the Mineralogical Record

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THE MINERALOGICAL RECORD

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Articles

Columns

COVER: CALCITE crystal cluster, 13.6 cm, from the famous Malmberget mine, Gällivose, Lapland, Sweden. Peter Lyckberg collection; Jeff Scovil photo.

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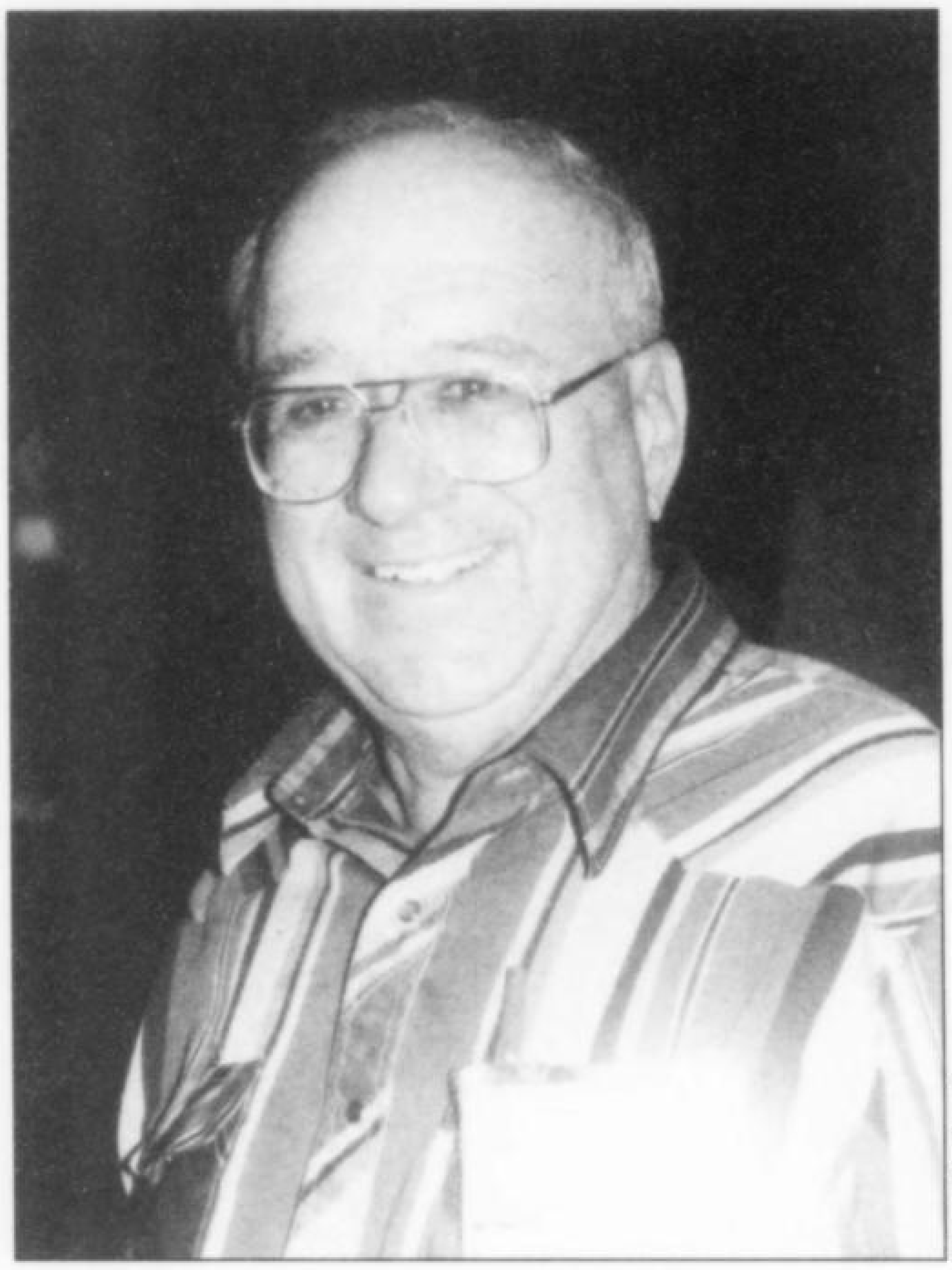
notes from the EDITOR



Kent England

Jim Minette (1936–2002)

OBITUARIES

Died, James W. Minette, 66, passed away on January 26, 2002, after short illness. He was born on January 20, 1936, in Iowa, but was a long-time resident of Boron, California. A graduate of the Colorado School of Mines, he was for many years associated with the U.S. Borax mines near Boron in engineering and executive management positions. He had also performed in a consulting capacity for mining operations around the world.

