineral specimens illustrated.

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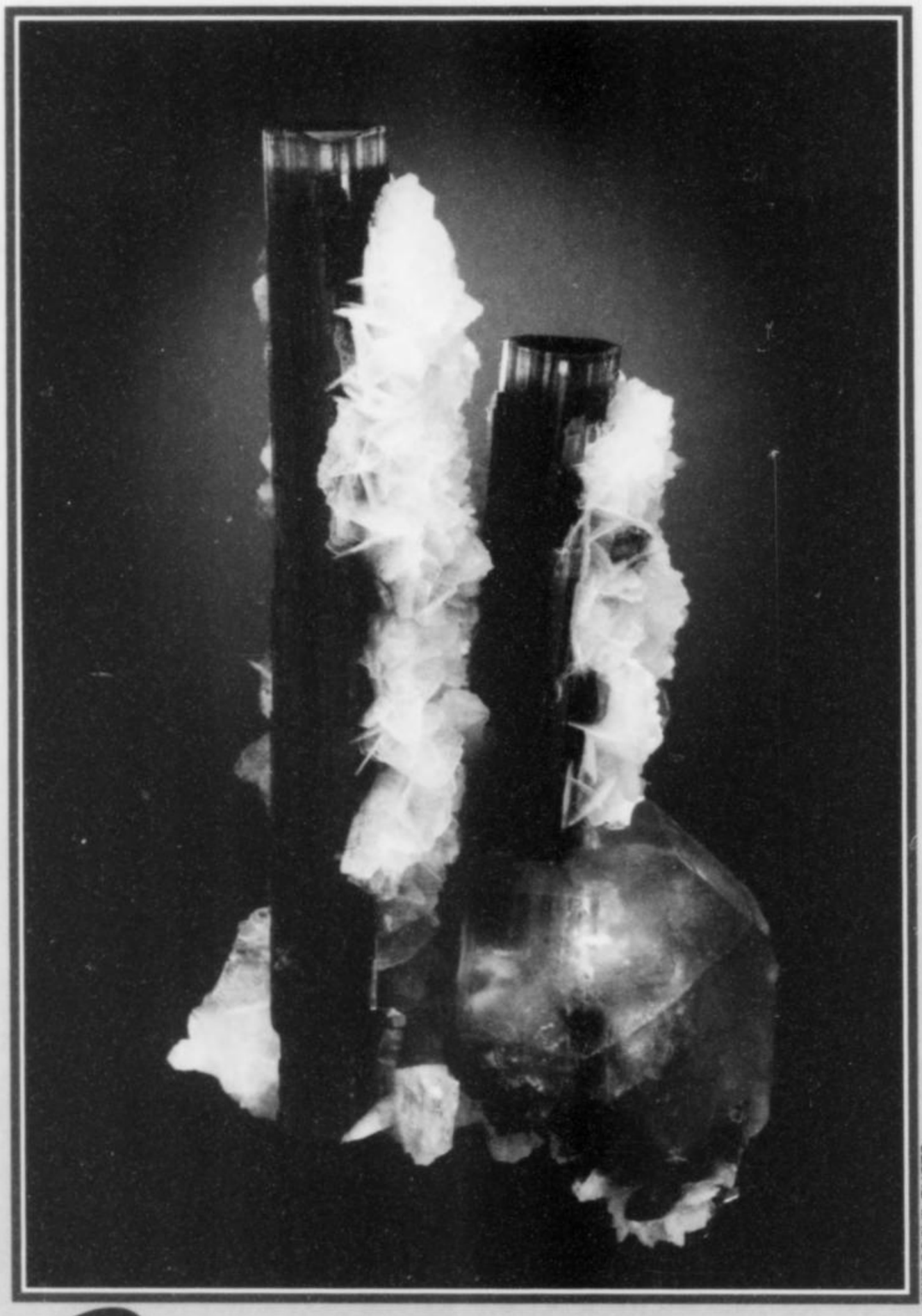

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Arizona collector/dealer Wayne Thompson is not someone you're likely to forget after meeting. Thin, energetic and wiry, with strawberry-blonde hair pulled back in a pony tail, he is bursting with enthusiasm for minerals. Wayne has been an active part of the mineral world for nearly half a century, and has endless fascinating stories to tell, once you get him going. He is one of the most successful field collectors of all time, and as a dealer he has handled a remarkable number of the world's finest mineral specimens.

INTRODUCTION

Wayne Thompson has been one of Arizona's best-known field collector/dealers for nearly half a century. His successes collecting in abandoned mines, above and below ground, are certainly enough to rank him with the legendary Edwin Over (1905–1962), but he has gone even further. Not content with collecting only at the usual abandoned sites, he pioneered the establishment of professional collector companies which could enter into specimen recovery contracts with mining companies at working mines otherwise off limits to mineral collecting. He is the veteran of over 100 commercial specimen-mining operations in the American West, Mexico, and around the world. Over the years he has developed into one of the mineral world's most exclusive dealers, and has handled hundreds of world-class specimens.

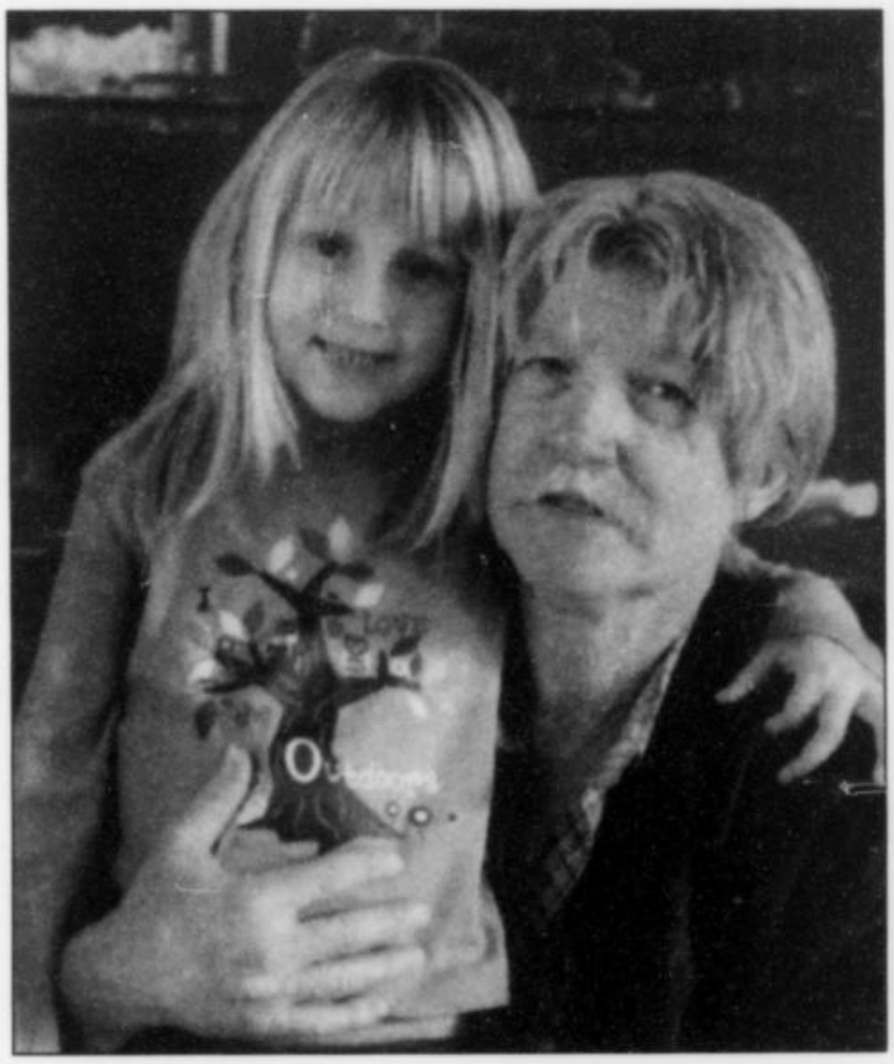


Figure 1. **Wayne Thompson and his daughter Stevia in his room at the Westward Look Show in Tucson, February 2006. Photo courtesy of *Foothills* magazine.**

EARLY LIFE

Wayne Arthur Thompson was born in Phoenix, Arizona on September 2, 1950, the son of Alice Morton and Loren Carlton Thompson, an electrician. His mother was born in New Mexico and grew up in the mining town of Ajo, Arizona, where her father Arthur Morton (Wayne's grandfather) worked as an electrical engineer at the New Cornelia mine. Wayne began collecting in the late 1950's, joined the Arizona Mineralogical Society at the age of eight, and also joined the mineral-oriented 4-H Club with his friend Les Presmyk that same year. When he was ten he collected vanadinite underground at the Apache mine with his father and his namesake uncle, D. Wayne Thompson. He worked hard at three

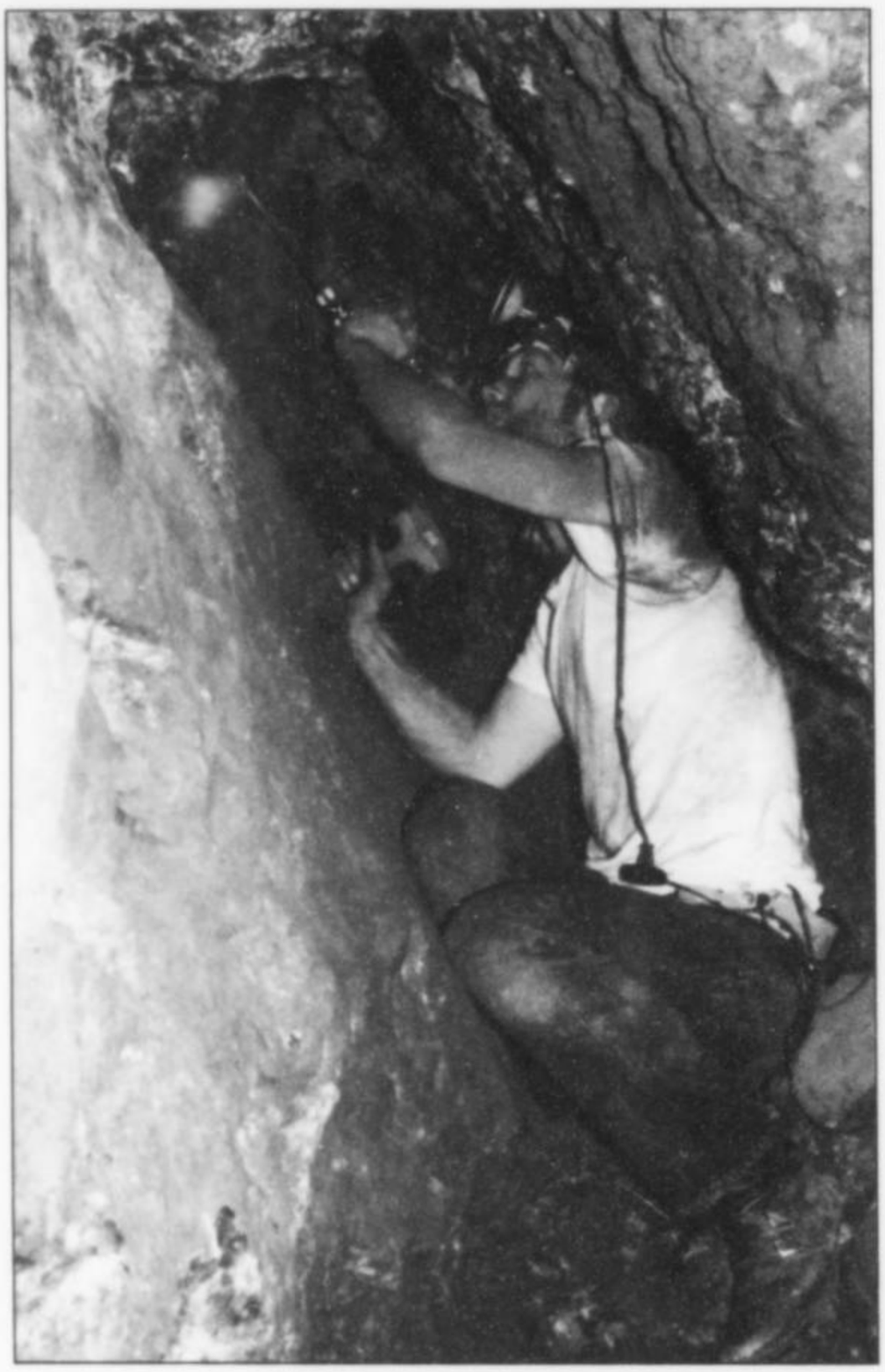


Figure 2. **Wayne at work digging red-spot wulfenite in the 79 mine, Gila County, Arizona. Wendell Wilson photo (1971).**

paper routes in order to earn money to buy specimens from local dealers such as Scott Williams, Dave New and Jimmy Mueller, and he attended his first Tucson Gem and Mineral Show in 1960 (he hasn't missed one since).

At an early age, Wayne decided to focus his collecting efforts not just on good minerals but on the very *finest* mineral specimens available. The pivotal incident occurred on a visit to Scott Williams' "Southwest Scientific" mineral shop in Scottsdale, Arizona in 1962. He had spent several hours going through drawers and boxes and had picked 15 or 20 specimens, enough to fill a flat. Included was a 4-cm diaboléite from Tiger, Arizona for $15.00. His pride and sense of accomplishment were deflated, however, when an older local collector named Harry Roberson walked in and purchased a very fine neptunite and benitoite for $135. Wayne's whole flat was worth about the same as Harry's single specimen, and Wayne realized that Harry had made the better buy.

With that lesson in mind, Wayne began focusing increasingly on expensive, higher quality specimens, both as a collector and as a dealer. His interest in Tiger minerals continued unabated, however, and that same year he spent $250 (heavy money for a 12-year-old in those days!) for a collection of Tiger minerals from Bob Jones.

PROSPECTING and PROFESSIONAL COLLECTING

Graduating from Cortez High School in 1968, Wayne worked his way through college by digging and selling minerals from many of Arizona's most famous localities. He attended Arizona State University as a Geology major, but left during his senior year to take part in a major specimen-mining operation at the San Francisco mine in Sonora, Mexico—personally opening the first of the great wulfenite pockets there, a six-foot-long walk-in cavity thickly lined with spectacular lemon-yellow wulfenite crystals to 8 cm. The dramatic story is told by Moore (2004). He spent the next six months prospecting abandoned mines throughout northern Mexico, discovering many formerly unknown occurrences, and taking voluminous notes for future reference.

During the 1970's he also collected extensively at the 79, Rowley, Red Cloud, Apache, Defiance, Flux, and Grand Reef mines—and has great stories to tell about his experiences in all of them. He once spent 27 days straight collecting at the Red Cloud mine. It was during my own years in graduate school at Arizona State (1969–1971) that I met Wayne, and partnered with him on numerous collecting trips, especially to the 79 mine. Watching him work, I had to admire his technique, his perseverence, and his patience. He would never destroy a specimen in a rush to get it out, as many collectors used to do—even if it meant leaving the piece in place for the next collector to work on.

Over the following years Wayne and his various partners personally collected, or purchased directly from the miners, a large percentage of the great specimens he has handled as a dealer. There are particular advantages to acquiring specimens at the source, before they have passed through the hands of other dealers and collectors. Such specimens can be professionally trimmed, prepared and meticulously preserved from damage; furthermore, they have not suffered an escalation in price by being passed around.

Wayne went through a period of (legitimately) field-collecting Indian pottery from archeological sites, in conjunction with an archeologist, and became an expert on that subject—a born

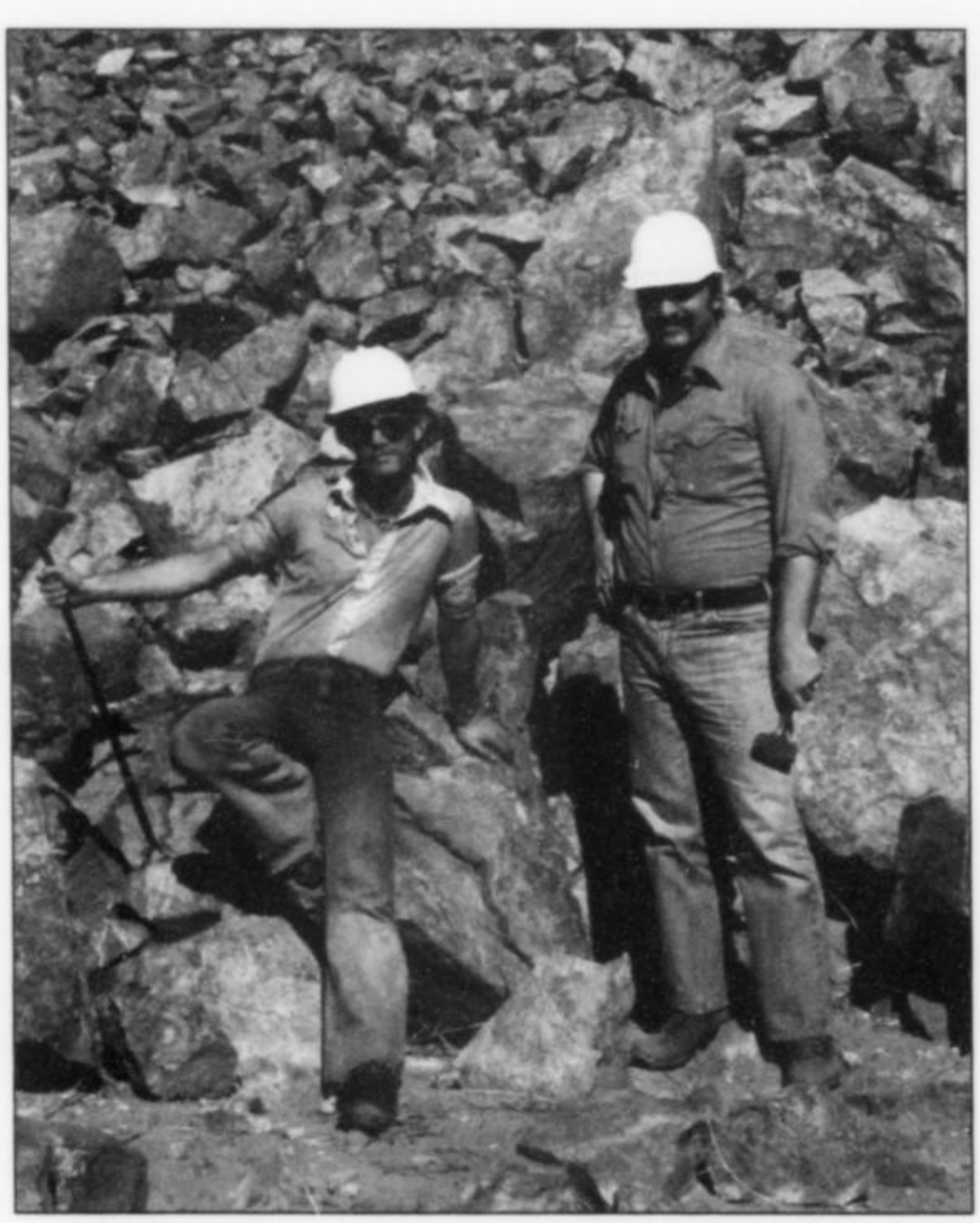


Figure 3. **Wayne Thompson and Wendell Wilson in the Ray mine open pit, near the occurrence of chrysocolla pseudomorphs, 1977.**

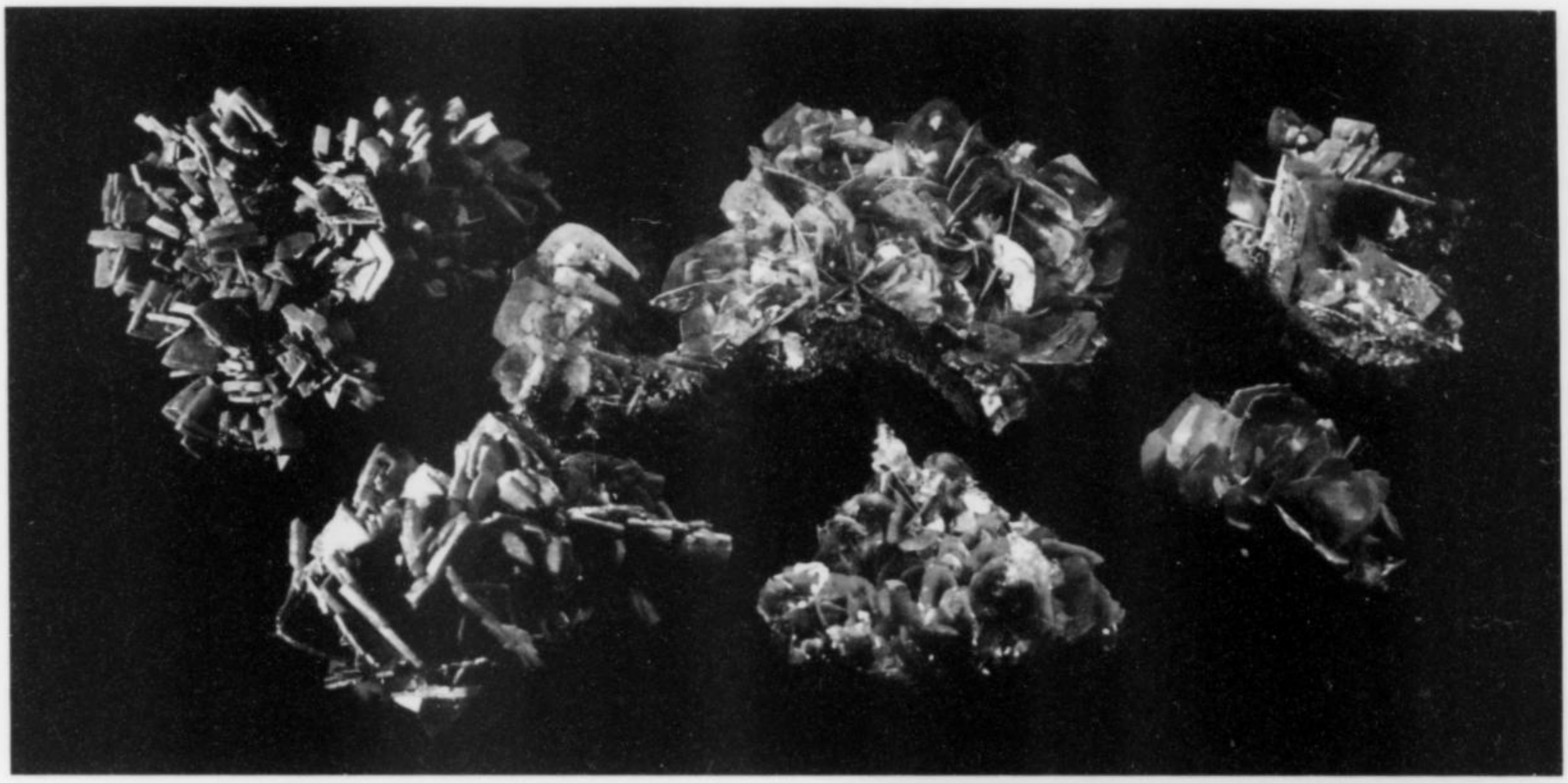


Figure 4. **Wulfenite specimens to 15 cm from the Defiance mine, Arizona, collected by Wayne Thompson in 1970. Wendell Wilson photo.**

collector can collect anything. But his true love was always minerals, and his flirtation with antiquities ended after a couple of years with his return to mineral collecting. In those days the large operating mines in Arizona were encountering collectible minerals regularly, but mine managers were reluctant to allow collectors access because of liability worries and the disruption of mining activities. In 1974 Wayne formed his first professional specimen recovery company, *Southwestern Mineral Associates*, which addressed these problems and gained the trust of big mining companies such as Phelps-Dodge Corporation (at Bisbee, Morenci, Metcalf, and Ajo) and Kennecott Copper Corporation (operator of the Ray mine). As a result, he was able to recover tens of thousands of specimens from these mines that would otherwise have gone to the crusher.

Following are some, though not nearly all, of the mining projects in which he has been involved.

Wah Wah Mountains 1973

In Utah Wayne leased the red beryl mine (the Violet claims of the Hodges family, before they were taken over by Ed and Rex Harris) in the Wah Wah Mountains. He and his brother Loren Thompson, with the help of Grant Richards, carefully collected many fine crystals from the white rhyolite. I remember suggesting jokingly to Grant that they should build a big waterproof fence around the productive hill and then fill the whole thing full of hydrofluoric acid to liberate the beautiful red beryl crystals *en masse*. Grant, who apparently was feeling like low man on the totem pole, said grumpily, "Yeah, and I'd probably have to be the one to swim out and see how it's doing!"

Mammoth-St. Anthony Mine 1972–1973

In his first big project following his post-college Mexico adventures, Wayne began a hazardous underground exploration program at the abandoned Mammoth-St. Anthony mine, Tiger, Arizona. He was guided by information supplied by his friend Archie Griffith, who had worked (with his brother George Griffith) collecting minerals there for the mining company for several years before the mines were closed. Following Archie's directions, Wayne would

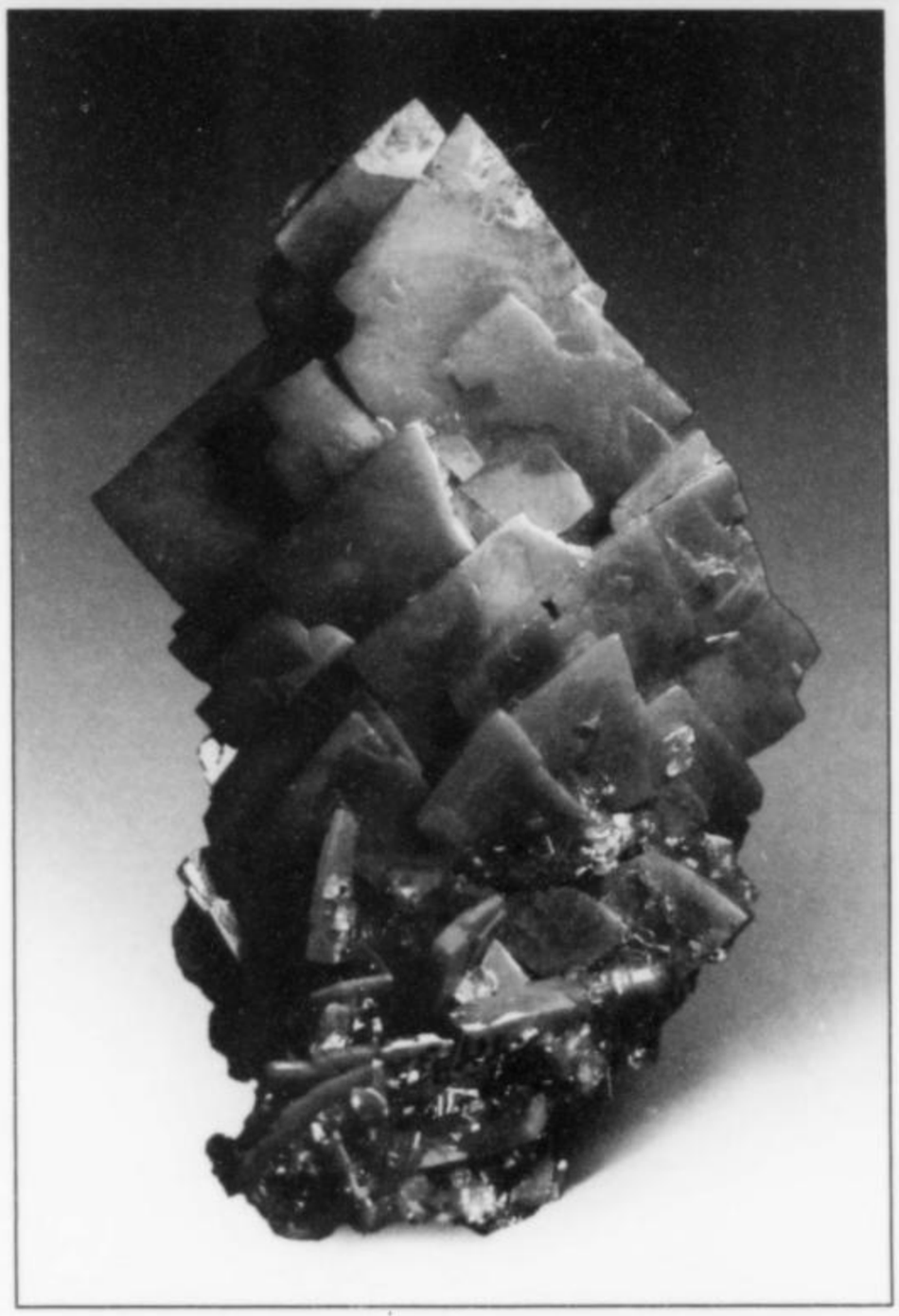


Figure 5. **Wulfenite crystal group, 6 cm, from the Defiance mine, Arizona, collected by Wayne Thompson in 1970. Doug Miller collection; Wendell Wilson photo.**

spend up to three days underground at a time, and eventually put in a total of over 1500 hours underground at Tiger.

It was not easy or safe to work in the unstable, labyrinthine workings; Wayne was nearly killed by rock falls and collapsing timbers on three separate occasions. An eerie rumble could periodically be heard, the sound of stopes collapsing in the distance, accompanied by sudden rushes of air down adjoining tunnels.

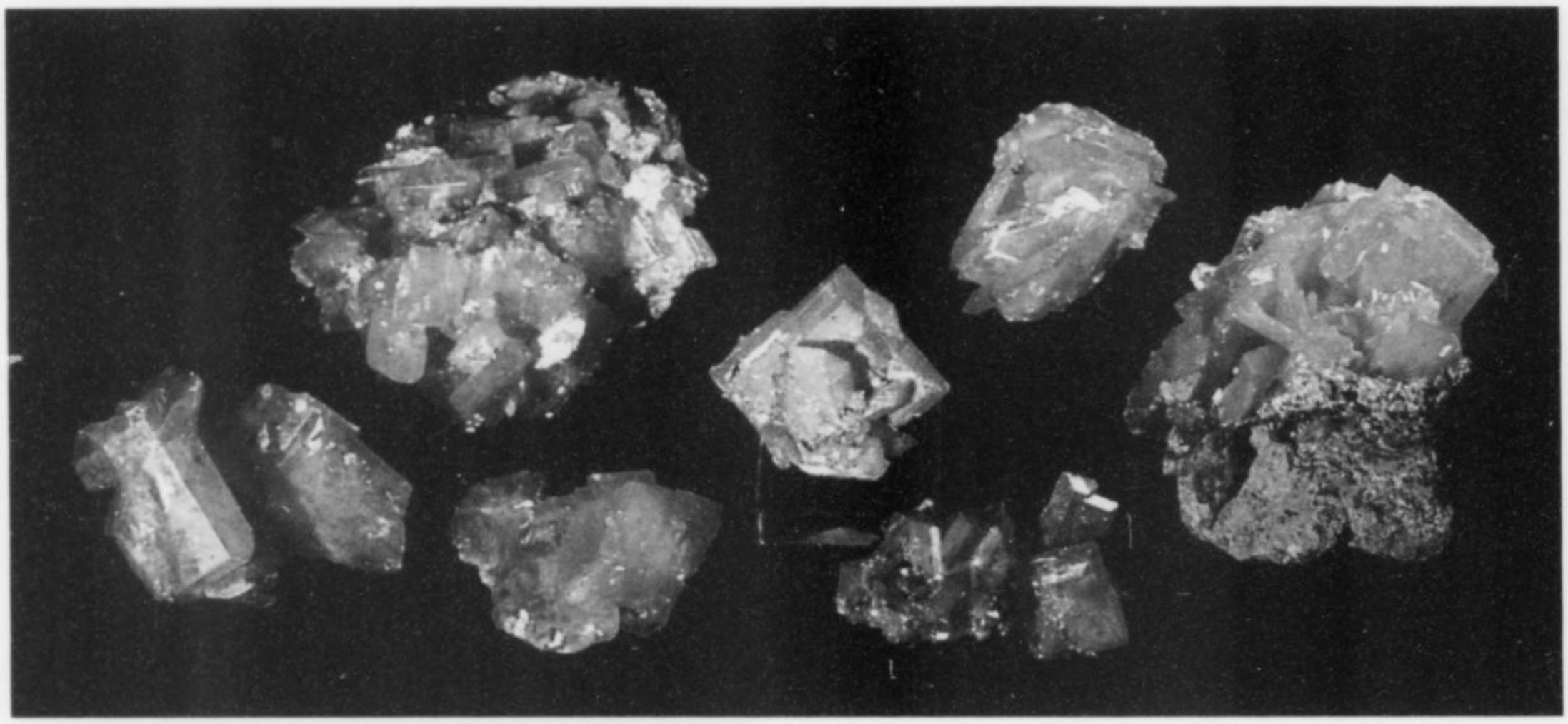


Figure 6. **Wulfenite specimens from a major pocket in the Old Yuma mine, collected by Wayne Thompson in 1969 (the plastic base measures 2.5 cm). Wendell Wilson photo.**

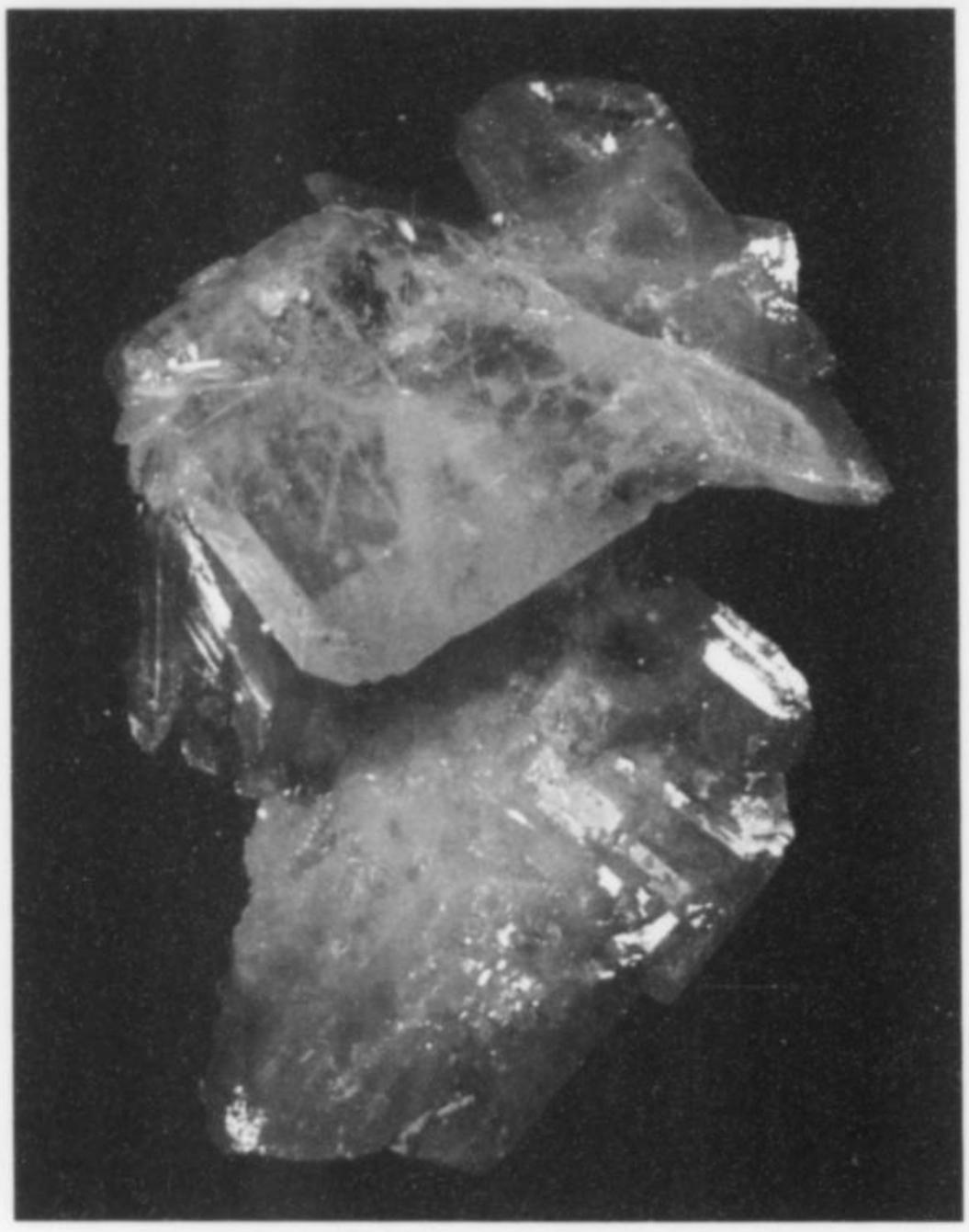


Figure 7. **Wulfenite crystal cluster, about 6.5 cm, from the Old Yuma mine, Pima County, Arizona. Collected by Wayne Thompson in 1969. Wendell Wilson photo.**

Passageways that were open on one trip were found to be collapsed and impassable on the next visit. Wayne's guardian angels must surely have been putting in serious overtime.

Wayne and his collecting partners located the linarite/caledonite stope, the diaboléite stope, a 300-foot exposure of cerussite (reticulated and V-twins) and several wulfenite veins, but the leadhillite (their principal target) proved to be inaccessible. On the 660 Level, a then-unknown mineral was found, later named *creaseyite* in 1975 by Sid Williams and Richard Bideaux (based on earlier specimens found by S. C. Creasey and others).

The Tiger project ended prematurely when Wayne signed a formal contract with Phelps Dodge Corporation for specimen recovery in 1974, and didn't want to endanger it with unauthorized collecting projects.

New Cornelia Mine, Ajo, Arizona 1975

In 1975, Wayne (with Mike New and Gary Fleck) reopened an abandoned area in the New Cornelia open pit at Ajo, Arizona. It was

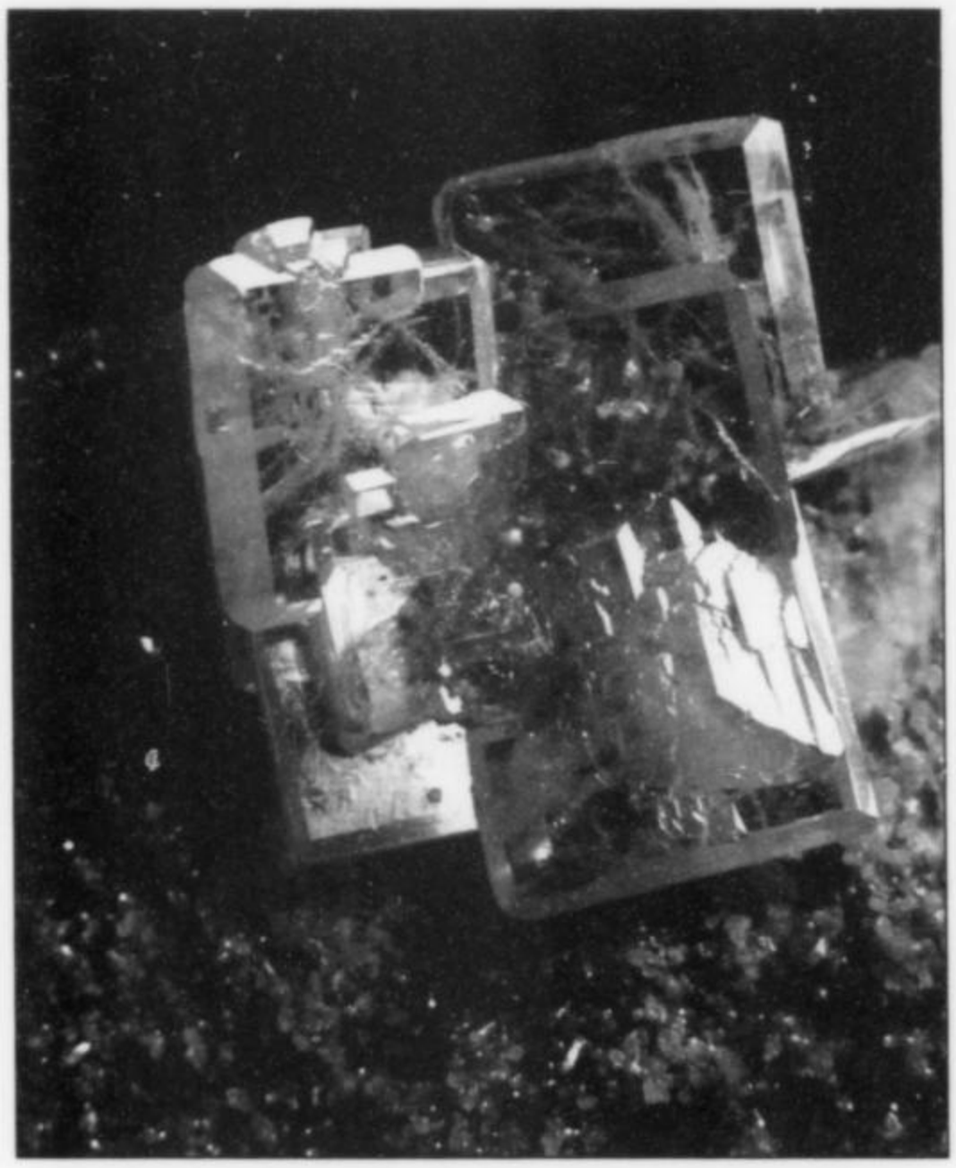


Figure 8. **Wulfenite crystal, 2 cm, from the Rowley mine, Arizona, collected by Wayne Thompson in 1971. Doug Miller collection; Wendell Wilson photo.**

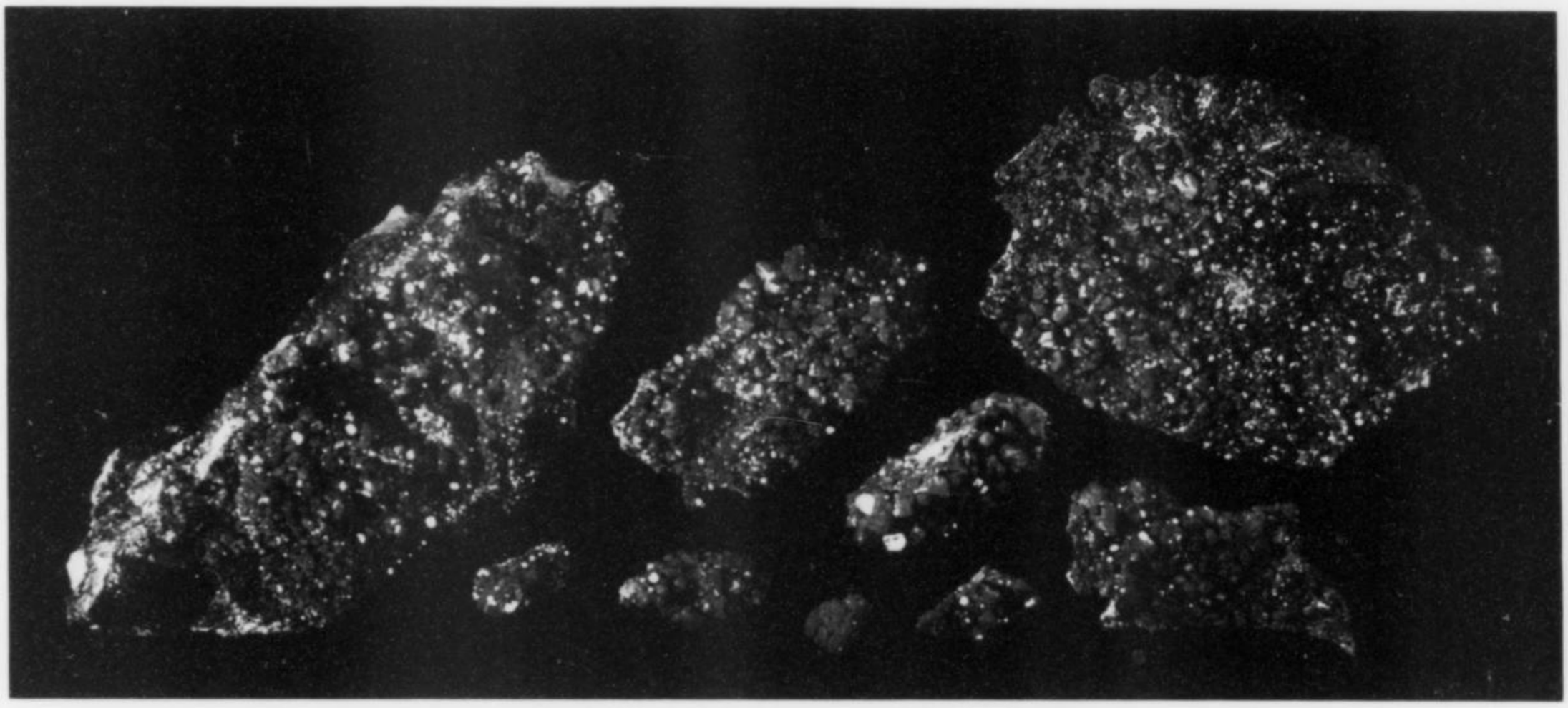


Figure 9. **Vanadinite specimens to 16 cm from the Apache mine, Gila County, Arizona, collected by Wayne Thompson in 1968–1969. Wendell Wilson photo.**

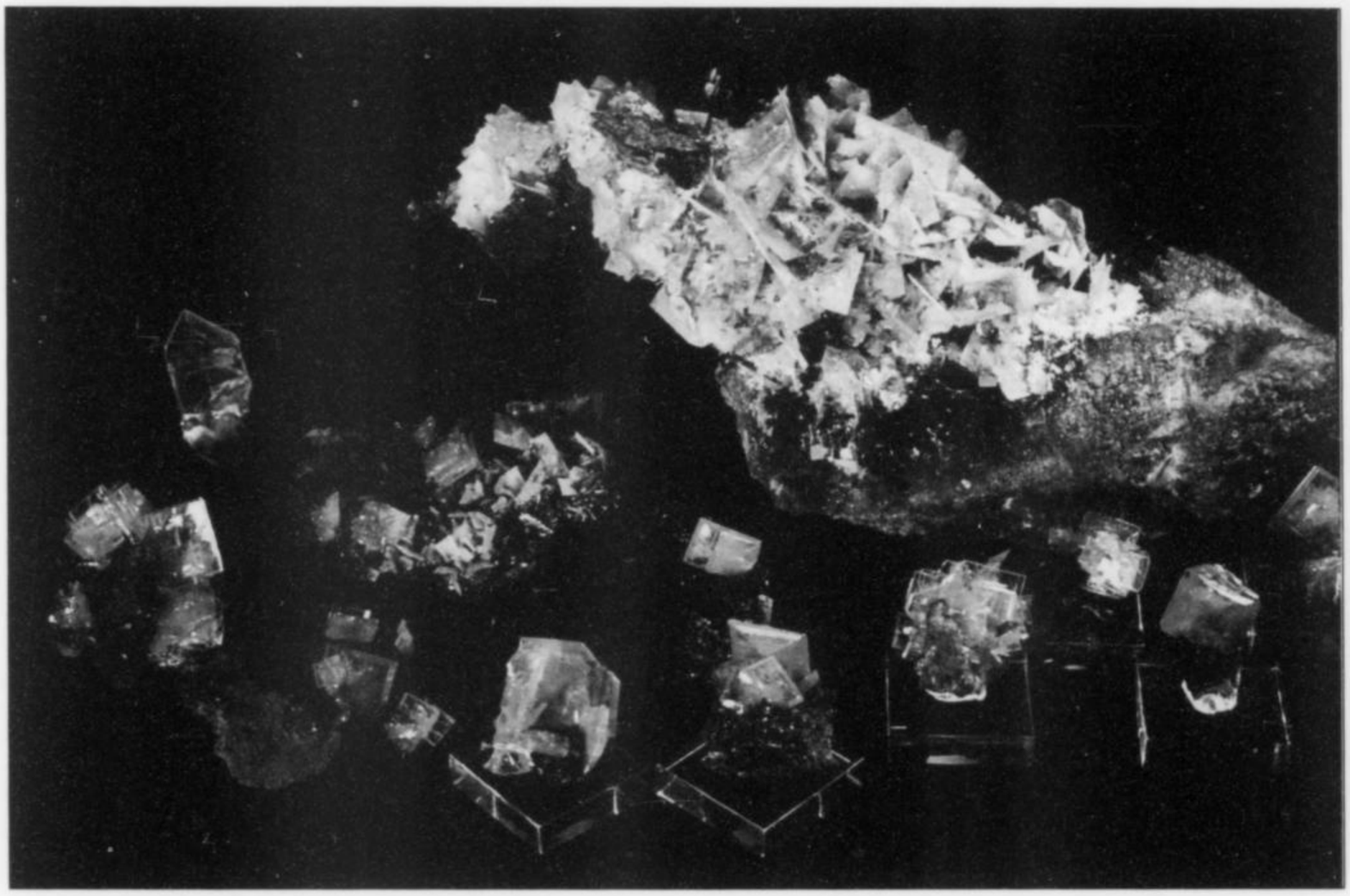


Figure 10. **Wulfenite specimens (many on 2.5-cm bases) from the 79 mine, Gila County, Arizona, collected by Wayne Thompson 1969–1971. The specimen at lower left appeared (as an oil painting by Wendell Wilson) on the cover of the *Mineralogical Record*, vol. 3, no. 6 (1972). Wendell Wilson photo.**

one of their first operations under contract with a mining company to recover specimens professionally. From a series of open cracks they collected several hundred specimens of azurite and malachite psuedomorphs after azurite with crystals to nearly 4 cm.

Bisbee Mines 1975

Wayne, with Phelps Dodge employee Richard Graeme as guide, dug out 25 flats of azurite rosettes on malachite at the Junction mine, then collected at the Campbell mine and the Cole mine in Bisbee, exploring for specimens. This operation ceased abruptly when azurite was discovered at the Morenci mine, and focus shifted to that project.