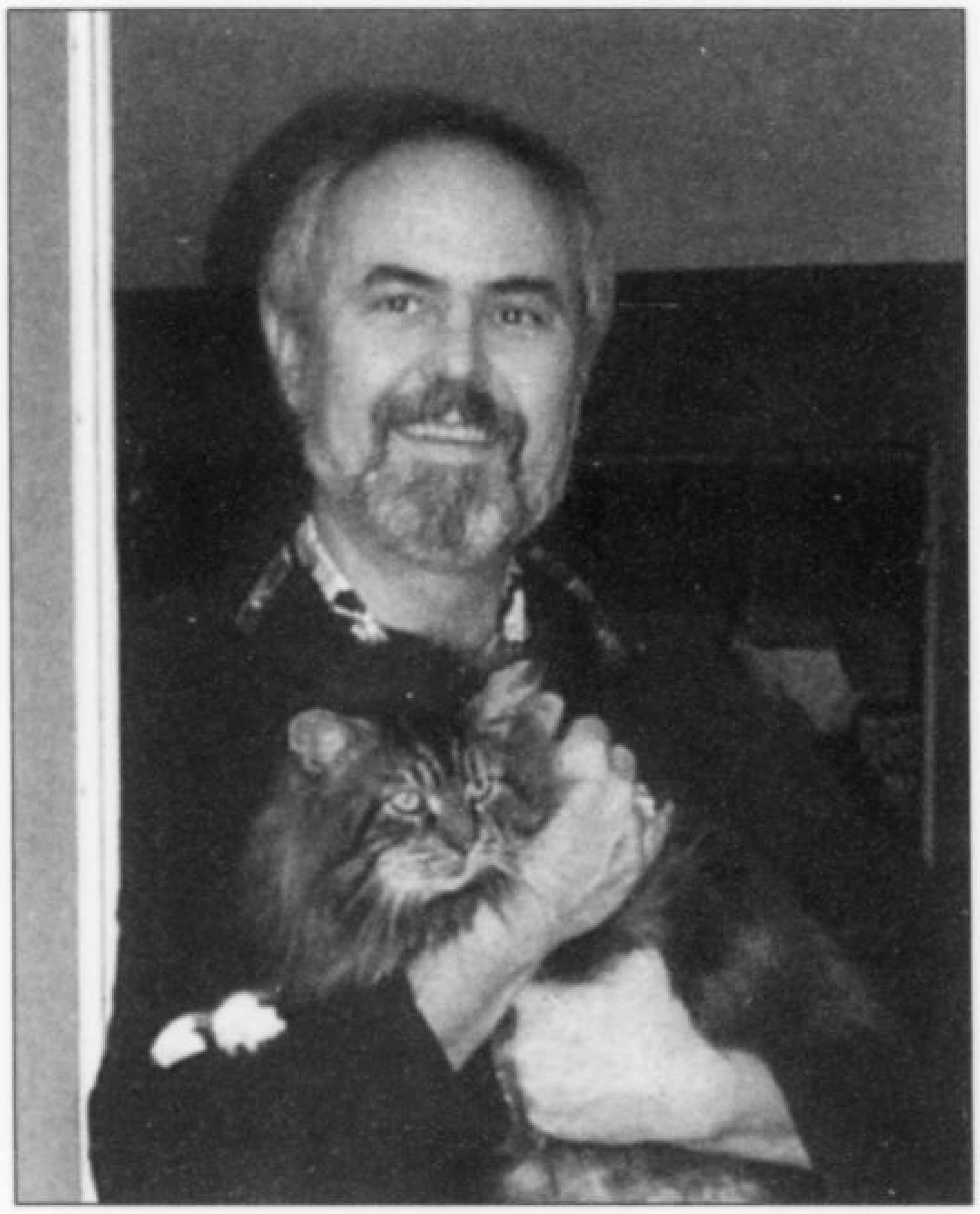
Jim was both mineral dealer and collector. He and Dawn assembled one of the truly fine private collections, using the profits from his activities as a dealer to fund new acquisitions for "the collection." Nothing was ever acquired for their collection without consultation and agreement. The Minettes' collection of borate minerals is perhaps the world's finest. They also assembled a top rank collection of thumbnails which many knowledgeable collectors also believe to be the world's finest. Jim's special fondness for smithsonite fostered still another great sub-collection.