Metcalf-Morenci Mines 1975

When Wayne received word that a huge zone of secondary copper minerals had been encountered at Phelps Dodge's operating Metcalf mine, he pulled out of Bisbee and shifted his working staff

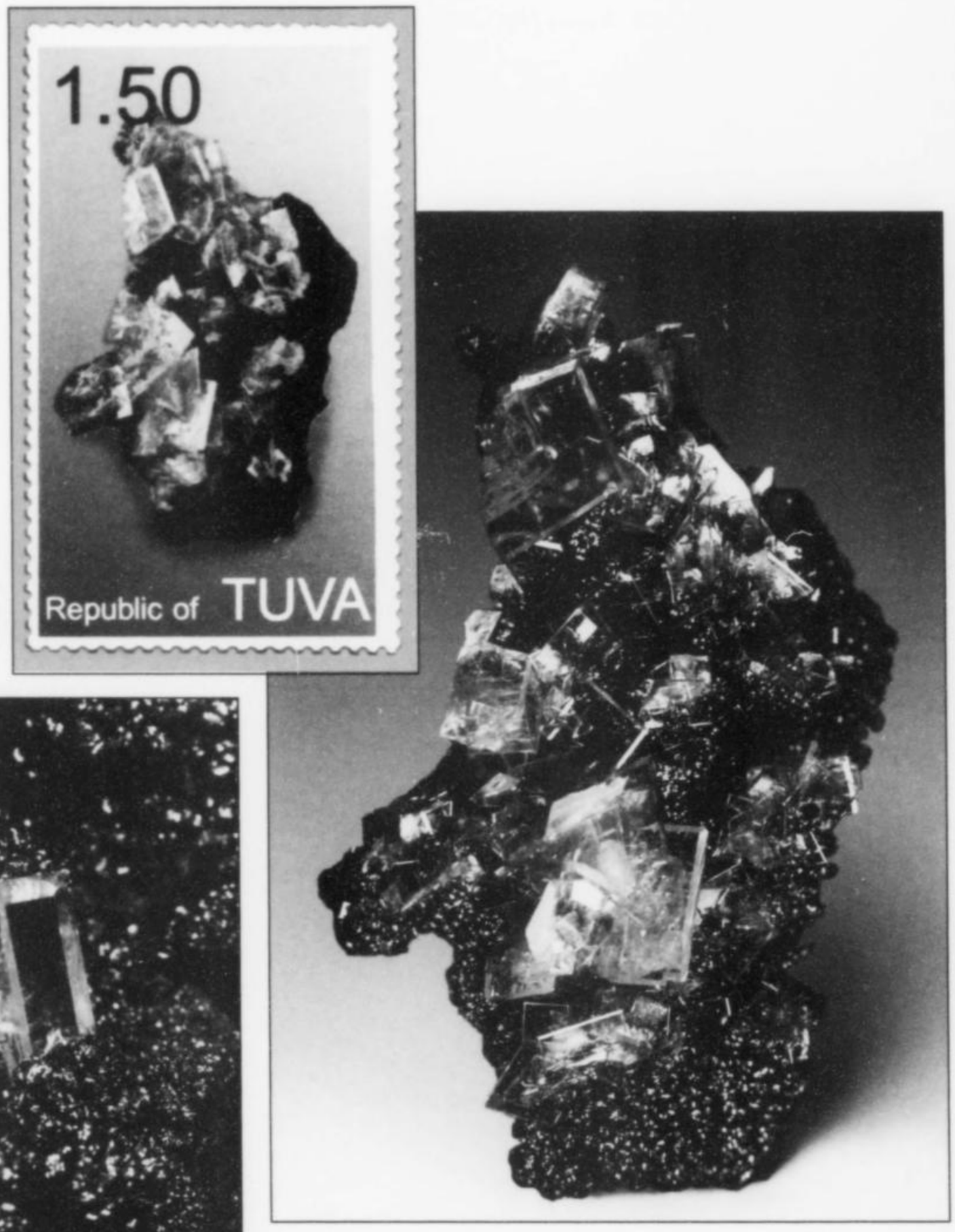
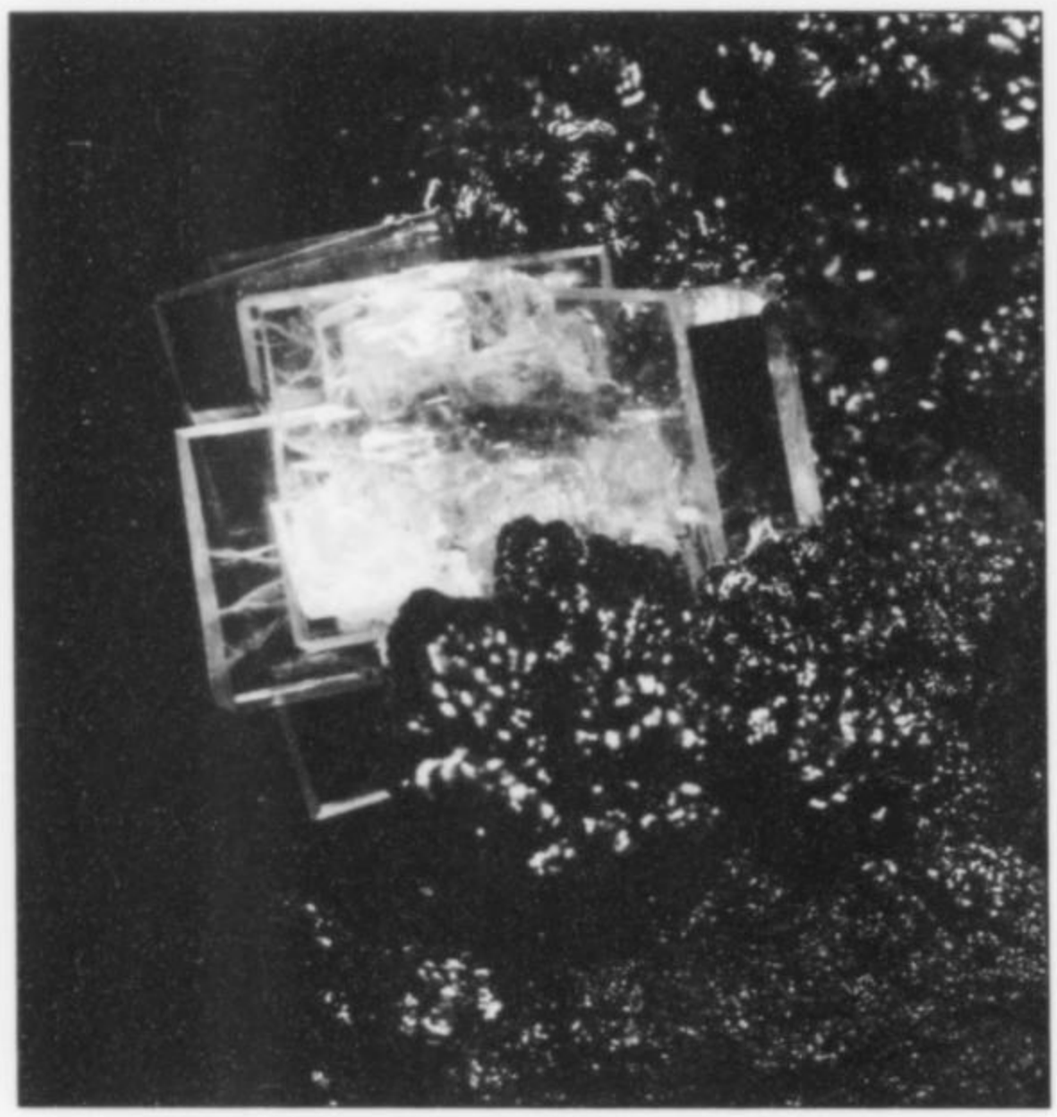


Figure 11. **Wulfenite specimen, 8 cm, from the 79 mine, collected by Wayne Thompson. This specimen was later pictured, without permission, on an illegal postage stamp purportedly issued by the government of the Russian Republic of Tuva in the 1990's (see inset). The specimen is now in the Smithsonian collection. Wendell Wilson photo.**

Figure 12. **Wulfenite crystal cluster, 2.5 cm, on mottramite, from the 79 mine, Arizona; collected by Wayne Thompson in 1970. Les Presmyk collection; Wendell Wilson photo.**



(Loren Thompson, Stan Esbenshade, Gary Fleck, Andy Clark, and Brian Huntsman) to Metcalf. Over the next year he extracted a hundred pick-up-truck loads of azurite and malachite—tens of thousands of specimens ranging from good collector material to decorator specimens. After the first year the operation was expanded to include the Morenci mine a mile away, and there they recovered superb specimens of crystalline, bladed azurite (some better than any specimens ever found at Bisbee, and more reminiscent of Tsumeb specimens), 500–600 dioptase specimens as good as the average Tiger material, and several hundred excellent malachite pseudomorphs after azurite. The premier specimens found during this time were several hundred malachite stalactites up to 36 cm long, studded with azurite rosettes.

Ray Mine 1976

The Ray mine project, initiated in 1976, was made possible by another of Wayne's early professional contracts with mining companies. Over the course of several years, a number of productive zones were encountered during copper mining operations, and Wayne was called in to recover thousands of specimens of native copper, cuprite, drusy quartz on chrysocolla, and chrysocolla pseudomorphs after malachite pseudomorphs after azurite. The lovely, pale turquoise-blue chrysocolla pseudomorphs, in particular, were the finest ever found. The various chrysocolla pockets that were encountered produced several hundred specimens, collected by Wayne and (under Wayne's contract) Gary Fleck, Andy Clark, Ed Anderson, Pat Garrett, Wayne Johnson, Wendell Wilson, Jack Lowell, Dave London, Don McCoy and others (see Thompson, 1980).

Grand Reef Mine 1980

By 1980 Wayne had put in well over 10,000 hours of collecting time in the field, at both open pit and underground mines. His project at the Grand Reef mine was difficult and frustrating because of the tenacious hardness of the rock enclosing pockets of brittle linarite crystals. One boulder that could not safely be broken down contained a superb cavity lined with large, deep blue linarite crystals. It was eventually purchased as-is by the prominent Australian collector Albert Chapman, who trimmed it down to size with a large-diameter diamond saw—and in the process discovered a *second* pocket hidden inside! (Chapman's collection is now in the Australian National Museum.)

Figure 13. **Wulfenite with mimetite, 9 cm, from the San Francisco mine, Sonora, Mexico. Collected by Ed Swoboda and Wayne Thompson in 1994. Stuart Wilensky collection; Jeff Scovil photo.**

Figure 14. **Drusy azurite stalactites on malachite, 13 cm, from the Morenci mine open pit. Collected by Wayne Thompson and Stan Esbenshade in 1986. Jeff Scovil photo.**

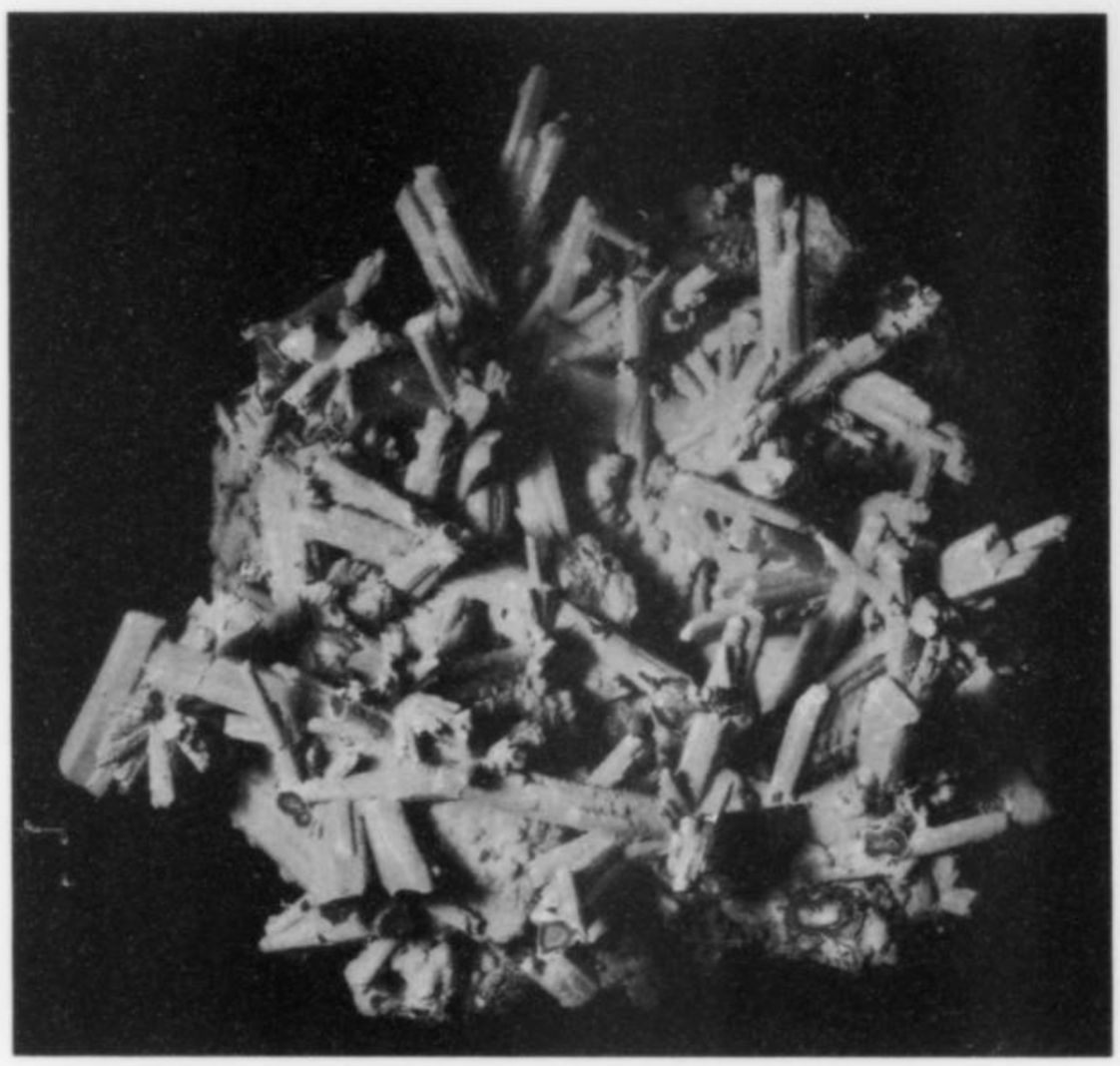


Figure 15. **Chrysocolla pseudomorphs after azurite (?) covering a large plate of matrix over a foot across, from the Ray mine. Collected by Wayne Thompson in 1976. Jeff Kurtzeman photo.**

Wayne also collected the type specimen for four new mineral species (grandreefite, aravaipaite, laurelite and pseudograndreefite) at the Grand Reef mine, with collecting partners Bob Johnson, Ed Anderson, and Wayne's wife Laura. The new species were all described by Kampf et al. (1989).

Leased and Purchased Mines

During the late 1970's and the 1980's other projects of Wayne's produced thousands of specimens of azurite (La Salle, Utah), barite (Grand Junction, Colorado), smoky quartz (Lincoln County, New Mexico), and wulfenite (from several different discoveries). But in the 1980's Wayne's focus began to shift from self-collecting minerals to leasing or purchasing localities outright in order to control production of specimens by his staff of professional diggers. He also spent more time purchasing specimens and collections for resale, which led to expeditions to Morocco, South Africa, Namibia, Brazil, Pakistan and most European countries in search of fine specimens. He initiated, or was active in, various specimen mining projects in Vera Cruz, Guerrero, and Sonora, Mexico; the Otjua mine in Namibia; chrysoberyl, topaz and brazilianite localities in Brazil; the De Maria gold mine in Califor-

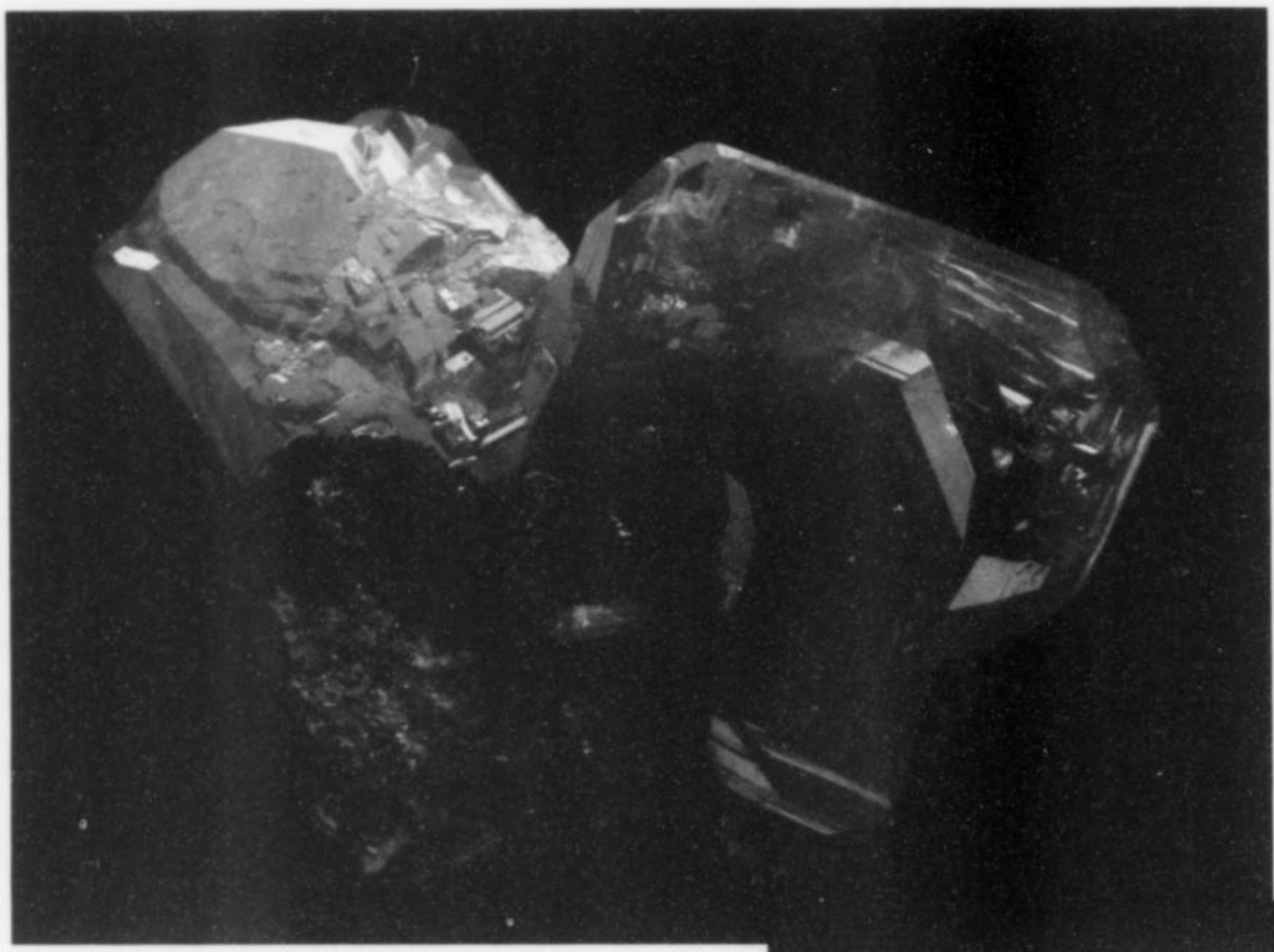


Figure 16. **Wulfenite crystal cluster, 4.6 cm, from the Red Cloud mine, La Paz County, Arizona. Collected during Wayne Thompson's mining venture there in 1996. Jeff Scovil photo.**

Figure 17. **Smoky quartz cluster, 15.5 cm, from the Smokey Bear prospect, Lincoln County, New Mexico; collected in 1988. Wendell Wilson photo.**

nia; the Blanchard mine in New Mexico; the Bunker Hill mine in Idaho; the Block D mine area in Arusha, Tanzania; and a new epidote locality in Kenya which he worked with the legendary African explorer Campbell Bridges. In Arizona he owned or leased the Red Cloud, Old Yuma, Grand Reef and Veta Grande mines.

The brazilianite operation was especially interesting. The finest specimens of the species ever found were those from the type locality, Corrego Frio, mined by Edward Swoboda in the 1940's. Although brazilianite has been found at numerous other localities in Minas Gerais since then, none has equalled the first find. Wayne's partner in Brazil, Pierre Laville, acquired the rights to mine the original area again, and Wayne financed the operation. It turned out that the Corrego Frio brazilianites had come from a small swarm of pegmatites all within a hundred feet of each other, and Laville found one vein that had not yet been worked. Over the next few months one cabinet-size crystal and many smaller crystals and clusters up to 5 cm were recovered, all having the blocky gemmy habit and good color characteristic of the original find.

Middle Eastern and Brazilian Mining

From 1988 to the present day, Wayne's agents and partners abroad have worked numerous pegmatites in Afghanistan and Pakistan. Some of these projects yielded very little, and others were spectacularly successful, producing many fine to world-class mineral specimens. His partners Tahir Igbal (in Pakistan) and Pierre Laville and Gene Meieran (in Brazil) have shipped hundreds of superb specimens to Wayne. The Medina aquamarine pocket in Brazil in 1995 produced several of the world's finest aquamarine crystals, which Wayne, Gene Meieran and Pierre Laville were able to pułchase at the mine from the miners.

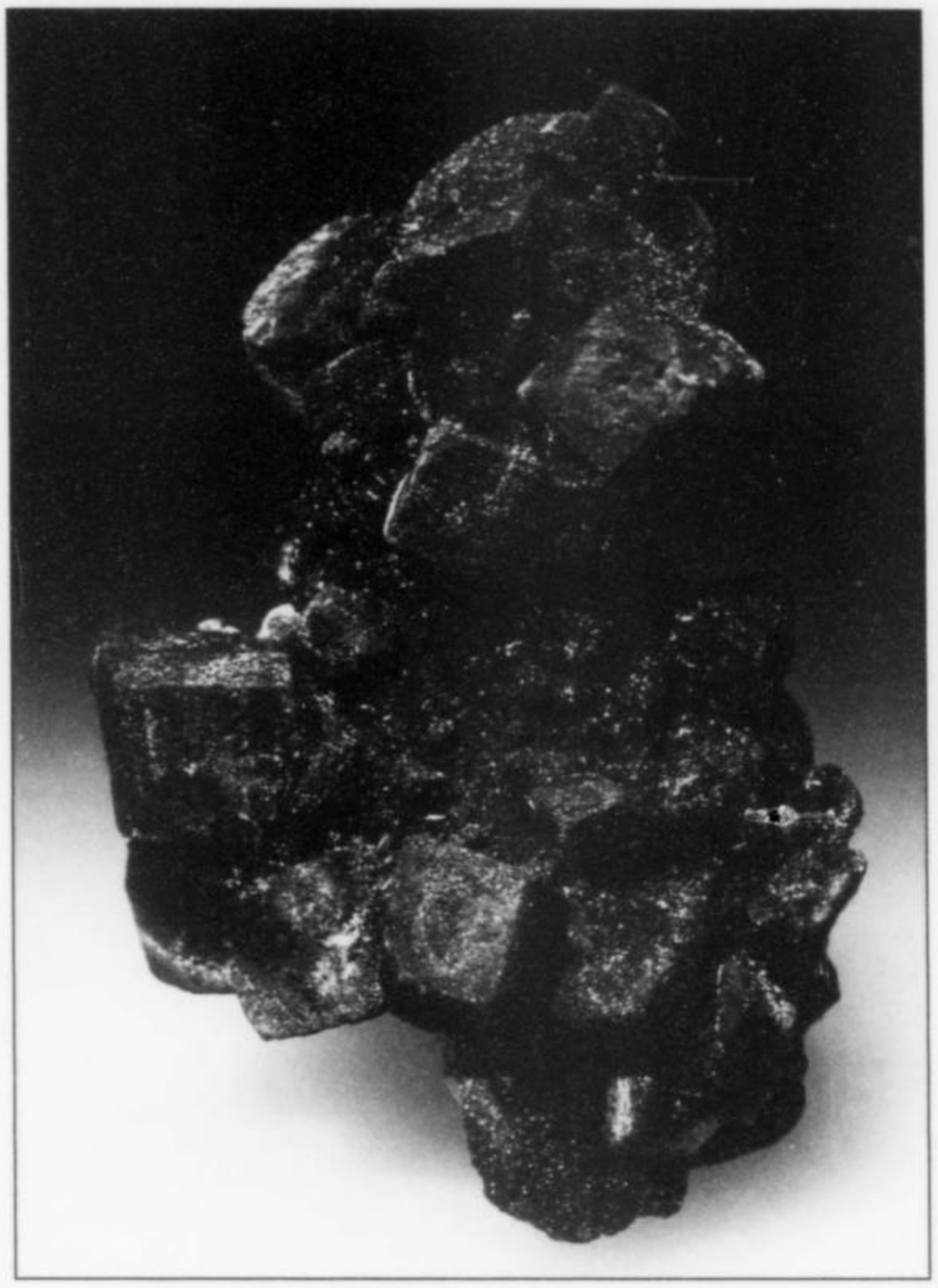


Figure 18. **Malachite pseudomorphs after azurite on malachite, 7 cm, from the New Cornelia mine, Ajo, Arizona. Collected by Wayne Thompson in 1975. William Thomas collection; Wendell Wilson photo.**

San Francisco Mine 1990–1994

In 1990 Wayne returned to the San Francisco mine in Sonora—for the fourth time—and began a four-year mining project with partners Ed Swoboda and James Horner. Ed lived at the mine and engineered the driving of an inclined shaft for about 2,000 feet to intersect the zone where Wayne had made his big 1971 strike. Three more exceptional pockets were found, and many thousands of fine wulfenite specimens were recovered, including some of the best ever collected there. One pocket measured approximately 5 by 6 by 13 feet and was completely lined with wulfenite crystals.

Bunker Hill Mine 1994

In 1994 Wayne contracted with Bob Hopper, head of a small group who owned the Bunker Hill mine in Kellogg, Idaho, to sell specimens recovered during Bob's mining operations there. After a few months of unproductive mining, Bob opened a series of remarkable crystal pockets that produced thousands of the finest pyromorphite specimens ever found anywhere. The color on these pieces ranges from bright green to yellow-green, yellow, orange and red-orange, and the crystals reach 5 cm. Wayne made numerous trips to the mine, and sold most of the great specimens over the next two years.

Red Cloud Mine 1994–1995

In 1994, in partnership once again with James Horner, Wayne purchased the famous Red Cloud mine at a Federal Court auction, and formed a corporation with Les Presmyk, Bill Larson and Gene Meieran to mine it for specimens. On April 1, 1996, the largest and most productive pocket ever found at the mine was entered by Wayne's miner Bob Johnson, and hundreds of great matrix specimens with crystals to 4 cm were recovered. Flats filled with the most gorgeous specimens covered the floor of Wayne and Laura's kitchen, living room and dining room! The exciting story of this discovery is told by Wilson (1996).

BUYING COLLECTIONS

Energetic as he has always been at field collecting, Wayne has purchased his share of collections over the years as well. For example, the Eric Asselborn collection, the Gary R. Hansen collection, and the Hadley and Marion Stewart collection had all been built over several decades, and each contained a number of exceptional specimens. These included many old classics, with labels from the Smithsonian, Harvard and British Museums, along with earlier provenance information (concerning who owned the pieces), some dating back nearly 200 years. The acquisition of such fine collections for resale doesn't happen every day, but when it does there are rare (brief!) opportunities for Wayne's customers to acquire extraordinary, long-unavailable specimens. And where a whole collection could not be acquired, Wayne has managed to acquire individual specimens by exchange (or to sell on consignment) from major museums and from such prominent collectors as Steve Smale and Bill Larson.

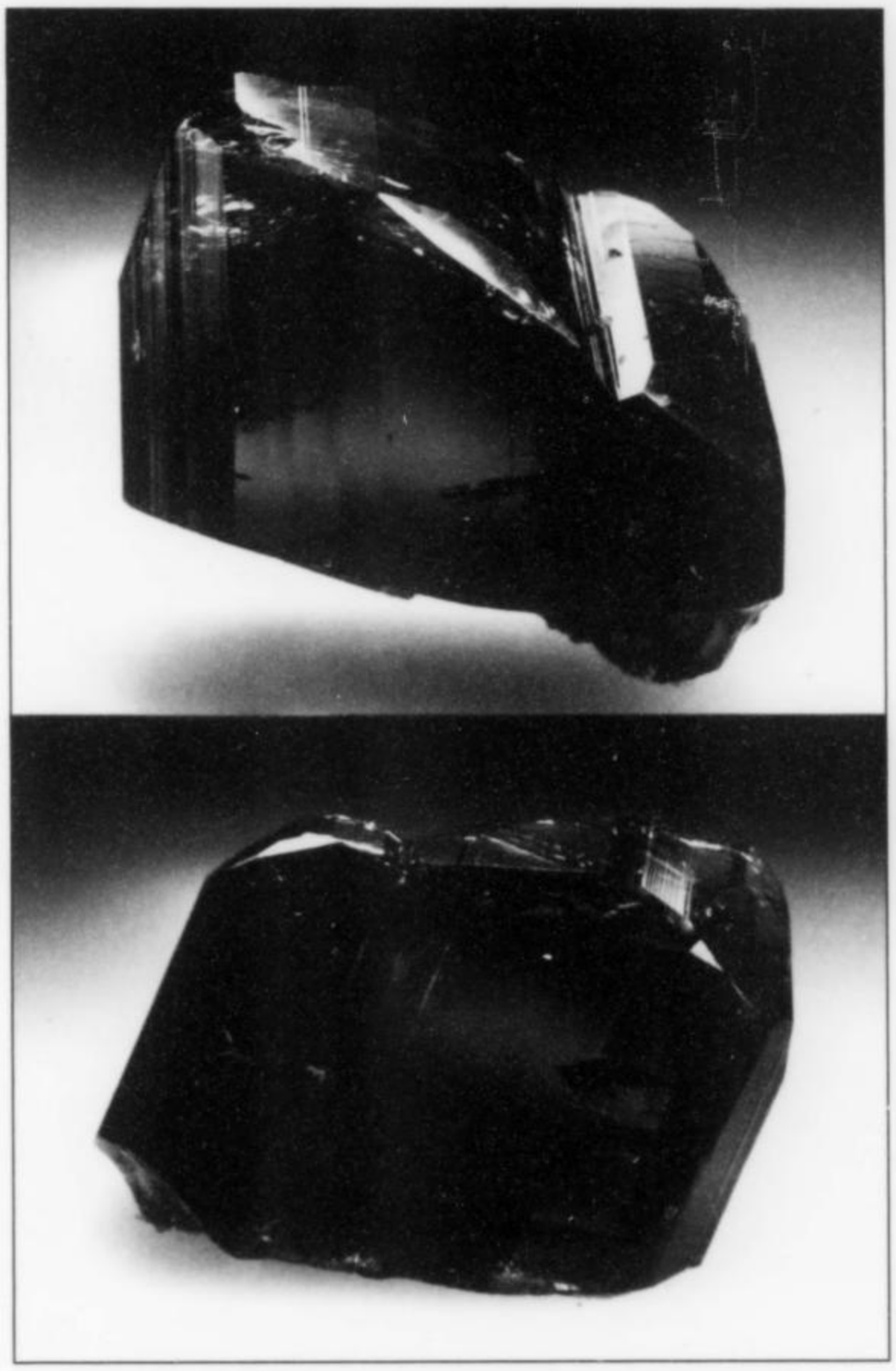


Figure 19. **Tanzanite (zoisite) crystal, 5 cm (two views), from Arusha, Tanzania. Collected during a specimen-mining operation sponsored in part by Wayne Thompson and Gene Meieran in 1995. Wendell Wilson photo.**

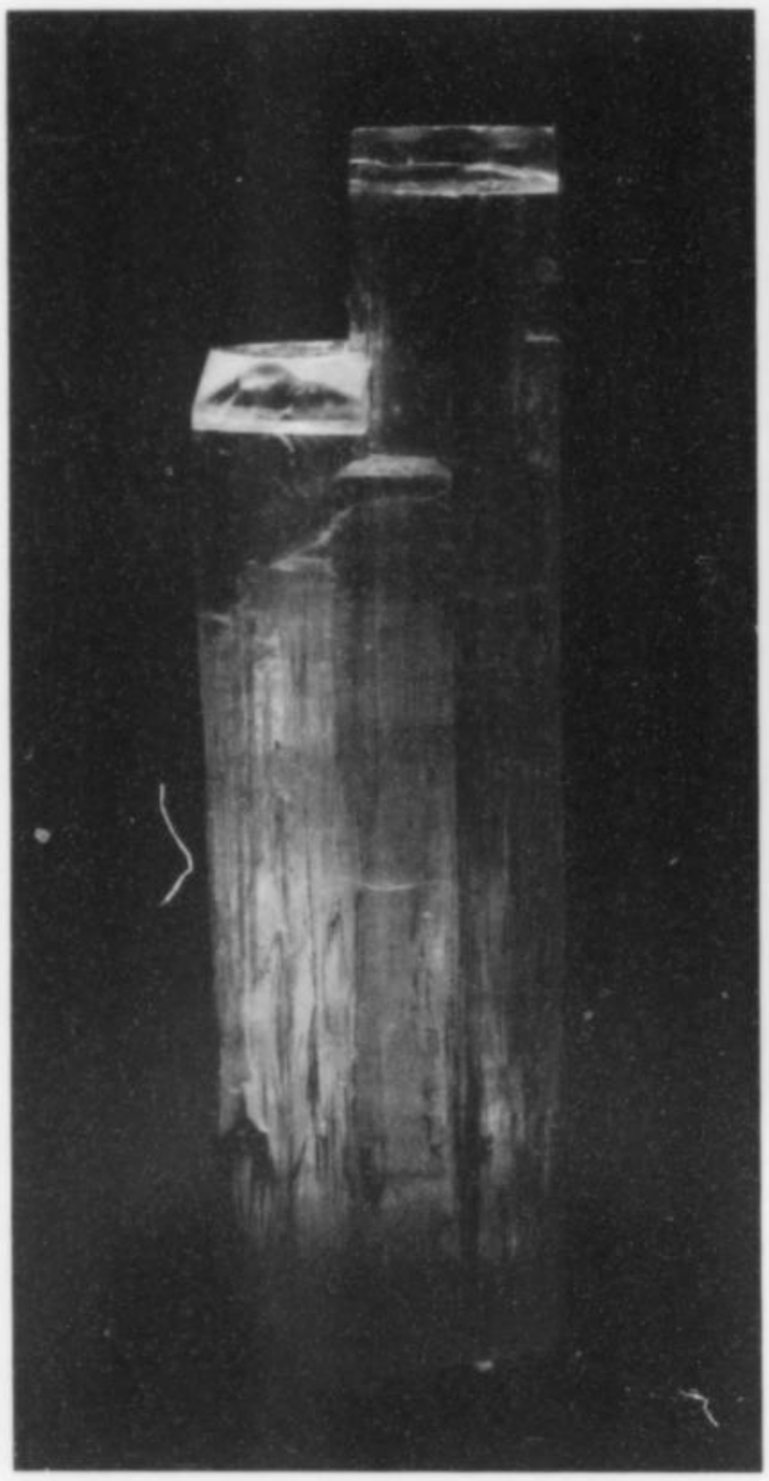


Figure 20. **Aquamarine beryl, 12 cm, from the "Blue mine," Shigar Valley, Skardu, Northern Areas, Pakistan. Collected in 1989 during Wayne Thompson's sponsored excavation there. Steve Smale collection and photo.**

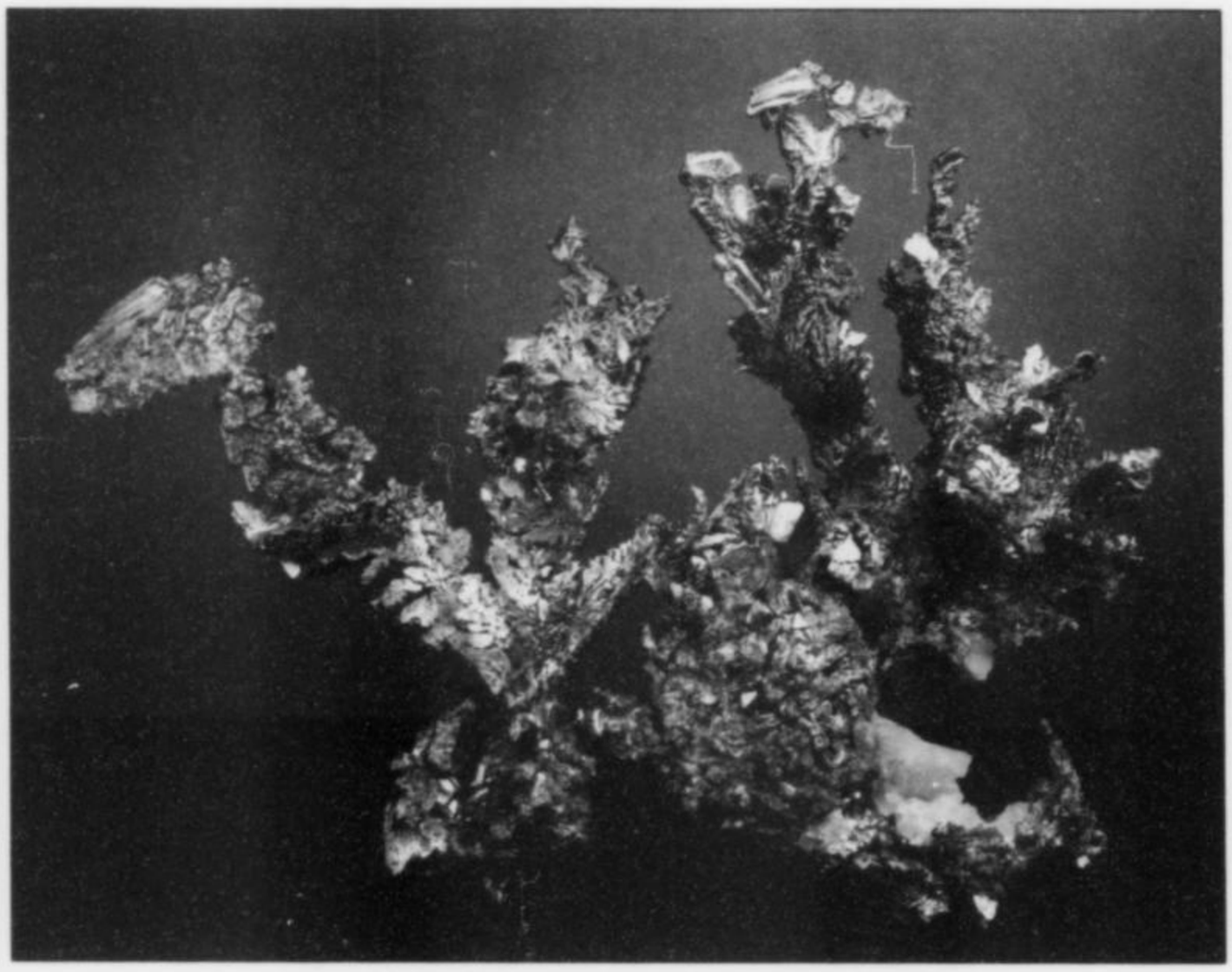


Figure 21. **Gold specimen, 8 cm, from the De Maria mine, California. Collected during Gene Meieran and Wayne Thompson's project there in 1990–1991. Steve Smale photo.**

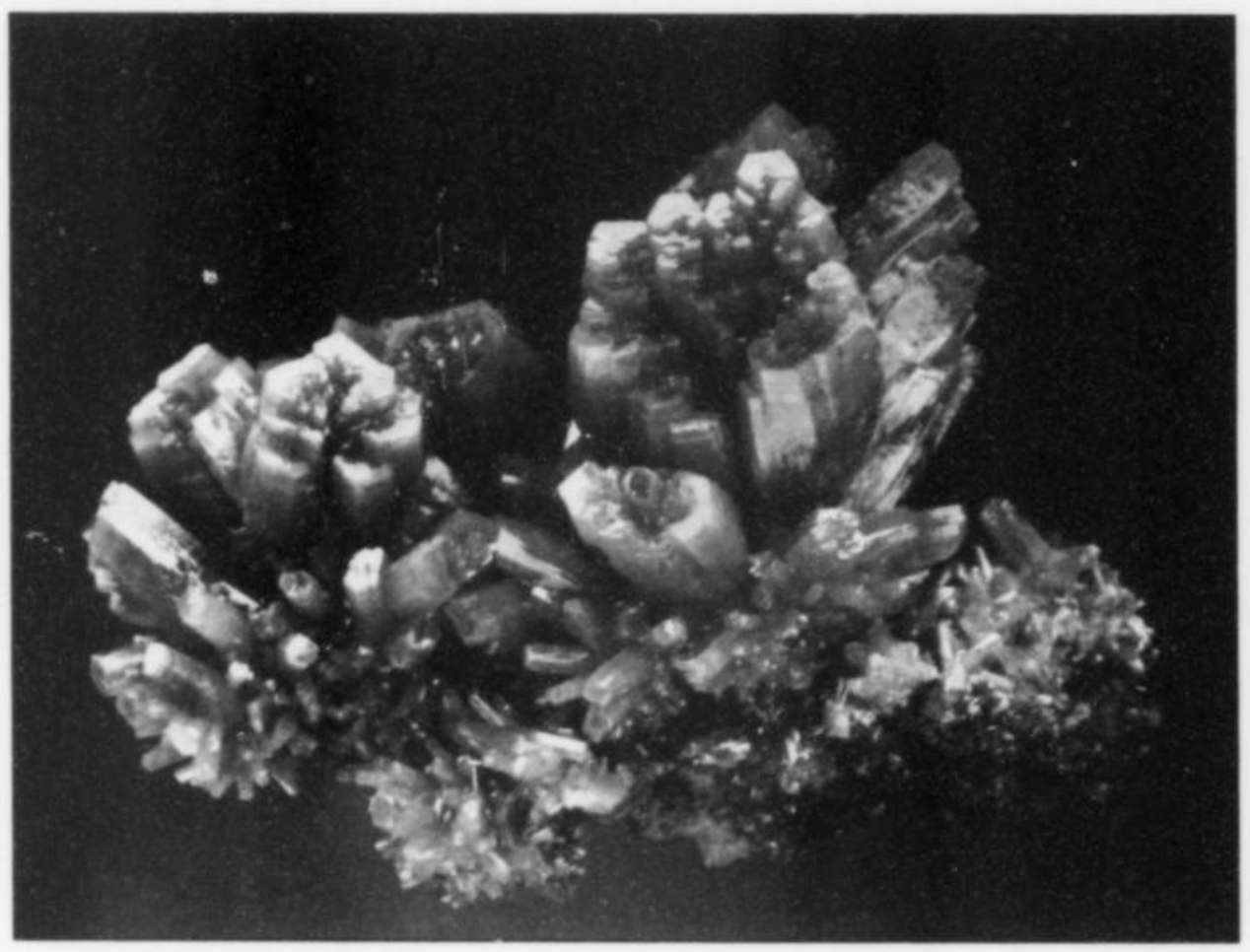


Figure 22. **Pyromorphite, 8.3 cm, from the Bunker Hill mine, Idaho. Collected by Bob Hopper during his project supported by Wayne Thompson and James Horner in 1994. William Larson collection; Jeff Scovil photo.**

MINERAL SHOWS

Wayne attended his first Tucson Gem and Mineral Show in 1960 and has returned every year since then, first as a collector, then as a tailgater (when the show was at the old Pima County Fairgrounds before 1971), then as a satellite-show dealer at the legendary Desert Inn, and finally as a main show dealer. He was among the first to open a salesroom at the Desert Inn when the main show was moved to the Tucson Convention Center in 1971. He later had a wholesale booth when there was a wholesale section of the main show, and has been a dealer on the main floor many times. Currently he has a showroom at the Westward Look resort show before the main show opens, and shares a booth with Bill Larson's Pala International at the main show. Many people don't realize that it was Wayne (with Dave Waisman) who originally financed and organized the Westward Look Mineral Show, held a few days in advance of the annual Tucson Gem and Mineral Show since 2002. This show focuses on gathering together the top dealers and the highest-quality mineral specimens in a resort-style setting.

BEHIND EVERY SUCCESSFUL MAN . . .

Wayne married Laura Estrada, a fifth-generation Arizonan, in 1978. Laura operates her own company, *Shades of the Earth*, selling wholesale fine-quality gemstones, and was a member of the American Gem Trade Association for many years. Throughout their marriage Laura has supporting Wayne in all the risks inherent in the buying and selling minerals; accompanied him to remote areas of the world, from Pakistan to Mexico; encouraging him (as a mineral collector in her own right) to keep rather than sell particular specimens; and many times has crawled fearlessly into underground

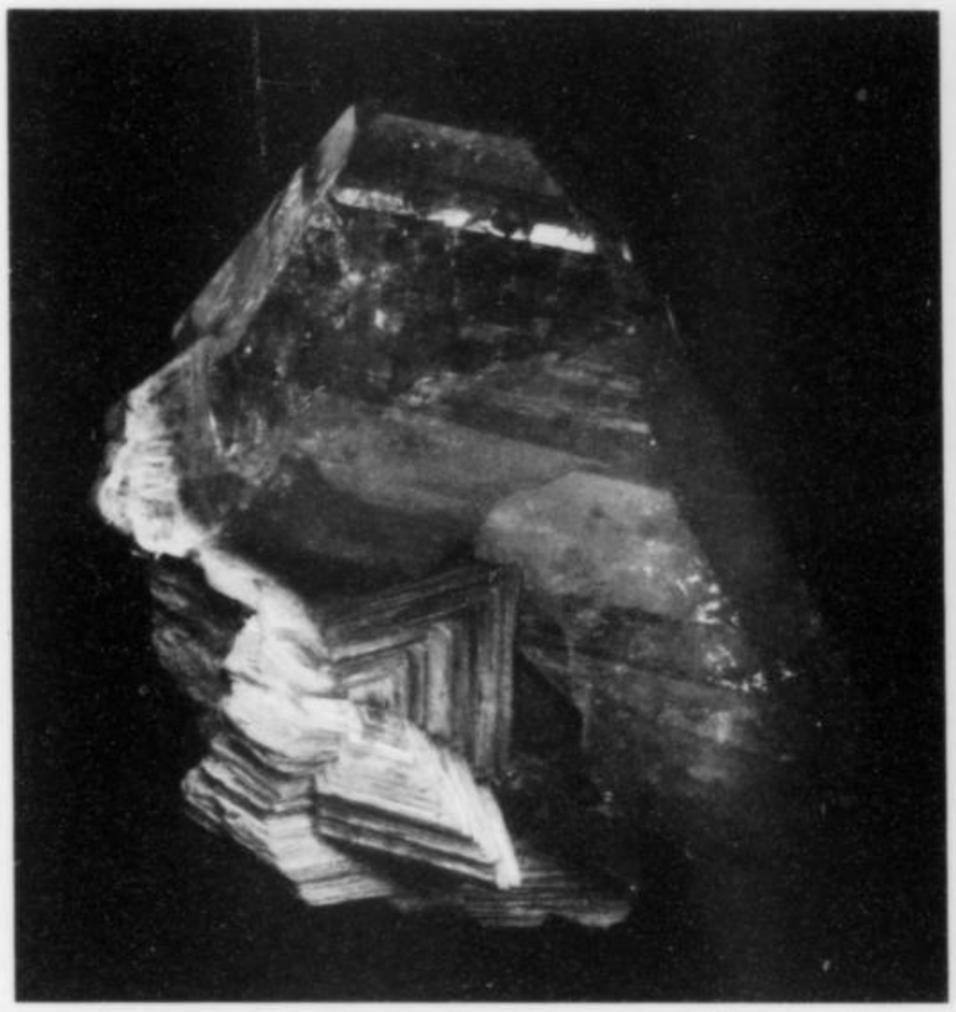


Figure 23. **Brazilianite crystal, 4.3 cm, from Corrego Frio, Minas Gerais, Brazil. Collected during Pierre Laville, Gene Meieran and Wayne Thompson's project there in 1999. Jeff Scovil photo.**

Figure 24. **Amethyst crystal cluster, 12 cm, from Las Vigas, Veracruz, Mexico, collected during Mike New and Wayne Thompson's project there in 1989–1990. Gene Meieran collection; Jeff Scovil photo.**

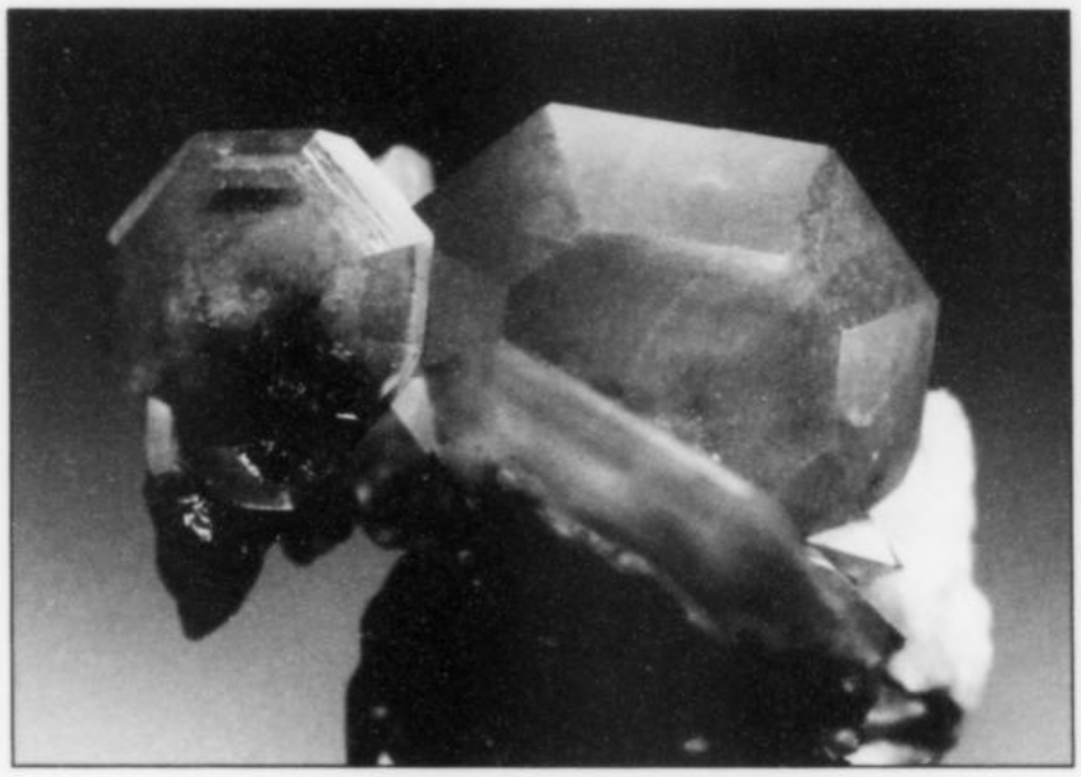


Figure 25. **A future project? Wulfenite from an unnamed mine (Wayne calls it the "Yellow Cloud mine") in northern Sonora, Mexico, discovered during reconnaissance prospecting by Wayne Thompson. He plans on exploiting it in the future. The main crystal is 1.2 cm. Wendell Wilson photo.**

Figure 26. **The larger portion of the original specimen from which the new species grandreefite, pseudograndreefite, aravaipaite and laurelite were all described by Kampf *et al.* (1989). It was collected by Wayne Thompson (with Laura Thompson, Bob Johnson and Ed Anderson) at the Grand Reef mine. The white acicular mineral is laurelite. Les Presmyk collection.**

workings to help him dig specimens in the San Francisco, the Flux, the Red Cloud, the Old Yuma and the Grand Reef mines, as well as the Morenci open pit. She has been the most supportive partner any mineral collector could ask for. These days Laura's time and love are devoted to being a mom to daughter Stevia, born on Valentine's Day 2001, and also to designing jewelry.