The Minettes shared their wonderful collection by exhibiting often and by graciously welcoming visitors. It is no exaggeration to say that they won almost every major award, including the prestigious McDole Trophy at the Tucson Show. Recently, at the 2001 Pasadena Show, they carried off the Meister Trophy for Best Theme Mineral, and the award for best dealer show theme case.

Jim's other interests included a collection of first edition and other mineral-related books, a collection of borax-related literature and antiques, and a great love of fly-fishing.

Jim will be remembered and missed by friends all over the mineral community.

Carter Rich



Joe Nagel (1949–2001)

Died, Joe Jochen Nagel, 52, of injuries received in an auto accident on December 5, 2001. He is survived by his partner, Sharon Beech, and his mother, Henny Nagel.

Joe was born on May 29, 1949 in Montabaur, Germany. The family soon emigrated to the "land of the free," settling in Beverly Hills, California where Joe grew up. A teenage interest in rocks ultimately led him to a Bachelor of Science degree in geology from UCLA in 1971. The geology department at the University of British Columbia was so impressed with Joe's 99th-percentile score on the Graduate Records Examinations that they immediately accepted him into their graduate program. So Joe became a "landed immigrant" in Canada in 1971, but he never gave up his American citizenship. A few years later he obtained his Master of Science degree in geology. During these first years in Canada, Joe and Sharon Beech formed their partnership.

In 1973, Joe applied for and was hired for the curator's position at the M.Y. Williams Geological Museum in the geology department of the University of British Columbia. He had not been there long when he was asked what he was planning to do for the annual British Columbia Federation Gem and Mineral Show that summer. Joe had never attended a big mineral show before, though he knew about rock shops. He had assumed that the rarer mineral specimens for university collections came from specialty dealerships, rather like laboratory chemicals from chemical supply houses. That first BC Fed Show was an inspiration. Joe, always able to recognize and seize opportunities, persuaded Sharon to set up with him their own mineral specimen retail company following the show. In order to learn the business Joe and Sharon spent time working for the late Prosper Williams and for Frank and Wendy Melanson at subsequent mineral shows.

When the geology department moved into a new building, Joe developed educational displays in support of first-year geology and mineralogy courses. Soon it was clear that the "Museum" had escaped from its storage space in Joe's office and had taken over the available space in the foyer and the halls of the first floor of the Geology Department.

Collecting and curating, and curating and dealing, are often regarded as conflicting interests. Joe was nevertheless involved simultaneously in collecting, curating and dealing minerals—and doing it all honestly. However, because of potential conflicts, Joe approached the department chairman with a proposal to set up a gift shop in the department and use the profits to buy specimens for the collection. He sold his business and moth-balled his collection, but retained the right to collect fluorites. Starting with $3,500 in "seed money," the Museum's new business venture eventually generated sales in excess of $800,000, the profit from which greatly enhanced the substance and value of the UBC mineral collection. This display and reference collection is today among those that the Pacific Mineral Museum draws upon for special exhibits.

During the 22 years that Joe was employed by UBC geology, he accomplished many things, any one of which the average person would have regarded as the achievement of a lifetime. Joe was smart and capable and proud of it. His refreshing bluntness was sometimes taken the wrong way. Frequently Joe's effect on people was startling, and Joe was sometimes a catalyst for dramatic changes in the lives of others. He supervised over two dozen summer students. One of them was a young construction worker who loved minerals and had just obtained a mathematics degree. Joe suggested that he think about a mineralogy career and recommended him to Gary Ansell, formerly at the Geological Survey of Canada. After the first morning at the Survey, Bob Downs knew exactly what he wanted to do—Bob is now a mineralogist at the University of Arizona in Tucson! Joe was also Mark Mauthner's mentor. Mark went from "summer student" as he got his mineralogy degrees to an associate in the gift shop after receiving his museology degree.

Joe's mandate for the museum was Canadian and Pacific Northwest minerals, so he got to know all of the field collectors active in that area. Ray Lasmanis, for example, brought him the first mandarinoite specimen ever found. When only iron and selenium showed up in a microprobe analysis, Joe knew he had a new species (ultimately described by Pete Dunn *et al.* in 1978). On another occasion, Joe convinced Bob Jackson to take over the operation of the Rock Candy mine (the subject of a 1981 article by Joe in the *Mineralogical Record*, vol. 12, no. 2, p. 99–101). Joe was also the producer and writer of the 1990 film "Rock Candy: A Story About Mineral Collecting," which starred Bob Jackson and featured others too numerous to mention. This may have been one of the first documentary films about how mineral specimens are collected, cleaned, marketed and exhibited.

Joe brought many beautiful things to Vancouver. At the Museum in 1990, Joe hosted a spectacular exhibit of "Harvard Gold," and in 1993 he presented the "Cutting Edge" exhibit of Susan Clarke's gemstones, featuring Tom McPhee's gem carvings. In spite of being nearly blind in one eye, Joe had a wonderful sense of the aesthetic. Initially Joe was interested in good mineral specimens, and the local collectors would eagerly await his return from the Denver or Tucson Shows with new specimens for the gift shop.

Joe also took seriously his mandate for geological education and organized a "Friends of the Museum" group which met for an evening's lecture almost monthly during the winters. Soon there was a newsletter, and the group swelled to more than 200 members. Cash customers were asked to leave their specimens at the shop for a few weeks "so that others could see and appreciate them." Joe was the catalyst who raised the connoisseurship of the collecting group, which led to dramatic changes in collectors' interests and in the quality of their collections.

Joe was always interested in photography and photographed specimens at mineral shows for presentations to the group. Soon he was taking beautiful natural history photographs of his travels and giving truly artistic multimedia talks. His travels to South America, western North America and other areas produced a collection of over 10,000 high-quality images. Using modern dissolve technology, he programmed selections with music to produce an unforgettable two-hour session experienced by thousands of people.

Back in the 1960's, while still in high school, Joe had his first exposure to mainframe computers. At UBC he was using the mainframe computer to catalog the collections. Again seizing an opportunity, he rode the personal computer revolution, eagerly utilizing the new capabilities, especially those related to image handling. Joe recognized the potential of "off the shelf" software which he could customize to permit communication with other systems! Joe knew that artifacts in a collection were objects coupled with good stories—even though some objects, with or without background stories, are beautiful enough to appeal to the aesthetic sense of any human. He toured the major eastern North American collections, capturing images of fine old specimens from mined-out British Columbia mines and adding these images to the UBC catalog. Joe summarized this work in an invited paper at the Rochester Symposium in 1991. Bart Cannon remarked, "Joe doesn't collect minerals anymore, just their images," and wondered to what ethereal plane Joe would move next.

That question was answered when Joe's interests moved to collections of collections irrespective of the actual artifacts. Throughout the late 1980's and early 1990's Joe became increasingly involved with the museum community in general and less involved with minerals. In 1995, with some anxiety for the future, he left the Geological Museum. By this time he had been diagnosed with multiple sclerosis, and had determined that he would enjoy the time left to him as best he could.

To his pleasant surprise, Joe found that his technical and artistic skills were highly marketable. He became a successful international museum consultant, finding himself in the enviable position of being able to pick and choose his projects. In addition to Canadian museums such as the Royal British Columbia Museum in Victoria, the Provincial Museum of Alberta in Calgary and Edmonton, and the Royal Ontario Museum in Toronto, he was doing work for the Harvard Mineralogical Museum in Cambridge, the American Museum of Natural History in New York, the Smithsonian Institution in Washington, and the Geologisk Museum in Copenhagen, to name a few. He also enjoyed working for smaller local museums, and out of the local "friends group" he inspired the creation of Vancouver's own Pacific Mineral Museum.