CONCLUSION

Today Wayne is still going strong, with specimen mining projects in Mexico, Brazil, Pakistan, Afghanistan, and locations in the U.S., while maintaining a full-time purchasing presence in several of the world's most potentially productive countries. Specimens come in regularly, but usually only one at a time from troubled areas like Afghanistan and Pakistan, where voluminous finds are rare. The specimens in Wayne's "personal collection" — which amounts more or less to his dealer stock—have generally numbered only ten to 25 pieces at any given time. The focus has been on the finest, most aesthetic specimens known; at the same time he has advised and guided other top-level collectors as necessary. When a shipment comes in, when a collection is purchased, or when a pocket has been collected in one of his mining ventures, all but the world-class pieces are immediately wholesaled to other dealers with whom he has close ties, so that he can devote all of his energy and time to the very top specimens. Finding buyers for these exceptional pieces is easy; the real

challenge is locating and obtaining more of such specimens for his customers.

When people share a common interest it is not surprising that they become friends, and Wayne feels that, for him, friendship outweighs the dealer-client relationship most of the time. He wants his specimens to have good investment potential—so he'll be able to look his friends in the eye after making a sale to them. His expectation is that 80% of the specimens he sells will be resellable by the collector in a year or less at the original purchase price or more—sometimes quite a bit more. He doesn't aspire to 100%, though, because of inevitable but unpredictable new discoveries. Sometimes a new pocket discovered at the locality, or another new locality, may devalue earlier specimens by changing the supply-demand ratio and the level of quality available. Nevertheless, high quality almost always holds its value and *on the average* he feels that a good profit should generally be realized. This has been demonstrated by Wayne's customers time and time again.

Wayne has sold to most of the great dealers and collectors of the last 50 years, and many of his best friends are the greatest collectors and dealers of the second half of the 20th and of the early 21st centuries. Wayne's specimens have found their way into elite collections of important connoisseurs such as James Horner, Gene Meieran, Sandor Fuss, Karl Kemph, Wayne Sorenson, Bill Larson, Ed Swoboda, Eric Asselborn, Steve Neely, Steve Smale, Jack Halpern, Peter Via, Norm and Roz Pellman and many others. He has also supplied fine specimens directly to the Smithsonian Institution, the Houston Museum of Natural Science, the Los Angeles County Museum of Natural History, and the Sorbonne in Paris. With the high-end market for minerals now booming, world-class specimens rarely last long in his possession. His clientele are limited in number to an exclusive few, but they take everything he can find, at prices characteristic of mid-range artworks by the Old Masters. The late Paul Desautels (1920–1991), Smithsonian curator and one of history's great mineralogical connoisseurs, always said that someday the finest mineral specimens would be recognized for the true masterpieces that they are, comparable to the great artworks, and with commensurate prices as well—and that prophecy is well on its way to being fulfilled.

NOTE ADDED IN PROOF

On October 3, 2006, as this issue was going to press, Wayne Thompson's wife Laura passed away following a four-year battle with cancer. She was 52 years old.

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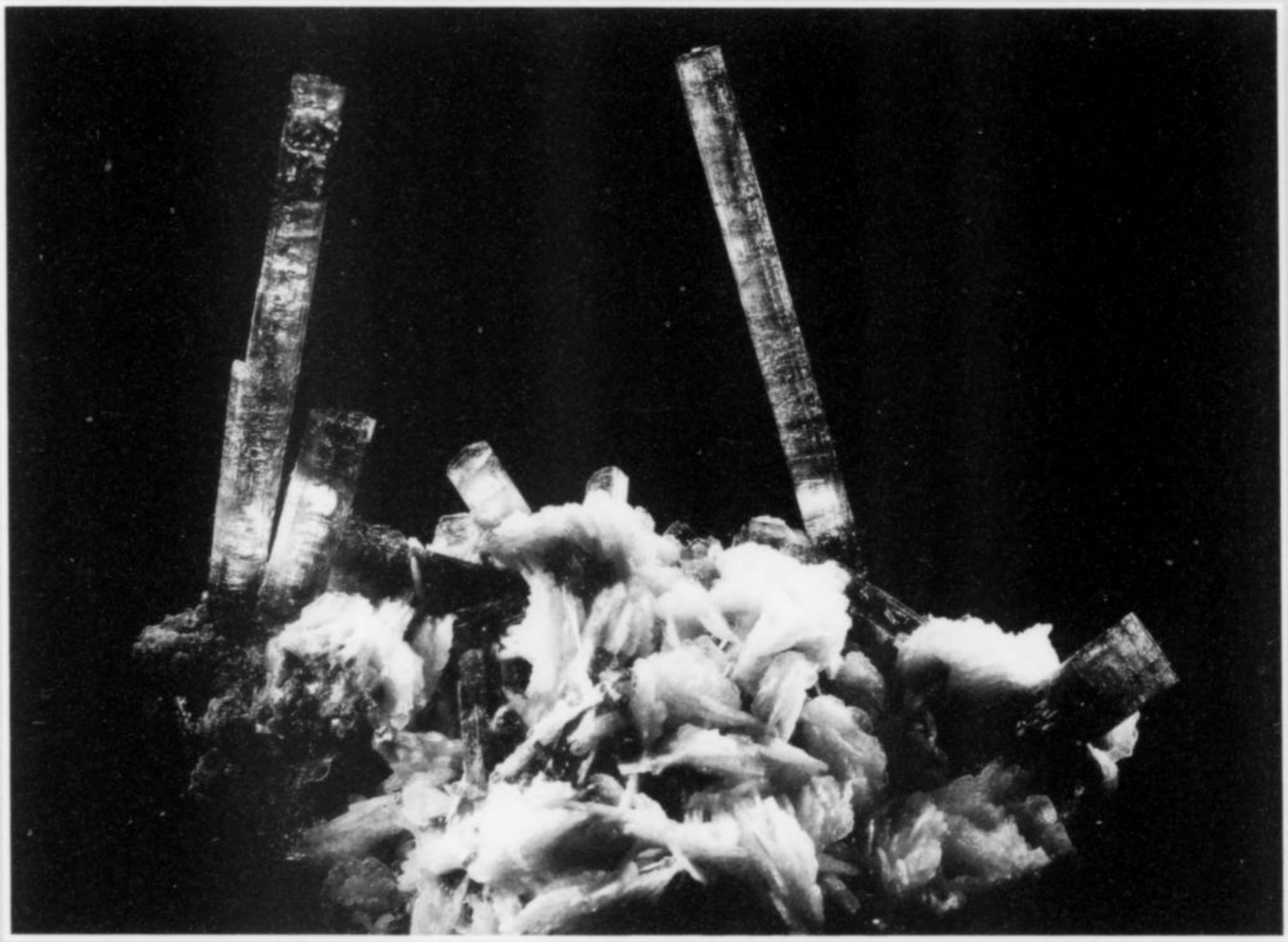

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on Cleavelandite
from Paprock nr. Nuristan, Kunar Province,
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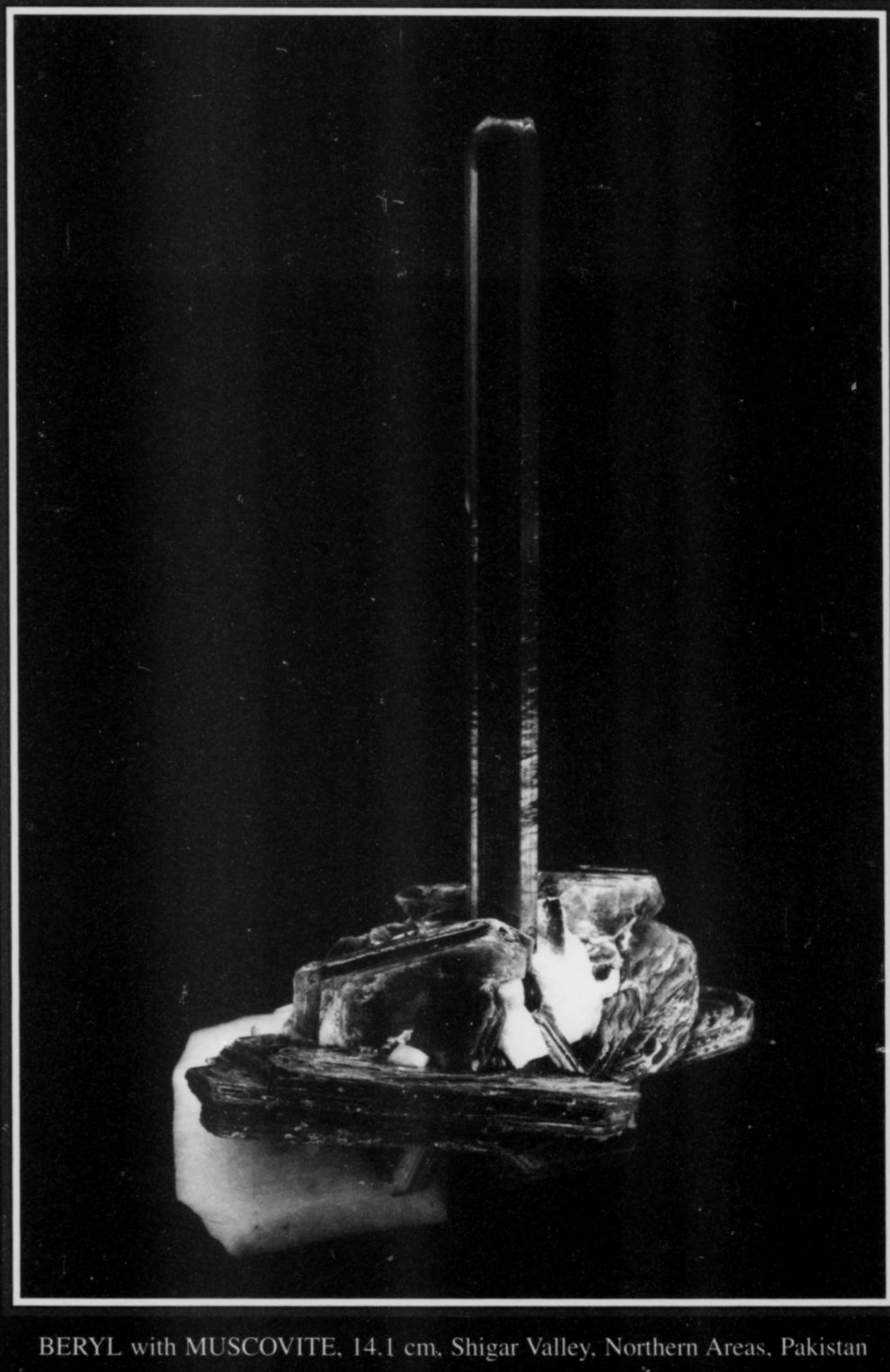


BERYL with MUSCOVITE, 14.1 cm, Shigar Valley, Northern Areas, Pakistan

Clara and Steve Smale

COLLECTORS

PHOTO BY JEFF SCOVIL

What's New in Minerals

Springfield Show 2006

by Joe Polityka

[August 11–13, 2006]

The weather was beautiful as we drove to Springfield, Massachusetts on Thursday August 10th, the day before the show's opening. The latest terrorist plot in England had just hit the news, and I wondered if show attendance might be affected. But there was no cause for worry; when the show opened on Friday morning the parking lot was full and those attending were smiling from ear to ear. The special exhibit this year featured world-wide minerals (and, of course, exceptional Michigan copper specimens) from the collection of the Seaman Mineral Museum at Michigan Technological University in Houghton, Michigan. Over 50 display cases offered a comprehensive view of the minerals of Michigan's copper and iron mining districts, including gemstones and agates of the Lake Superior region. There were also many cases of classic United States and worldwide minerals. More about these later.

About 200 dealers were set up in the retail and wholesale sections and, as usual, there was a lot to see. This year two things struck me: the prices of common species and the shortage of minerals in the "what's new" department. There were plenty of worthy specimens in the kilobuck range which were good enough to command top prices. However, $400 for a dull 5-cm prehnite finger (prehnite after anhydrite) and $800 for a 5-cm amethyst crystal on matrix (with a prominent ding in the middle of the amethyst) struck me as a bit much. In some ways I felt like Rip Van Winkle after his 20-year sleep. But there have always been overpriced specimens on the market. As in past years, there were many good mineral specimens and some pleasant surprises.

Kristalle featured specimens from the Marty Zinn and Kirby Siber collections. Both collections took many years to assemble and contained many top quality pieces. We all know Marty, of course; Kirby Siber (a partner with his brother Eddy in the Siber+Siber mineral dealership) is the world-renowned Swiss paleontologist who is also a mineral collector. There was a feeding frenzy at Wayne and Donna Leicht's table all weekend.

Rob Lavinsky of *The Arkenstone* had many one-of-a-kind specimens from the Ed David collection. Rob also had some **gold** specimens in quartz matrix in miniature to cabinet sizes. These came on the market recently and are from the Mockingbird mine, Mariposa County, California. Some of the specimens have flattened octahedral crystals in branching formations up to 5 cm in width, perched on a massive quartz matrix. He also had some new **copper** crystal specimens from the Chino mine, Santa Rita, Grant County, New Mexico. These specimens, without matrix, are usually single and parallel elongated crystal groups averaging 4 cm in length and about 1 cm in width.

A pleasant surprise brought to my attention by John Veevaert of *Trinity Minerals* was **wulfenite** in red-orange crystals on matrix from the northwestern area of Nonan, Xinjiang Province, China. Kevin Downey of *Well Arranged Molecules* and Guanghua Liu of *AAA Minerals* had the only specimens of these here at the show. They are a rich deep reddish orange color with crystals to about 1 cm across. Most specimens had slight damage; however, this is a minor feature when you consider the location and color. Kevin also had some unusual scepter **smoky quartz** crystals from Cong Ly, Hunan Province, China with fantastic shapes.

John Veevaert also informed me that Guanghua Liu of *AAA Minerals* has just published a very valuable reference book on Chinese minerals and the mineral deposits that are producing specimens today. Available for $148.00 plus shipping, it offers 365 indexed pages of stunning photos of minerals (many by Jeff Scovil) from all over China. A review is posted on the "Bookstore" section of the *Mineralogical Record*'s website, www.MineralogicalRecord.com, where copies can be ordered.

Terry Szenics had some exceptional specimens of well crystallized **pseudomalachite** from a new find at the Manto Cuba mine at Inca de Oro, Chile. He also had specimens of the very rare species **ahrbarite**—a deep, rich blue, copper-based arsenate—from the Soledad mine, Guanaco district, Chile (both species are found in microcrystals). Terry also had the last of the better specimens of **szenicsite**, the new mineral of a few years ago that Terry discovered. Last, but not least, he had **libethenite** in dark green microcrystals from the Los Azules mine, Quebrada San Miguel mining district, near Paipote, Chile.

The Brazilian dealer Luis Menezes had some exceptional specimens of **wodginite epitactic overgrowths on cassiterite** from the Jaboti mine, in Minas Gerais, Brazil. The dark single crystals are up to 3 cm in size. These were described in a 1978 article in the *Mineralogical Record* (vol. 9, no. 1).

Other dealers with similarly high quality specimens were *Collector's Edge, Minerals America* and *Dan Weinrich*. Dan Weinrich had the best variety of minerals from China, especially **fluorite** crystals of many sizes and colors, with very little or no damage.

At *Mountain Minerals International*, Dudley Blauwet had his usual extensive selection of minerals from Pakistan and Southeast Asia. Many specimens are one of a kind.

In the wholesale section *Donald K. Olson* had an 8-foot-wide cabinet filled to the brim with Michigan **copper and silver** specimens in all sizes, from thumbnail to museum size. Each specimen is unique, with some showing crystal faces and others branching flattened crystals. Another cabinet of similar size was filled with a mixed bag of world-wide specimens.

Jewel Tunnel Imports had some interesting and attractive **andradite** from Magana near Sandare, Cercle du Nioro, Kayes Region, Mali. The crystals, with sharp edges, up to 5 cm in diameter, are quite lustrous and are a must for the garnet collector. The crystals I saw were all without matrix and were reasonably priced.

Orange-red **stilbite** (or is it stellerite, as some claim?) was prominent at the booths of *Wright's Rock Shop, Raj Minerals* and *Superb Minerals India.* The crystal sheaves sit on a dark matrix or a green chloritic matrix which makes for an attractive contrast.

Earlier I mentioned this year's display of minerals and gems from the collection of the Seaman Mineral Museum. This was your chance to see unexcelled copper, silver and calcite specimens from Michigan's copper region and specimens from the Michigan iron mines. Also, hundreds of singular specimens from around the world were displayed according to geographic locations such as Germany, Africa and the United States. If you did not attend the show, shame on you! If you attend any shows during the year you must put the Springfield Show on your list. In this age of higher gas prices it is your most cost-effective way of seeing the collection of a prominent collector or museum.

The 2007 show will feature specimens from the collections of the Sterling Hill Mining Museum and Franklin Mineral Museum in New Jersey, and will include a special fluorescent mineral display. This will be a show at which ugly massive minerals (and some nicely crystallized ones as well!) will glow beautifully in the dark! Be prepared to see every color in the fluorescence spectrum!

Denver Show 2006

by Tom Moore

[September 12–17, 2006]

This year once again, the early-autumnal Denver Show offered its mineralogical pilgrims a breezy, companionable scene with (despite all the bustle) an easygoing ambiance which seems to emanate from the beautiful Rocky Mountain front vistas off to the west, where serene stands of trees are yellowing and chilling out without stir or comment. Meanwhile, the show's convivial treasure-hunting seems to run its course all too soon, leaving one too wired to sleep during the plane flight home, remembering many good talks and good dinners with good people.

Unseasonably chilly air came down from those primal mountains this year, and high winds one night rose mysteriously from nearly cloudless skies around the Holiday Inn, but Marty Zinn's hotel show went swimmingly all the same. Over at the 39th Annual Denver Gem & Mineral Show (the "Main Show"), one could welcome back Mr. Bones, the walking dinosaur skeleton who prowls about and feints at eating the heads of small children—he had been absent from last year's show, and I had (yes) worried about him.

This Denver Show, although not especially rich in exciting new mineral finds, was nevertheless highly stimulating, as it featured showings of many "old" and exceptional specimens, both as small lots and as one-of-a-kinders, both in the dealers' stocks and in the display cases. A couple of major collections and several minor ones were being recycled, and the Main Show displays were even finer than usual (see later). This show's size is such that the 2006 what's-new roster, even though thin, could not help but contain lots of interesting things anyway, including some from Colorado, where several sorts of collecting action have been going on this year:

In the Tarryall Range, Park County, miarolitic pockets in aplite dikes have long been known for occasionally yielding good **topaz**, either as loose single crystals or in specimens showing topaz crystals resting on smoky quartz crystal faces. Early in 2006, Stephen D. Renner of *Northwestern Mining Co.* (P.O. Box 789, Florissant, CO 80816-0789) took on the Tarryalls quite seriously and made them give up about 1,000 thumbnail and small-miniature specimens of topaz, the best of which were to be seen in the room Stephen shared with Scott Kleine's *Great Basin Minerals* in the Holiday Inn. All of the topaz crystals are sharp, face-rich, highly lustrous, and at least 75% gemmy; all but a few are totally colorless, and those elite few are a lovely, limpid pale blue. Some specimens are single crystals (with cleaved bases) from less than 1 to about 3 cm, whereas others show topaz crystals perched lightly on medium brown crystals of smoky quartz, and there are a few clusters of two or three topaz crystals delicately attached. Stephen's two best pieces are a beautiful, blocky, pale blue gem crystal measuring about 2.5 × 2.5 × 3 cm, and a spectacular crystal, likewise gemmy throughout, which measures 3 × 4 × 5 cm and weighs 365 carats. Watch for Stephen at future shows, for he is spending a lot of time digging in the Mountains these days, and who knows what interesting names he'll bestow on future productive pockets: so far he's called three of them the "Hubcap," "Bottom Dollar Redux," and "Molo Binis pockets."

Two more field collectors who have been fruitfully busy in Colorado lately are Joe and Susan Dorris of the combined dealership of *Pinnacle 5 Minerals LLC* and *Glacier Peak Mining LLC* (glacier@frii.com). In the Holiday Inn, Joe and Susan filled almost a whole room with vivid specimens of green **microcline** ("amazonite") dug over the past couple of collecting seasons, mostly from the "Last Chance Pocket" in a claim called the Smoky Hawk mine near Florissant. The microcline crystals have an exceptionally fine color, about the deepest blue-green one could hope for from Colorado microcline. Most of the Dorrises' specimens are loose, miniature-size single crystals, but more impressive, of course, are the cabinet specimens showing sharp crystals of microcline to 10 cm with smoky quartz crystals of about the same size. Joe and Susan also had their own stash of pristinely gemmy Colorado **topaz** crystals ranging in size from 1 to 3.5 cm and in color from palest sherry to very pale blue.

By the time of the coming Tucson Show there may well be further healthy developments in Colorado. Bryan Lees of *Collector's Edge* (www.CollectorsEdge.com), inspired by the recent great pocket strike of **aquamarine** on Mt. Antero (see the Tucson 2005 report), has leased a part of this famous collecting area and even now is pulling out **phenakite** specimens with individual crystals to 2.5 cm: we should see these, Bryan says, in Tucson in 2007. He surmises that this phenakite pocket area on Mt. Antero marks the top of an alteration zone where aquamarine crystals have been destroyed by hydrothermal solutions which then deposited phenakite higher up; accordingly he is planning to look lower down on the mountain for fresh aquamarine. At the same time, the working partnership between *Collector's Edge* and Robert Stoufer's dealership, *Colorado Minerals* (www.ColoradoMinerals.com), as described in my Tucson 2006 report, is continuing to bring to light fairly good supplies of **sphalerite, galena** and **amethyst** specimens from the Commodore mine, Creede, Mineral County. At the Main Show in Denver, Robert Stoufer was offering many more specimens of the type described from the Tucson Show, with resinous yellow-brown sphalerite crystals to 5 cm.

Some of the best **gold** crystal specimens from California—and therefore some of the best from anywhere—have long come from the Mockingbird mine, Mariposa County. This mine lies on the same vein structure as the nearby, and even more famous, Colorado Quartz mine, and gold crystals from both mines are prized for their bright luster and sharp octahedral forms (with slightly rounded edges). For about six years now, miner John Emmett has been working, mostly part-time, to find gold crystals at the Mockingbird mine, and some of the best results of his work may be seen now on Rob Lavinsky's *Arkenstone* website (www.irocks.com), while a few more were on view in Denver, both in Rob's alcove at the Main Show and in the Holiday Inn ballroom, where they were chaperoned by Doug Wallace of *Mineral Search* (www.goldminerals.com). Doug had about ten gold specimens from the Mockingbird mine,

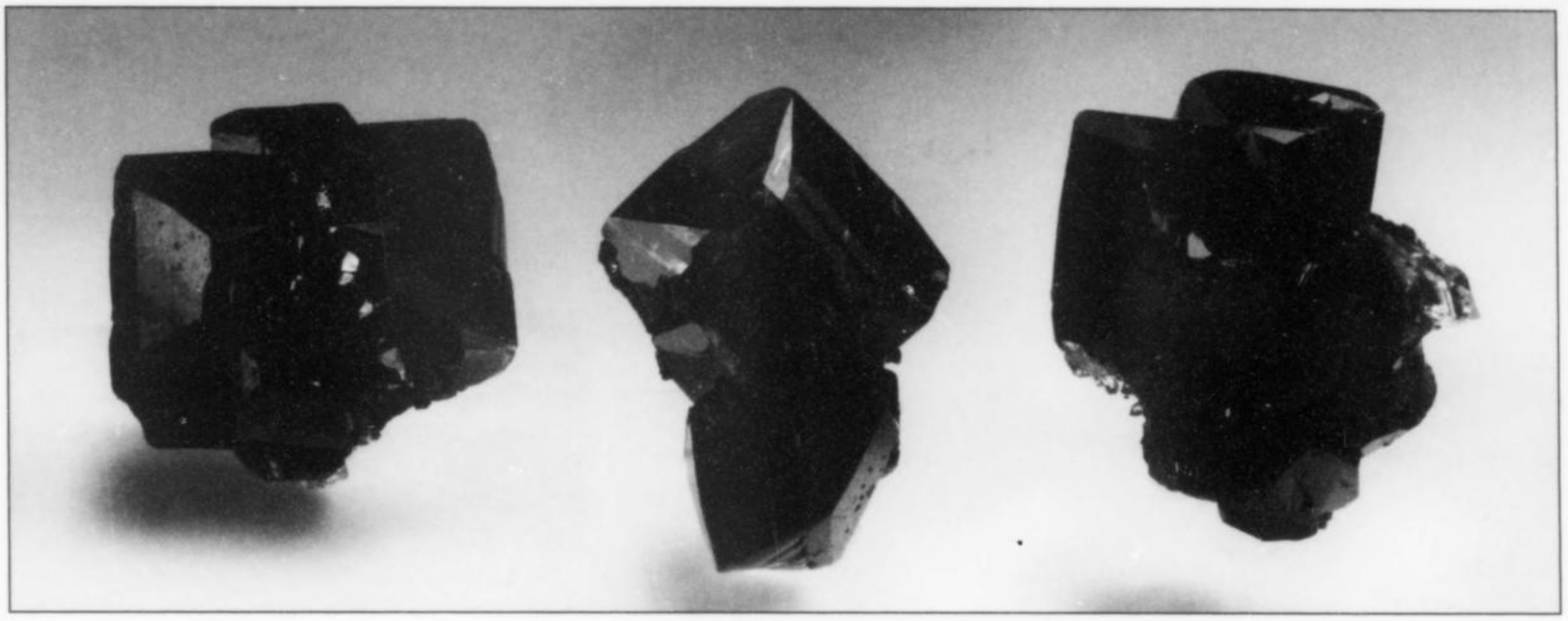


Figure 1. **Lazulite thumbnails (to 2.2 cm) from last summer's collecting season in the Yukon. Rod Tyson specimens; Wendell Wilson photo.**

all miniatures, all superb, with hoppered octahedral crystals to 1 cm in crisp little groups, or with brightly lustrous, flattened dendritic-growth sheets rising from massive quartz matrix. One specimen, which Doug calls "the trilobite," shows a single spinel-law-twinned crystal of gold measuring about 1.5 × 2 cm lying lightly atop a chunk of milky quartz.