Joe had eclectic tastes and would always surprise you with new interests. He showed little interest in politics until a forest near his home was threatened with development; in response he deployed all his educational skills to organize and publicize a neighborhood group called Sunnyside Acres Heritage Society. He led this group as president, while they collected and spent $30,000 in an effective campaign to save the forest. Finally, after a five-year fight, Sunnyside Acres became a 400-acre forest preserve that will remain a park for all to enjoy in perpetuity. This is Joe's permanent legacy, for without him this forest would be a suburban development today.

Everyone has dreams; Joe was good at getting the ball rolling and making those dreams come true. His "out-of-the-box" thinking found solutions where others saw only problems. People with that rare and valuable talent are always going to be sorely missed.

Robert Woodside and Art Soregaroli

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Curator (Geol.): Dr. William Kelly
Tel: 518-474-7559
Collections Mgr. (Geol.):
Michael Hawkins
Tel: 518-486-2011
Fax: 518-486-3696
3140 Cultural Education Ctr.
Albany, NY 12230-0001
Website: www.nysm.nysed.gov
Hours: 10–5 daily (closed Thanksgiving, Christmas, New Years)
Specialty: New York & worldwide minerals
Support Org.: NY State Acad. of Mineralogy (www.nysm.nysed.gov/nysam)

Geology and Meteorite Museums University of New Mexico
Curators: Barry Kues (Geology), Rhian Jones (Meteorites)
Tel: (505) 277-4204
Dept. of Earth & Planetary Sciences
Northrop Hall, Univ. of New Mexico
Albuquerque, NM 87131
Hours: 8–12, 1–4 M–F (closed on school holidays)
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Tel: (828) 254-7162
Fax: (828) 257-4505
Website: www.main.nc.us/colburn
Pack Place Education, Arts & Science Center
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Asheville, NC 28801
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Fax: 406-496-4451
e-mail:dberg@mtech.edu
Program Director: Ginette Abdo
Tel: 406-496-4414
e-mail:gabdo@mtech.edu
Website: www.mbmg.mtech.edu/museumm.htm
Montana Bureau of Mines & Geology
Montana Tech of UM,
1300 W. Park Street
Butte, Montana 59701
Hours: Mem/Day to Labor Day 9-6 daily; Rest of year M-F 9-4; Open Sat & Sun May, Sept & Oct 1-5 pm
Specialties: Butte and Montana minerals, worldwide classics

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Curators: Dr. Carl A. Francis
William Metropolis
Tel: (617) 495-4758
24 Oxford Street
Cambridge, Mass. 02138
Hours: 9–4:30 M–Sat.; 1–4:30 Sun.
Specialties: Systematic Mineral Coll'n

Western Museum of Mining & Industry
Curator: Terry A. Girouard
Tel: (719) 495-2182
email: curatewmmi@juno.com
Dir. of Educ.: Gary Renville
Tel: (719) 488-0880
Fax: (719) 488-9261
www.wmmi.org
1025 North Gate Road
Colorado Springs, CO 80921
Hours: 9–4 M-Sat., (12-4 Sun., June–Sept. only), closed holidays
Specialties: Colorado minerals & ores, Western mining memorabilia, 14,000-vol. research library

The Gillespie Museum of Minerals, Stetson University
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E-mail: bbradfor@stetson.edu
Assistant Director: Holli M. Vanater
Tel: (904) 822-7330
E-mail: hvanater@stetson.edu
Fax: (904) 822-7328
234 E. Michigan Avenue
DeLand, Florida
Mailing: 421 N. Woodland Blvd., Unit 8403, DeLand, FL 32720-3757
Hours: 9–noon, 1–4 M–F when university is in session (closed on holidays, university breaks & in the summer)
Specialties: Worldwide comprehensive collection of rocks & minerals; Florida rocks, minerals & fossils; large historic fluorescent collection