John Seibel of *Seibel Minerals* (johnseibel@hotmail.com) is often good for something surprising and self-collected from somewhere in or near California. This time, at the Main Show, he had four flats of very bright, pretty specimens of **chalcophyllite** which he had dug in August 2006 in the old underground workings of the Majuba Hill mine, Pershing County, Nevada. As Martin Jensen explains in his article on the locality (in the Nevada Issue: vol. 16, no. 1), Majuba Hill's best specimens of rare, colorful arsenate species emerged in the 1940's and 1950's while the mine was still active, and infrequently thereafter, from an area called the Copper Stope. This stope has been inaccessible for some years now, but a chance rockfall last May opened it up again—the result being John Seibel's hundred or so matrix pieces, from thumbnail size to 6 × 8 cm, showing altered rhyolite sprinkled with tabular, brilliant sky-blue chalcophyllite crystals to 5 mm. In a few cases the chalcophyllite crystals form rosette-shaped aggregates, but mostly they are flake-like singles thinly or thickly strewn over matrix, with microcrystals of azurite and brochantite and drusy areas of green-stained "adularia" orthoclase. Although they are no match, of course, for the best of the antique specimens from Wheal Muttrell, Cornwall, England, these new specimens nevertheless are some of the best chalcophyllites ever found in the United States.

In my 2002 Tucson Show report you read about how, in the summer of 2001, Stan Esbenshade had been combing the dumps of the Chino open-pit copper mine in Grant County, New Mexico, with his metal detector, and found a marvelous boulder which produced about 50 superb specimens of crystallized **native copper**. Another copper-specimen jackpot was hit again at the Chino mine on July 1, 2006, but this time it came from a crystal-lined pocket exposed by a blast on the 5100-foot bench of the pit. The pocket was totally cleaned out, yielding about 200 specimens from thumbnail size to 8 cm long, the take eventually being split between Rob Lavinsky's *Arkenstone* and Les Presmyk's *De Natura* (www.denatura.net) dealership. On Rob's website you can see some fine larger specimens which are complete "floater" stalks of bristling spinel-law twins of copper. The *De Natura* stand at the Main Show harbored three flats of thumbnail and small miniature-size specimens of the same material, each specimen a little loose coppery stalk. This new Chino mine copper is reminiscent of specimens both from the old Ray mine, Arizona, and from the Itauz mine, Kazakhstan, except that Itauz specimens (and some Ray specimens as well) typically show a burnished, old-penny copper color, whereas the Chino mine specimens are (to my taste anyway) overcleaned and thus rather too new-penny bright. That will change with time, of course, as they gradually develop a patina in the showcase or specimen drawer.

The last stop in the U.S. is Magnet Cove, Hot Springs County, Arkansas—site of a magnetite-mining operation of mid-19th century vintage and, ever since then and up to the present, a source of distinctive specimens of rutile, brookite and several other oxide species much less well known. This year, in the Holiday Inn ballroom in Denver, John and Maryanne Fender of *Fender Natural Resources* (fendernaturalresources@yahoo.com) offered twelve fascinating *flats* of Magnet Cove specimens which they had bought in 2005 from Clyde Hardin of Malvern, Arkansas, a dedicated local collector who'd kept digging these odd items through all the years from 1972 to 2003. Looking through the flats, with their hundreds of thumbnail and miniature-size, brown and black specimens rolling around in cotton-lined boxes (each with a detailed label) was one of those experiences that one goes to major shows *for*—educational as anything, but more fun even than that. Among the specimens were brilliantly adamantine black "sixling" groups of **rutile** to 4 cm; **brookite** of several sorts, including canted, house-of-cards piles of bright black tabular crystals on quartz; clusters of sharp black, glossy, octahedral crystals of **Fe-rich spinel**, with individuals to 5 mm on edge; simple-octahedral black **magnetite** crystals with rounded, brown, faintly lustrous **kimzeyite** crystals to 4 mm resting on them; similar specimens with **baddeleyite pseudomorphs after kimzeyite**, also brown and equant, to 1 cm; sharp lustrous brown **perovskite** crystals to 1.5 cm; and **anatase pseudomorphs after perovskite**, the dull brown but sharply formed octahedrons to 1.5 cm resting on magnetite crystals. Yes, there is more to Magnet Cove minerals than just rutile sixlings and pitted black brookite on even more heavily pitted quartz crystals. A full locality article on Magnet Cove is in preparation for a future issue of the *Mineralogical Record*.

Figure 2. **Microlite—two conjoined dodecahedral crystals with trisoctahedral modifications, 2.1 cm—from the Urubu mine, Itinga, Minas Gerais, Brazil. John Veevaert specimen; Wendell Wilson photo.**

In a highway roadcut 1 kilometer west of the Yellow Lake Pumping Station near Olalla, British Columbia, the rare zeolite **brewsterite** was found in very fine (for the species) specimens during the 1970's, and there have been intermittent collecting revivals since then. In August 2006, Rod Tyson and his associates collected about 20 specimens which probably represent the best brewsterite found to date at Yellow Lake, and these were for sale at the always-interesting stand of *Tyson's Fine Minerals* (www.tysons-minerals.com) at the Main Show in Denver. Sharp, highly lustrous brewsterite crystals exceptionally reaching 1 cm form druses on walls of vugs in vesicular andesite. The brewsterite is pearly white and translucent to colorless and transparent, although in most specimens there are pink overtones from iron oxide staining. The matrix pieces range from 2 to 10 cm across.

To most collectors' tastes, however, white zeolites (even rare white zeolites) can be no more than warm-up acts when dramatically colored phosphates from the Rapid Creek-Big Fish, Yukon locality are on hand—and such indeed was the case at Tyson's. During this past August's collecting season the phosphatic ironstones exposed in streambeds at Rapid Creek-Big Fish yielded about 3 flats of superb and beautiful **lazulite** thumbnails and miniatures, with indigo-blue, mirror-faced, form-rich, flashing lazulite crystals to more than 2 cm. Some of the specimens are simply loose, single crystals or loose clusters of two or three, while others show the lazulite crystals resting on brown ironstone matrix with microcrystals of **siderite** and **kulanite**. A few specimens show an odd growth feature: crater-like depressions in the centers of lazulite crystals, similar in appearance to the central depressions in cyclic rutile twins. Of interest too is the fact that a fine thumbnail of this lazulite could he had for around $100–$150 (though the very best thumbnail was priced at $1200); in other words this find made not only for one of the show's most beautiful items but for one of its best bargains too. To top it off, the Tysons offered a handful of fine thumbnail **wardite** specimens, with sharp, lustrous, pale blue-green pseudo-octahedral wardite crystals to 1.5 cm associated with white microcrystals of **goyazite**; and they offered a few exceptional clusters of glassy pale green **augelite** crystals, and sprays of dark blue-green acicular **gormanite** as well.

From a brand-new occurrence in Colombia have come modest but likable **epidote** specimens: the locality is a mountainside digging of some kind called the Siph mine, Sipi County, Chocy Department. Isaias Casanova, who offered the specimens in the Main Show booth of his *IC Minerals* (icminerals@earthlink.net), could tell me nothing for sure about the place, but we agreed that the specimens combine features of epidotes from Prince of Wales Island, Alaska; Pampa Blanca, Peru; and some Swiss and Austrian Alpine pockets. Lustrous, bladed, wedge-terminated epidote crystals to 4 cm form subparallel sprays which rest on and between fat crystals of chlorite-included quartz to 4 × 4 × 5 cm. The quartz in itself is quite pretty, being transparent but slightly foggy and faintly green inside. Isaias had two flats of miniature to small cabinet-size specimens of this promising-looking material.

Also at the Main Show, Brian Kosnar of *Mineral Classics* (Minclassics@aol.com) was showing off a few matrix slabs—wide, thin pieces of matrix range from 5 to 30 cm across—of hard quartz porphyry thickly coated with powder-blue microcrystals of **vauxite**, together with sparser microcrystals of paravauxite and metavauxite. On some specimens, the blue vauxite forms casts after vanished spherical aggregates of **wavellite** to 8 mm diameter, and one specimen even shows metallic black microcrystals of **franckeite**. Yes, of course, the source of these specimens is the famous Siglo XX mine, Llallagua, Bolivia. If you consult the lengthy article in the March-April 2006 issue you'll read that most Siglo XX mine specimens of "the three vauxites" have come from the zone in the mine called the Contacto vein, and that indeed is where these new specimens were discovered, this past June. The find produced about 50 matrix vauxite specimens, and Alfredo Petrov (a co-author of the article) also was selling a few in his room at the Holiday Inn in Denver.

Brazil, uncharacteristically, spoke with only a small voice this time. Luis Menezes (lmenezesminerals@uol.com.br) had some **microlite** specimens found in mid-2004 on the dumps of the Urubu tourmaline mine, Araçuaí district, Minas Gerais: yellow-brown, rounded, face-rich crystals to 2 cm, a few of them partly gemmy, perched on pieces of pegmatitic matrix composed chiefly of albite and lepidolite. Luis also was selling off (for a consigner) a lot of ten brilliant black, wedge-shaped crystals of **wodginite epitactic on cassiterite**, from the 1975 find in the Jaboti mine, Galiléia,

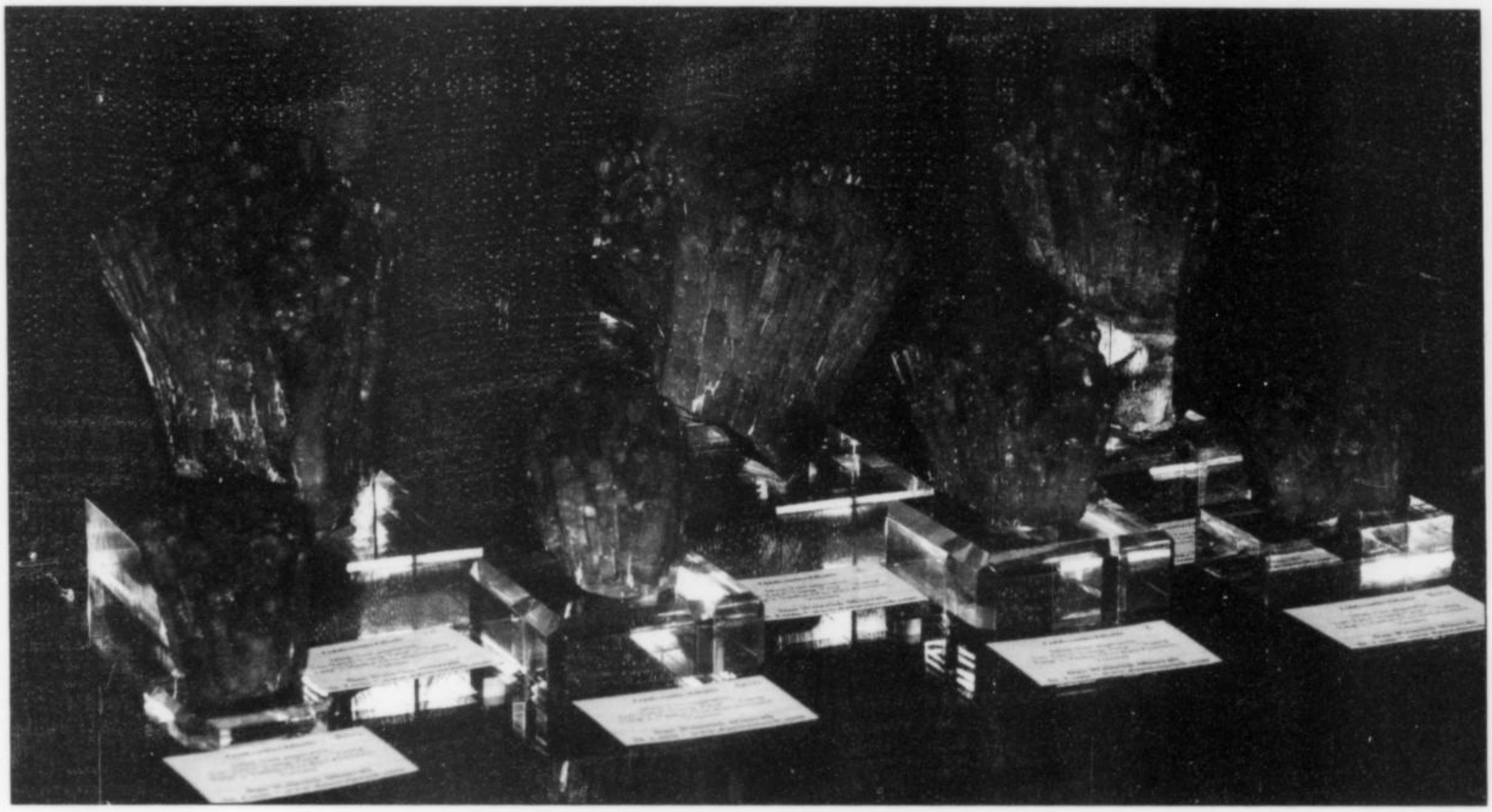


Figure 3. **Tourmaline in diverging clusters to 13.5 cm from the Minh Tien pegmatite, Luc Yen, Yen Bei Province, Viet Nam. Dan Weinrich specimens; Wendell Wilson photo.**

Minas Gerais—probably the last specimens from this one-time occurrence that we will ever see marketed as a group. The wodginite/cassiterite crystals, all off matrix, range between 2 and 10 cm. Meanwhile, in another room in the Holiday Inn, Carlos Vasconcelos of the *Vasconcelos* dealership (vasconpedras@uol.com.br) had about 200 hefty **kyanite** specimens mined last summer at São Jose da Safira, Minas Gerais. These specimens, ranging from a mere 7 cm to nearly 40 cm across, are typical jumbles of bladed blue crystals once wholly enclosed in massive quartz, now held together by quartz remnants left after etching; the kyanite crystals are rich blue, and many are remarkable for having gemmy interiors and distinct terminal faces.

Europe was a no-show in the what's-new department at Denver, and Africa was nearly so; however, one Moroccan dealer working out of a tent at the Holiday Inn did have a nice, somewhat "different" lot of **vanadinite** specimens which had been found three months ago at the well-known Acif (ACF) mine, Mibladen. The specimens' handler, a young man from the dealership of *El Hor Frères* (bougafermaroc@hotmail.com), told me that about 200 specimens of the material had come from a digging 15 meters down in a surface prospect, and specimens from the several flats he had brought to Denver were selling fast even as we spoke. The vanadinite crystals are very lustrous and red-orange (with a greater orange component than most vanadinite from Mibladen); they are of simple hexagonal-tabular habit and quite thin, and they stand delicately straight up on earthy brown matrix plates of altered limestone, in specimens to large-cabinet size.

From Russia I saw only two noteworthy new items at this show, both of them from Dalnegorsk, Primorskiy Kray—for a good scoop on this world-class post-Soviet locality see the article by Grant and Wilson in vol. 32, no. 1 (Jan.-Feb. 2001). This past summer the polymetallic Nikolay mine at Dalnegorsk, already established as the source of the world's finest pyrrhotite crystals and some outstanding galena crystals too, produced small numbers of specimens showing **galena coating pyrrhotite**. The mostly miniature-size specimens show sharp, distinctly hexagonal-prismatic forms to 3 cm all sparkling with solid coatings of brilliant metallic gray galena microcrystals, but still consisting of bronze-colored pyrrhotite within, as revealed by a few broken crystals. Several dealers had these specimens, but the prize for the best is hereby awarded jointly to *KARP* (www.karp.cz) and to Victor Ponomarenko's *Axinite-PM Ltd.* (mineralvvp@omen.ru).

In the Holiday Inn room of "Axinite-PM," a handful of specimens bespoke a nice single-pocket find, last July, of **pink apophyllite** on datolite matrix, this not from any of Dalnegorsk's metallic mines but from the nearby Bor mine, where a huge deposit of massive datolite is exploited as boron ore. In these new specimens, ranging from a 1.5-cm loose crystal to a 15-cm-wide matrix piece covered with crystals, medium-lustrous apophyllite forms very sharp tetragonal-bipyramidal crystals with small prism faces; these crystals are transparent and very pale pink, and reach 1.5 cm individually. Matrix specimens in which the pink apophyllite makes crusts and little pile-ups on pale green massive datolite are very pretty. The article by Grant and Wilson (2001) does indeed mention pink apophyllite crystals from Dalnegorsk, but stipulates that they are quite rare and hence "most desirable"; much more commonly the apophyllite of this locality is colorless, white or green (most likely it is of the species fluorapophyllite).

Before leaving the room of Victor Ponomarenko's "Axinite-PM," and before leaving the ex-Soviet Union, let us note a brand new **quartz** locality of some promise: the Aktas mine near Dzhezkazgan, Kazakhstan. Actually, according to Victor, the quartz specimens come from an unnamed outcrop 12 km from the Aktas mine, and digging at the place began just this past July. Most of the quartz crystals are "normal" prisms with large rhombohedral terminal faces, reaching 35 cm long; they are lustrous, transparent, and colorless to grayish (from chlorite inclusions), occurring in stately clusters. Other, smaller, specimens are groups of sharp,

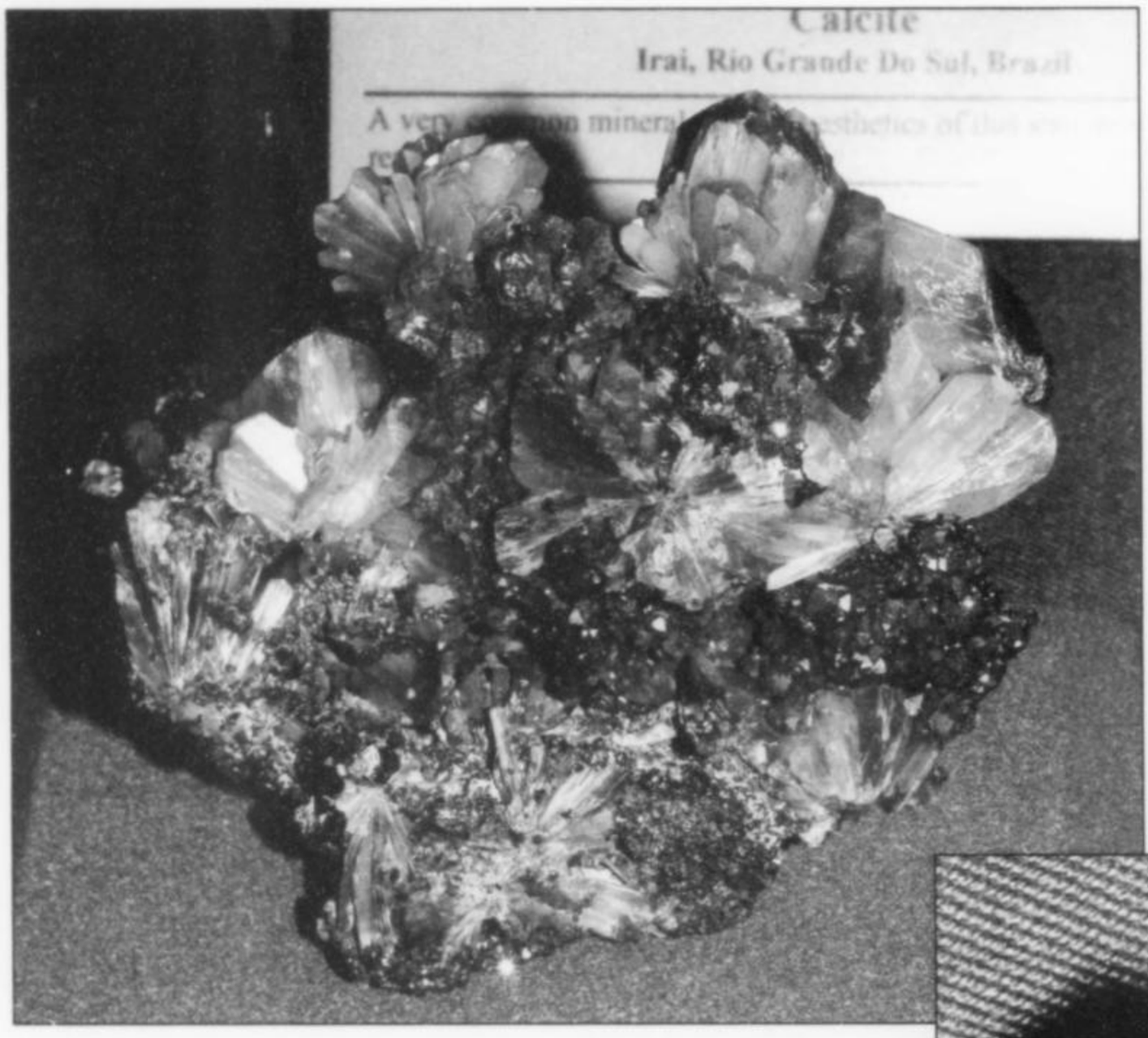
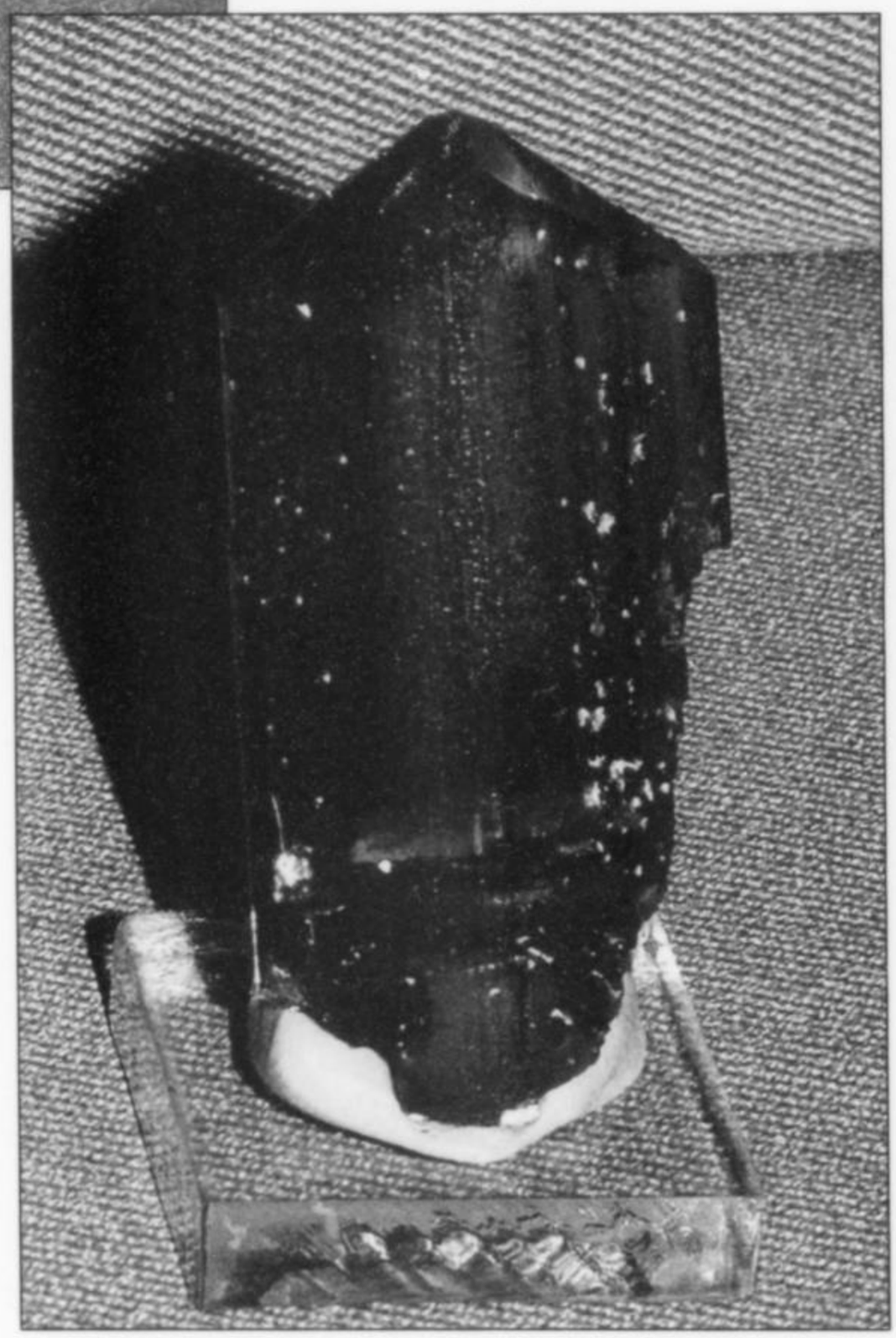


Figure 4. **Valentinite crystals on matrix (probably the world's best specimen), about 13 cm, from Oruro, Bolivia. Houston Museum of Natural Science collection; Wendell Wilson photo.**

Figure 7. **Euclase crystal, about 5 cm, from near Ouro Preto, Minas Gerais, Brazil. Smithsonian Institution collection; Wendell Wilson photo.**



lustrous smoky quartz crystals, some with faden lines, individually between 5 and 20 cm long; these latter specimens strongly suggest Swiss Alpine smoky quartz.

Luscious-looking little parallel clusters of dark purple-maroon prismatic crystals of **vesuvianite** from Alchuri, Northern Areas, Pakistan have been spotty presences at mineral shows for several years now, although they have never yet achieved real star quality, as the crystal groups in almost all cases are free of matrix and show an excess of broken surfaces. This time there were hopeful signs: Dudley Blauwet of *Mountain Minerals International* had a couple of very nice miniature specimens wherein the vesuvianite crystals are terminated on both ends by shiny pinacoid faces, and Rob Lavinsky showed me three just-acquired thumbnails with truly first-rate aesthetics: they are rich brownish purple (more brown than in earlier cases), doubly terminated vesuvianite crystals to 2 cm in crisp little groups with milky white calcite crystals. Dudley, furthermore, had a few small specimens which may be harbingers of something new and exotic from Pakistan: six bright black clusters of tabular crystals of **allanite-(Ce)**, with individuals to 2.5 cm, associated with microcrystals of titanite. These emerged last June from surface workings at Torgar (near Zagi Mountain), in the Khyber Agency, North West Frontier Province.

In mysterious Myanmar (Burma), a few intriguing items have recently come from the famous Mogok gem tract. First, an unusually lavish selection of specimens of pink **elbaite** of the now well-known "mushroom" aggregate habit was being offered in the Holiday Inn by the Czech dealership of *KARP*, whose friendly Dr. Ivo Szegeny brought to Denver about 100 specimens showing fine, lustrous, translucent, trigonal "mushrooms" exceptionally to 6 cm across, some on pegmatitic matrix with crude pale green microcline crystals and black spots and microcrystals of schorl (Ivo told me that 80% of the samples of this material which are collected have dirty grayish, not pink, elbaite mushrooms, and thus never see the specimen marketplace). Also in the KARP room were a dozen loose crystals of **enstatite** from Mogok which, for only about $100 tops, were remarkable bargains, considering that they are *gemmy* euhedral crystals of a rock-forming silicate species almost never seen as free-standing crystals at all. This enstatite forms sharp, striated, wedge-terminated prisms from 2 to 4 cm long, with a lovely transparency in a difficult-to-describe color: sort of a peridot-green with brownish and yellowish overtones. There is only one matrix specimen: a chunk of greenish black, mafic-looking rock with a gemmy 2-cm enstatite crystal rising vertically from a cranny.

And here's a real rarity—the *KARP* dealership also had three

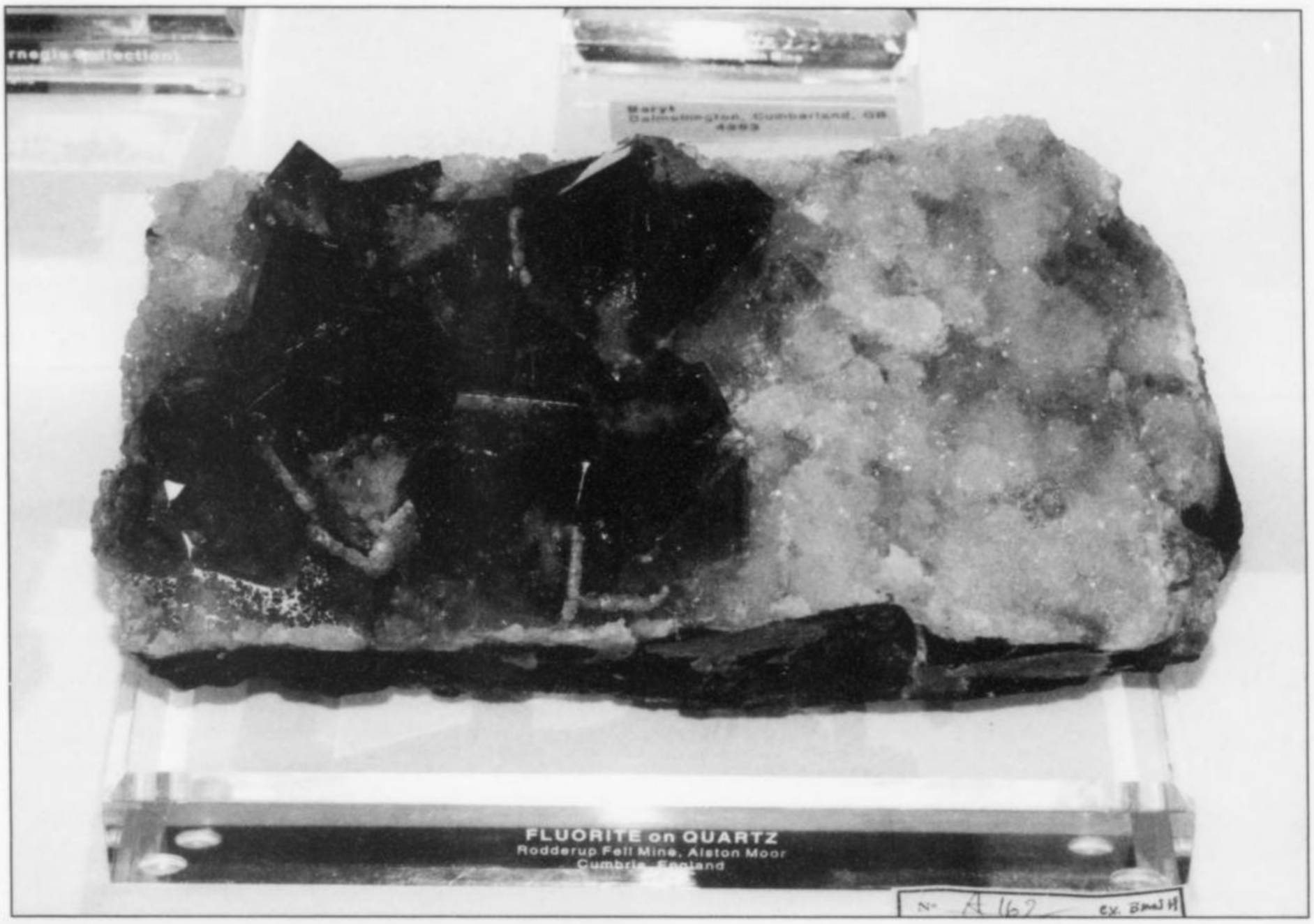


Figure 5. **Fluorite on drusy quartz, about 30 cm, from the Rodderup Fell mine, Alston Moor, Cumberland, England; part of Rob Lavinsky's "Olde English Classics" exhibit (mostly from the Eric Asselborn collection). Wendell Wilson photo.**

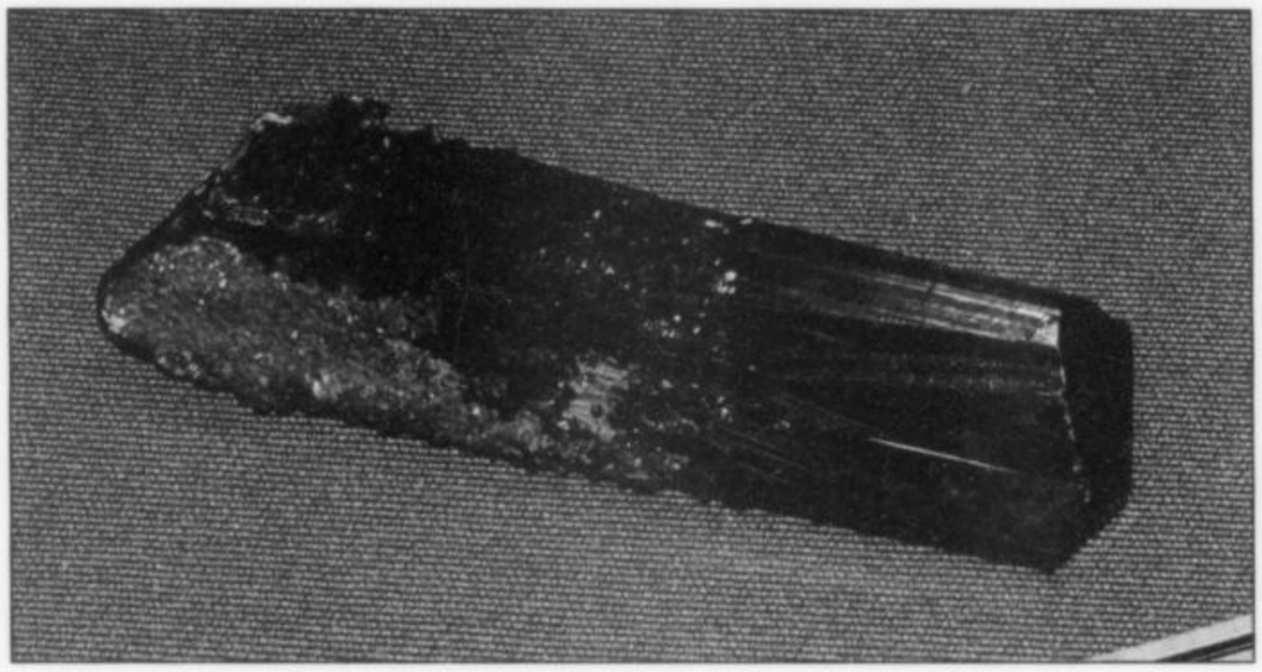


Figure 6. **Proustite crystal, about 10 cm, from Chañarcillo, Chile, in the Smithsonian Institution exhibit; Wendell Wilson photo.**

loose crystals of **jeremejevite** from Mogok—an excitingly new occurrence of a very rare species heretofore known only from an old Russian locality and, of course, from two localities in Namibia which produced gemmy blue prismatic crystals. The five Burmese jeremejevite crystals which made it to Denver are very pale yellow-orange, not especially lustrous but largely gemmy, loose prisms with pyramid terminations; the largest is a 3-cm crystal which is slightly cloudy and crazed, while the others, all around 1 cm, are wholly transparent and free of feathers or flaws. And finally—speaking of thumbnail-size, palest yellow gem crystals from Burma—Dudley Blauwet, *KARP*, and some other dealerships had more swarms of the loose, limpid, "drill-bit" twinned **phenakite** crystals from "Momeik" which we have been seeing for the past two or three years. I mention these new ones only because (1) Dudley gave, for the first time I've noticed, a more specific locality designation, namely the Kat Chay mine, Momeik, and (2) Dudley also had two phenakite thumbnails from this place which do *not* show drill-bit twinning but rather are single, equant crystals, Mt. Antero-style, to about 1.75 cm on a matrix of massive milky white quartz.

Moving on to Mongolia but remaining in the *KARP* room at the Holiday Inn for one more what's-new visitation, let us glance briefly at a new find of **aquamarine** crystals in a pegmatite at Hutag uul ord, Suhbater aimag, Mongolia (very close, Ivo Szegeny says, to the Russian border). The loose, single crystals are very pale blue, but thoroughly gemmy, hexagonal prisms to 2 cm.

Maybe the biggest news concerning Chinese minerals at this time is Dr. Guanghua Liu's just-published book, *Fine Minerals of China*, a gorgeous, hardbound photo portfolio *cum* locality survey which Dr. Liu was proudly selling at this show; copies may be purchased online from the "Bookstore" section of the *Mineralogical Record* website (www.MineralogicalRecord.com), where a detailed review is also posted. As for new mineral discoveries in China, well, *Collectors' Edge* has just gotten in a goodly supply of large miniature and cabinet-size specimens of an attractive new **calcite** from the Fozichong lead-zinc mine, Guangxi Province, and these were to be seen both in the Holiday Inn and Main Show outposts of the dealership. Sharp, lustrous, milky gray-white to transparent and nearly colorless, blocky-prismatic to tabular calcite crystals measuring individually to 5 × 5 × 6 cm form dense piles and parallel stacks on dark gray limestone matrix; some of the

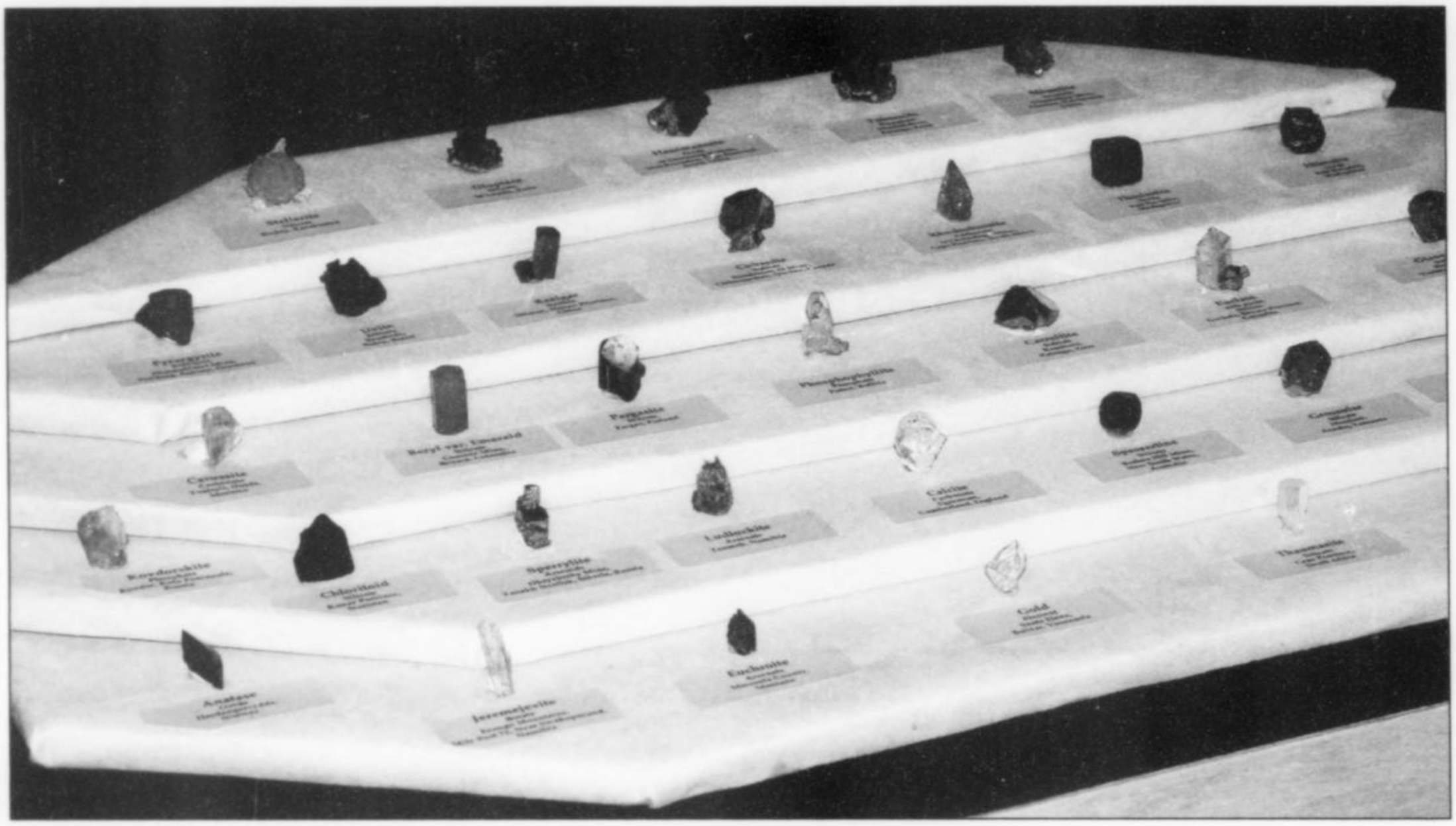


Figure 8. **Thumbnail exhibit of Alexander Schauss. Wendell Wilson photo.**

crystals' basal faces have thin, opaque milky white zones. Probably the calcite crystals are contact-twinned on (0001); this is hard to see on hexagonal prisms lacking re-entrant angles, but the fine-scale growth features on the prism faces give it away. In Denver about 100 in all were available, the largest reaching about 30 cm across.

Chinese **rhodochrosite**, as seen at several dealerships around this show, is looking ever more promising. The best specimens (so far) show pale to medium-pink, translucent, lenticular crystals to 3 cm on matrix; other specimens, suggesting second-string material from the Sweet Home mine, Colorado, show simple rhombohedral, pink rhodochrosite crystals to 2 cm or so, on matrix with crystals of purple **fluorite**, acicular colorless **quartz**, and black **sphalerite**. One locality citation (given in Dr. Liu's book and by several dealers) is "Babu mine, Hezhou, Guangxi"; however, *Collector's Edge* (which had the best specimens of the material in Denver) gives "Wuzhou, Guangxi." Accordingly to Bryan Lees, whose Chinese agent is now on the spot at "Wuzhou," this is a commercial mine whose ore production will likely not last long, but specimen-mining for rhodochrosite (as at the Sweet Home mine) may well supersede it.

In the previous "What's New" column in the *Mineralogical Record* the new strike of **acanthite and native silver** specimens from China, first brought into the U.S. by *Collector's Edge,* is mentioned, and several specimens are illustrated. Specimens which were available in Denver, the best ones reminiscent of recent offerings from the Imiter mine, Morocco, show dull gray, subhedral to euhedral (simple cubic) acanthite crystals in clusters adorned with bright curls of native silver; the *very* best of these I saw is an impressive 5 × 5-cm group of sharp cubes uniformly about 1.25 cm. Several other dealerships, most notably that of Bert Ottens (www.ottens-mineralien.de) also had good pieces from the occurrence. It is, however, my duty to mention that three utterly superb Chinese acanthite specimens which were on hand at Denver put the general run of Hongda mine specimens far in the shade. Locality information on them is shadowy: they *may* be also from the Hongda mine but there's a suspicion (which I share) that they come from another, presumably Chinese, place altogether. Two of the specimens, held respectively by Rob Lavinsky and Dan Weinrich (www.danweinrich.com), are great towering aggregates of sharp, gray, octahedral acanthite crystals on matrix, each specimen measuring around 12 × 12 cm; the third specimen, on view at Dan Weinrich's stand at the Main Show, is an elegant, brightly metallic, rectilinear group of stalk-like acanthite crystals (greatly elongated cubes, as in some old pieces from Freiberg, Germany) measuring about 3 × 4 × 5 cm. Naturally, we will stay tuned for further, reliable word of this clearly world-class acanthite occurrence.

The final what's-new, which is truly surprising if of only modest "significance," hails from New Zealand. There, a basalt flow neighbored by ultramafic rocks on Mount Upcot, Middlehurst, South Island, produces very good specimens of several zeolite species, pre-eminently of **stilbite**, as glassy orange, perky-looking "wheat-sheaf" aggregates to about 3 cm, grouped in loose clusters from large-miniature to medium-cabinet size. Two years ago, Bill Hawes and his former wife Marge extracted about 500 stilbite specimens from a single pocket on Mount Upcot, and Bill had several flats of these in his room in the Holiday Inn at Denver. Bill, by the way, is a longtime and expert western U.S. field collector of minerals, gemstones and fossils, as well as a former employee of *Collector's Edge*, and has just recently decided to become a dealer in his own right. In his debut as such at Denver this year he was selling off (besides the New Zealand stilbites) many fine, assorted things, including hundreds of thumbnails from what has been his personal collection. To inquire about whatever remains unsold (for his room was abuzz with commerce, whenever I looked in), contact him (108 Pikes Peak Lane, Florissant, CO 08016).

As already mentioned, this Denver Show was remarkable both for its wealth of material being sold off from fine old collections

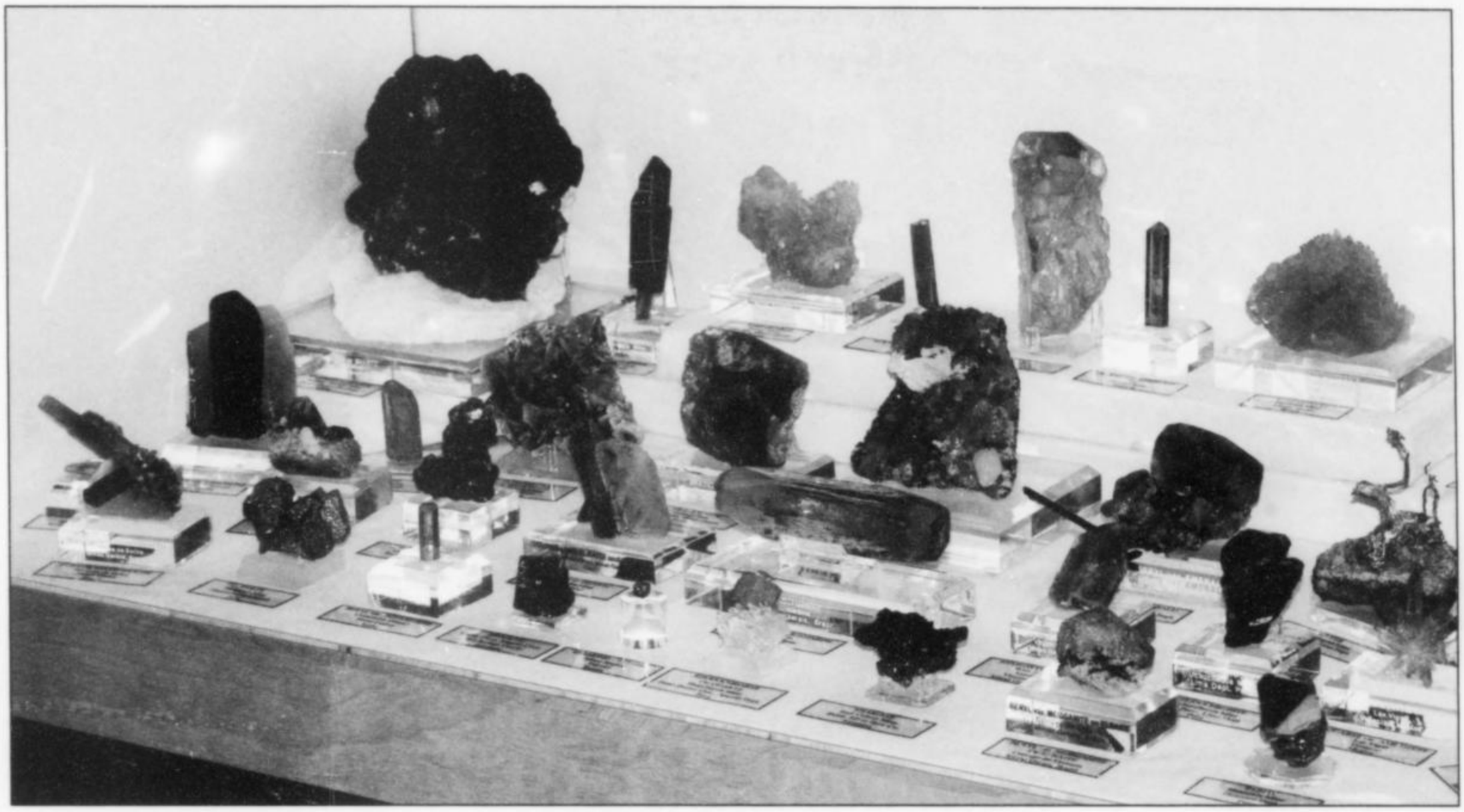


Figure 9. **The "MAD" case; specimens from the collections of the members of the Mineralogical Association of Dallas. Wendell Wilson photo.**

and for a superb group of displays at the Main Show, chiefly though not exclusively related to the show's theme of South American minerals. Among the collections being recycled was that of **Roz and (the late) Norm Pellman** of Tucson, with aesthetically choice, mostly cabinet-size pieces (those anyway which had not already been sold by the time the show opened) on view in the Main Show booths of *Collector's Edge* and *Kristalle/Crystal Classics*, the dealerships which are handling the resale of the fabulous Pellman collection. Rob Lavinsky and Wayne Thompson have split the extraordinary collection, mostly of European classics, accumulated by French collector (and professional urologist) **Eric Asselborn**—and great was the spectacle of Asselborn specimens to be seen with both dealerships. Rob Lavinsky (again) is handling some of the 6,000 pieces once in the private collection of **Charles L. Key** (best known for Namibian desiderata), and I have already briefly described the Magnet Cove, Arkansas collection built, mostly through field collecting, by **Clyde Hardin**, now being offered by John and Maryanne Fender . . . such is a survey of highlights, at least, of this Year Of Collections at Denver.

Many cases at the Main Show tackled South American Minerals, the hands-down best of them being the Smithsonian's case, with 21 amazing pieces including a totally gemmy blue 5-cm euclase crystal from Ouro Preto, Minas Gerais, Brazil; a single, thick, lustrous, still-red proustite crystal 9.5 cm long from Chañarcillo, Chile (a gift from J. J. Trelawney); and the "Mackay necklace," with a faceted, vibrant, deep green, 168-carat Colombian emerald set amid cascades of faceted diamonds. Others among the widely varied "South American" cases included one full of exceptional native element, sulfide and sulfosalt specimens from South America (Bill and Carol Smith); a single 35 × 35-cm piece from the great "cranberry tourmaline" find at Brazil's Jonas mine in 1978, half of the specimen being a great glossy quartz crystal, the other half being a jackstraw richness of very red, very gemmy elbaite crystals (Graeber and Himes); and Tom Hughes' case of Peruvian specimens (next door to his very impressive case of self-collected thumbnails from all over the U.S.). Other entities which put in wonderful cases, most but not all on the South American theme, included the Cranbrook Institute; the Lizzadro Museum of Lapidary Arts; the Montana Tech Mineral Museum of the University of Montana; the William Weinman Mineral Museum; the National Museum of Scotland; the New Mexico Bureau of Geology and Mineral Resources; the Denver Museum of Nature and Science; the Mineralogical Museum of Bonn; the American Museum of Natural History; the Virginia Tech Museum of Geological Sciences; the Colorado School of Mines Geology Museum; the Royal Ontario Museum; the Cincinnati Museum Center; and the Rice Northwest Museum of Rocks and Minerals.

Sixteen members of the Mineralogical Association of Dallas put 25 wondrous miscellaneous specimens into what is by now the much-awaited "MAD case"; Irv Brown had a small case with six super-specimens, each one matched with a miniaturized copy of a magazine cover picturing *that* specimen; Rob Lavinsky, Wally Mann, Jeff Starr and Karl Warning encouraged morale with a case of fine specimens bought at shows for $100 or less; the Houston Museum showed 13 superlative specimens from everywhere, among which a well-nigh unbelievable 10 × 10-cm valentinite from Oruro, Bolivia lingers longest in my sensorium; Alexander Schauss had a fine (competitive) case of thumbnails; Keith Proctor's case was its usual orgy of color centered on the immense "fruit bowl" rhodochrosite plate from the Sweet Home mine; Dudley Blauwet had two cases of (mostly) Asian specimens; Jeff Self presented the yield of a, um, *self*-collected pocket of fluorite, smoky quartz and muscovite on Mount Antero; the "Central Arizona Mineral Minions" donor case was packed with fine things; and Stuart and Donna Wilensky indulged in creative aesthetics by showing six wonderful cabinet-size specimens of pyrite on quartz from differ-

ent localities, each with a huge, sharp, brilliant pyrite crystal surrounded by prisms of colorless quartz.

And then there was the large case of giant, overwhelmingly good "Olde English Classics," all but one of them from the Eric Asselborn collection, put in by Rob Lavinsky (who even now is agonizing over whether to be the professional dealer he is and to *sell them off* or, rather, to keep and to cherish them, personally and forever). Among the 14 large cabinet pieces here was a matrix plate of fluorite from the Rodderup Fell mine, Alston Moor, Cumbria, with gorgeous, glowing, 3.5-cm cubes of purple/yellow fluorite showing prominent phantoms, on a quartz druse (this specimen is about a foot wide), and, my own favorite specimen, probably, in all the show, a bournonite from the famed Herodsfoot mine, Cornwall, with a gleaming 3.5-cm metallic black cogwheel rising from amidst others on a 12-cm matrix covered by drusy quartz.

A final note: The Herodsfoot bournonite was a stunning-enough classic to see, but while Rob was setting up that showcase he took time out to remove from his pocket a small box and revealed the contents to those standing about: a mind-blowing, breath-taking phosphophyllite twin over an inch tall, the finest for its size that any of us (including Bill Larson, who has seen a lot!) had ever seen. Wendell Wilson suggested to Rob that he should put it in his exhibit case and retitle the case "Olde English Classics—and Phosphophyllite"! It would have been a show-stopper even amid those large and fabulous cabinet specimens; its all-too-brief appearance was one of the highlights of the show.

Any questions? No? Then farewell from Denver 2006. . . . I shall see you (yes you, dear reader, whoever you are, just come up to me and say hello, and show me a nice specimen of something or other) in February 2007 at the Great Tucson Show.

Letters

Shipping Minerals Insured

I had thought of writing this letter long ago to assist collectors and dealers with problems they've encountered in transporting minerals using airfreight carriers. After reading Cliff Vermont's letter in the July-August issue I decided to write immediately.

Being a mineral dealer, I have shipped many hundreds of specimens with UPS and, less frequently, with Federal Express. I have an account with UPS and ship with them on a regular basis. I've paid thousands of dollars in insurance fees to UPS, and in the past 15 years have had only two incidents. In addition, I was involved peripherally with a claim with FedEx just a year ago.

UPS will insure an individual carton for up to $50,000. And they charge you for it, especially if you are shipping overnight. I do not know how the policy works if you opt to waive the "adult signature required" option, because I have never done so, but I hope the details of the two incidents I am about to describe will be helpful to everyone planning on shipping via UPS or FedEx.

I shipped a hefty, 40-pound matrix specimen of Elmwood Calcite from an out-of-state location back to my home office about six years ago. The specimen was extraordinary, and was valued and insured using UPS for $35,000. I packed the specimen in two boxes; an interior box immobilized the piece, and was floated within an exterior carton about 30% larger than the interior box. Upon receipt the next day, I slid my hand into the inner box to touch the crystal and noticed that it was moving, no longer attached to the matrix. I was tempted to unpack the piece immediately and inspect it firsthand, but my father, who was present (and is himself the owner of a trucking company) yelled, "Stop! Don't do anything! Call UPS first!"

When I did they told me not to open the box any further, and to leave it just the way I had received it. So I left the box alone until an inspector/appraiser visited my office, over 45 days later! Upon inspection it was clear that the box showed some crushing and tears that had exposed the inner box (which had also suffered some crushing as well) and had obviously broken the specimen.

The inspector was very nice, but had no idea what a mineral was, nor what the value of such things might be. After I opened it and found my severely broken specimen the inspector asked me what the piece was now worth in its damaged condition. I said around $7,000, as it was still a remarkable single crystal (after its unprofessional trim); he promised to convey this information to the UPS office and said they would contact me.

Nothing happened for a month. Finally I received a phone call from UPS and was informed that their insurance is not meant to cover minerals due to the fragile nature of the specimens, and that they were not honoring my claim! I was livid! I had paid thousands of dollars in insurance fees for shipments prior to that incident, under the assumption that the insurance was good, and could not believe they could charge me for the insurance and then deny responsibility!

I knew I had to contact a lawyer. I had

my attorney write a letter to UPS, including copies of their invoices to me, detailing prior shipments and stating that because they charged me for the insurance but upon receiving a claim had failed to honor it, they were committing fraud. He also stated that unless they began negotiations with him to resolve the claim he fully intented to bring a lawsuit against them, and possibly also file a class action suit.

A week after the letter was sent I received a very different call from UPS, with an apologetic tone, agreeing to reimbursing me $25,000 and allowing me to keep the specimen as it was for its "residual value," as they called it. I agreed and was content with my settlement but not with the process. Since that experience I have filed only one other claim with UPS, for around $5,000. They paid it, only after I again sent a letter from my attorney. (I still ship insured packages with UPS to this day.)

I mentioned another incident I had been involved in just six months ago, involving FedEx. In this case I was neither the shipper nor the recipient, but just a witness to a deal. A collector, Marc Weil, had sold some specimens he had culled from his collection to mineral dealer Rob Lavinsky in Texas. The specimens were shipped in four double-boxed cartons, each one insured for $50,000. Upon receiving them in Texas Rob sadly found that two of the cartons had been severely mishandled and the total value of the damaged pieces added up to over $55,000. Of course he contacted Marc and told him of the problem, recommending that he file a claim. Marc did so immediately and then the games began!

FedEx gave Marc the same line that Cliff Vermont had received (save the "no delivery signature required part"), to which Marc promised they'd be hearing from his attorneys. Unlike UPS, which became reasonable after receiving a letter from an attorney, FedEx did no such thing. After an inspection of the goods and after receiving all of the documentation proving the values, FedEx refused to offer anything more than a token amount in the neighborhood of a couple of thousand dollars. This is after going back and forth between both FedEx's and Marc's lawyers for months.

After about a year, with Marc not backing down a bit, the case went to court. Marc was forced to spend more money to assert his claim, including attorneys' fees, his own personal time and fact-gathering, including arrangements for witnesses, interviews, and appraisals. Once at the hearing and seeing that Marc was willing to pursue his claim to the end, FedEx finally offered a settlement of $50,000 to put the case to rest, and Marc's attorney accepted the offer.

So the moral of these two stories is that both UPS and FedEx are indeed responsible for the insurance, regardless of what their policies state, but they won't tell you that. In my opinion it's a scam. They charge you for insurance time and time again, and then when you have a problem they tell you you're *not really insured!* The trick is you have to be willing to fight, and deal with a long process.

Below is a check list you should use when shipping mineral specimens of high value, so you will have followed the proper protocol for supporting a claim if one becomes necessary. These are things the carriers will ask about at the time of a claim, and will affect how you are compensated. I hope it helps save someone out there from going through the unfortunate situation that Cliff Vermont just experienced. Note that the shipper must file the claim, but the recipient must follow certain steps so that you can document the damage and support your claim; therefore *both* the shipper and the recipient must understand the following procedures.

(1) First, always pack the mineral in a *new* inner box, and with enough packing so that it cannot move within that box at all, and can absorb some shock from regular handling.

(2) Next, float the inner box in a *new* outer box using some sort of packing material like foam or packing peanuts to immobilize the inner box inside the outer box.

(3) Always mark both the inner and outer boxes with warnings like "Fragile, handle with care!" or "This side up!" whichever makes sense. And tape all the openings of the box with box tape, including the edges.

(4) Take a photo of the mineral specimen before you ship it and keep it for your records. Have an invoice available to document what you paid for the mineral from a dealer or collector; if an invoice is not available an appraisal is helpful if you can get one prior to shipping. (Note: If you don't have an appraisal and the mineral is broken in shipping, you can get one that will be honored after the fact by presenting an appraiser with the mineral in its broken state together with the photo you made before it was shipped.)

(5) Take a photograph of the box in its condition prior to releasing it to the carrier. Note: If the carton is received with visible mistreatment, like crushing, tearing, splitting, or interior contents exposed, you must document it. But if it looks the same as when you shipped it that does not release the carrier from their liability! It just makes your case a little harder to fight, but if you paid for insurance, then you are entitled to a claim.

(6) Always opt for the "adult signature required" option. And pay to ship the carton overnight or 2nd day. It costs more, but things that are insured for over 5,000 dollars and are sent as air shipments are handled differently from other packages. I know that with UPS, at least, every time the box is moved from one driver to another it has to be signed for. And "high value shipments" are kept separate from the rest of the packages, and are handled differently as well.

(7) If you receive a box that looks like it has been mistreated in shipping, take photos before you open it, and note the condition of the carton on the delivery receipt when signing it. Don't kill the messenger! Abusing the driver who delivers your package is not going to do any good. Just note on the receipt the condition of the box, and ask for a copy from the driver. They have nothing to do with the claim process.

(8) Immediately after receiving a carton that has been damaged, call the carrier to file a claim and ask them to schedule an inspection. Save all the packing material and the carton that was used in shipping. Dispose of nothing, and once you determine that a specimen is damaged, then leave the rest of the carton packed (assuming there is more than one specimen inside) until the inspector is there with you.

(9) Call an attorney and have him draft a letter detailing the events and the receipt of the broken specimen. List the value and attach any supporting documentation, copies of old labels with prices on them, invoices, appraisals, photos, etc. The letter, being the first one, should have a firm tone and basically state that you are waiting for them to settle this claim. If they refuse, your attorney will be able to guide you through the rest of the process.

(10) Lastly, dig in and prepare to fight over the long haul. Call the claims department relentlessly and be prepared to spend time, energy and some money to get reimbursed. If they can get rid of you easily they will.

I also agree with Cliff Vermont that you should look carefully at the written policies of the carrier you are planning on using to ship your specimens, and I must state that I never ship with the USPS so I don't have any experience with shipping or claims with them. But the long and short of it is, if you packed it correctly, and they accepted the package, and you paid for insurance, and it breaks, they are liable! You just have to fight.

Daniel Trinchillo Jr.
New York, New York

Wm. Niven

Your William Niven article in the latest *Mineralogical Record* (v.37, n.4) was one of my all-time favorites. I have been interested in New York City history and minerals for a long time—and the "Kunz garnet" is probably the most famous New York City mineral specimen—so I was glad to learn something new about that. And he also collected at two of the most interesting other localities in the U.S.: Magnet Cove and Barringer Hill. With the demise of *Matrix*, I have been missing some good articles on historical U.S. mineralogy.

Kelly Nash
Dallas, TX

Silvermines Sulfosalts

I am wondering if anyone has, or knows of, any specimens of, the more unusual minerals from Mogul mine, Silvermines, County Tipperary, Ireland? I am also trying to determine the whereabouts of both bournonite specimens figured in Stephen Moreton's 1999 article, "The Silvermines District" (*Mineralogical Record*, vol. 30, no. 2, p. 99–106, Figs. 4 and 11); the photos show a 2.1-cm bournonite crystal with pyrite and sphalerite, and a sphalerite on bournonite, both in the Ben DeWit collection.

Any of the rarer species from Silvermines such as jordanite, proustite, tennantite etc. are of interest as well. I would be very grateful for any information or photographs. Thank you!

Barry Flannery
barryflannery@gmail.com

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Unit 8403]
DeLand, FL 32720-3757
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E-mail:pbartos@mines.edu
Website: www.mines.edu/academic/
geology/museum
Golden, Colorado 80401
Hours: 9–4 M–Sat., 1–4 Sun.
(closed on school holidays &
Sundays in the summer)
Specialties: Worldwide minerals;
Colorado mining & minerals

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Curator & Professor of Mineralogy:
Dr. George W. Robinson
E-mail: robinson@mtu.edu
Tel: 906-487-2572; Fax: 906-487-3027
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Michigan Technological University
1400 Townsend Drive
Houghton, MI 49931-1295
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Natural History Museum of Los Angeles County

Fax: (213) 749-4107
Website: http://nhm.org/minsci
Curator (Mineral Sciences):
Dr. Anthony R. Kampf
Tel: (213) 763-3328
E-mail: akampf@nhm.org
Collections Manager:
Dorothy L. Ettensohn
Tel: (213) 763-3327
E-mail: dettenso@nhm.org
900 Exposition Blvd.
Los Angeles, CA 90007
Hours: 9:30–5:00 Daily
Specialties: Calif. & worldwide minerals, gold, gem crystals, colored gemstones, micromounts
Support organization:
The Gem and Mineral Council

University of Delaware Mineralogical Museum

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University of Delaware
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Phoenix, AZ 85007
Hours: 8–5 M–F, 11–4 Sat., closed Sun. & holidays
Specialty: Arizona minerals, worldwide minerals & fossils, uses of minerals

Matilda and Karl Pfeiffer Museum and Study Center

Executive Director: Teresa Taylor
Tel: (870) 598-3228
E-mail: pfeifferfnd@centurytel.net
P.O. Box 66
1071 Heritage Park Drive
Piggott, AR 72454
Hours: 9–4 Tues.–Fri., 11–4 Sat. (Daylight Savings Time)
Specialties: Fine collection of geodes from Keokuk, Iowa, area; worldwide collection of minerals

Carnegie Museum of Natural History

Collection Manager: Marc L. Wilson
Tel: (412) 622-3391
4400 Forbes Avenue
Pittsburgh, PA 15213
Hours: 10–5 Tues.–Sat., 10–9 F, 1–5 Sun., closed Mon. & holidays
Specialty: Worldwide minerals & gems

W. M. Keck Earth Science & Engineering Museum

Administrator: Rachel A. Dolbier
Tel: 775-784-4528, Fax: 775-784-1766
E-mail: rdolbier@unr.edu
Website: http://mines.unr/edu/museum
Mackay School of Earth Science & Engineering
University of Nevada, **Reno** 89557
Hours: 9–4 Mon.–Fri. (closed university holidays) and by appointment
Specialty: Comstock ores, worldwide minerals, mining artifacts, Mackay silver

New Mexico Bureau of Mines & Mineral Resources—Mineral Museum

Director: Dr. Virgil W. Lueth
Tel: (505) 835-5140
E-mail: vwlueth@nmt.edu
Fax: (505) 835-6333
Associate Curator: Robert Eveleth
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E-mail: beveleth@gis.nmt.edu
New Mexico Tech,
801 Leroy Place
Socorro, NM 87801
Hours: 8–5 M–F, 10–3 Sat., Sun
Specialties: New Mexico minerals, mining artifacts, worldwide minerals

Arizona-Sonora Desert Museum

Fax: (520) 883-2500
Website: http://www.desertmuseum.org
Curator, Mineralogy: Anna M. Domitrovic
Tel: (520) 883-3033
E-mail: adomitrovic@desertmuseum.org
2021 N. Kinney Road
Tucson, AZ 85743-8918
Hours: 8:30-5 Daily (Oct.-Feb.)
7:30-5 Daily (Mar.-Sept.)
Specialty: Arizona minerals

U.S. National Museum of Natural History (Smithsonian Institution)

Curator: Dr. Jeffrey E. Post
E-mail: minerals@nmnh.si.edu
Collection Managers: Paul Pohwat and Russell Feather
(Dept. of Mineral Sciences)
Washington, DC 20560-0119
Hours: 10 am–5:30 pm daily
Specialties: Worldwide minerals, gems, research specimens

William Weinman Mineral Museum

Website: www.weinmanmuseum.org
Tel. (770) 386-0576
Director: Jose Santamaria x401
E-mail: joses@weinmanmuseum.org
Curator: Julian Gray x415
E-mail: juliang@weinmanmuseum.org
Collections Manager: Cherry Johnson x405
E-mail: cherryj@weinmanmuseum.org
51 Mineral Museum Dr.
White, GA 30184
Mailing Address:
P.O. Box 3663
Cartersville, GA 30120
Hours: Mon-Sat 10-5, closed Sundays
Specialty: Georgia and worldwide minerals, fossils and mining artifacts

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Museo Civico di Storia Naturale

Curator: Dr. Federico Pezzotta
Tel: +39 02 8846 3326
Fax: +39 02 8846 3281
E-Mail:
Federico.Pezzotta@comune.miland.it
Department of Mineralogy and Petrography
Corso Venezia, 55
I-20121 **Milano,** Italy
Hours: 9 am–6 pm daily, closed Mondays
Specialties: Italian minerals, pegmatite minerals

Gargoti Mineral Museum

Director: K. C. Pandey
Tel: ++91 2551 230528
Fax: ++91 2551 230866
D-59 MIDC, Malegaon, **Sinnar**, Nashik 422 103 India
Specialty: Minerals of India

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Quartz, Dalnegorsk, Primorskiy Kray, Russia -- Photo by Richard Jackson

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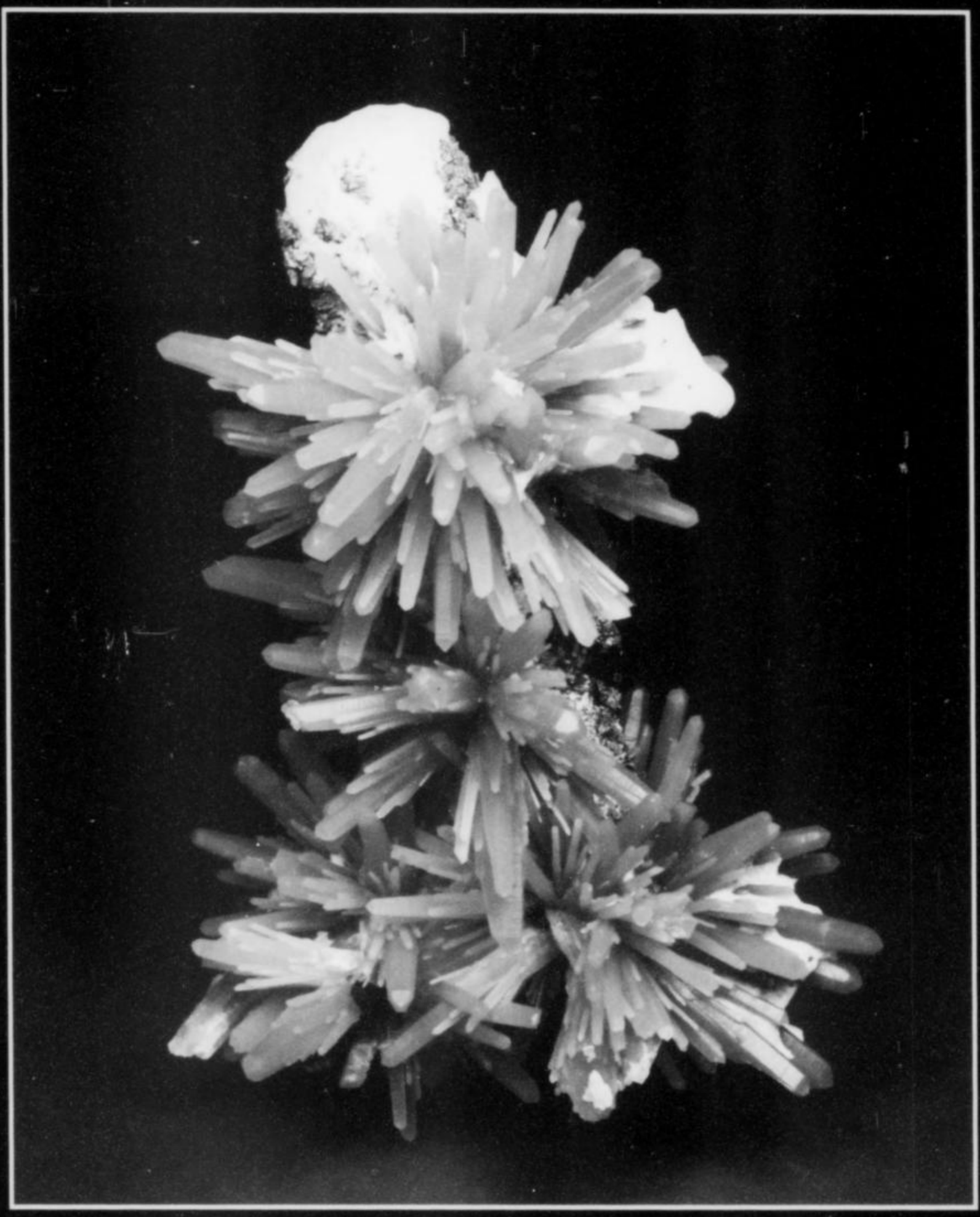

Quartz, Dalnegorsk, Primorskiy Kray, Russia -- Photo by Richard Jackson

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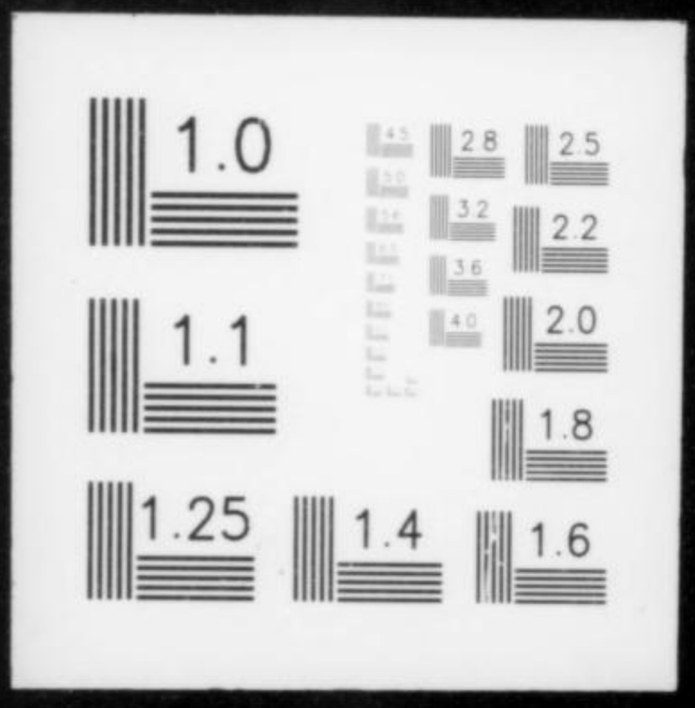
As we looked up the height of rock, there, peering and winking at us like myriads of curious eyes, shone thousands upon thousands of these bright opals... At the mine I went over the hoards of opals, each one a miniature sunset as it lies in your palm, like a shower of fireworks as they pour from your fingers.

– G.F. Kunz in Mexico

Mexican Opal

Photo: Harold & Erica Van Pelt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