The Denver Museum of Nature and Science
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Tel: (303) 370-6445
Dept. of Earth Sciences
2001 Colorado Blvd.
Denver, CO 80205
Hours: 9–5 daily
Specialties: Colorado minerals

Geology Museum Colorado School of Mines
Curator: Paul J. Bartos
Tel: (303) 273-3823
Golden, Colorado 80401
Hours: 9–4 M–Sat., 1–4 Sun. (closed on school holidays & Sundays in the summer)
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Curator (mineralogy):
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Houston, Texas 77030
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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
Support organization:
The Gem and Mineral Council

California State Mining and Mineral Museum

Website: http//parks.ca.gov/parkpages/park_page.asp?lvl_id=227
Curator: Peggy Ronning
Tel: (209) 742-7625
Fax: (209) 966-3597
e-mail: mineralcurator@sierratel.com
5005 Fairgrounds Rd.
Mariposa, CA 95338
Mailing Address:
P.O. Box 1192
Mariposa, CA 95338
Hours: 10–6 Daily (May–Sept.)
10–4 Wÿ¥.–Mon. (Oct–Apr.)
Specialties: Gold, California minerals, California mining

Arizona Mining & Mineral Museum

Department Director: Doug Sawyer
Curator: Sue Celestian
Tel: (602) 255-3795
1502 W. Washington Avenue
Phoenix, AZ 85007
Hours: 8–5 M–F, 11–4 Sat., closed Sun. & holidays
Specialty: Arizona 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

Museum of Geology

Curator: Thomas J. Campbell
Tel: (605) 718-2288
South Dakota School of Mines & Technology
501 E. St. Joseph St.
Rapid City, SD 57701-3995

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
Tel: (505) 835-5325
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

Penn State Earth & Mineral Sciences Museum

Curator: Dr. Andrew Sicree, PhD
Tel: (814) 865-6427
E-mail: sicree@geosc.psu.edu
Steidle Building
University Park
State College, PA 16802
Hours: 9–5 M–F & by Appt. (closed holidays)
Specialties: Mineral properties exhibits; "velvet" malachite; old Penna. minerals, mining art

Arizona-SonoraDesert Museum

Collections Manager & Mineralogist: Anna M. Domitrovic
Tel: (520) 883-1380 ext. 152
Fax: (520) 883-2500
2021 N. Kinney Road
Tucson, AZ 85743-8918
Hours: 8:30-5 Daily (Oct.-Feb.)
7:30-6 Daily (Mar.-Sept.)
Specialty: Arizona minerals

Pacific Mineral Museum

Director/Curator: Mark Mauthner
Tel: (604) 689-8700
E-Mail: markm@pacificmineralmuseum.org
848 West Hastings Street
Vancouver, B.C., Canada V6C 1C8
Hours: M–F 10–5, Weekends 10–6 (Closed Mondays in winter)
Specialties: BC–Yukon–Pacific NW, worldwide, gold, silver

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

Asst. Curator: Doug Gravely
Tel: (770) 386-0576
51 Mineral Museum Dr.
White, GA 30184
Hours: 10–4:30 Tues.–Sat., 2–4:30 Sun.
Specialty: Georgia & worldwide minerals & fossils

Europe

Museo Civico di Storia Naturale

Curator: Dr. Federico Pezzotta
Tel: +39 02 8846 3326
Fax: +39 02 8846 3281
E-Mail: fpezzotta@yahoo.com
Associate Curator: Alessandro Guastoni
Department of Mineralogy and Petrography
Corso Venezia, 55
I-20121 **Milano,** Italy
Hours: 9 am–6 pm daily
Specialties: Italian minerals, pegmatite minerals

The Friends of Mineralogy, Inc.

Visit the national Friends of Mineralogy website at www.indiana.edu/~minerals/fm.html

Who We Are:

Vol 1, No 1, Mineralogical Record, Spring 1970

The *Friends of Mineralogy* was founded in Tucson, Arizona, on February 13, 1970. Its objectives were to promote better mineral appreciation, education and preservation. The chief aims and activities of *FM* include:

* Compiling and publishing information on mineral localities, and important mineral collections.
* Encouraging improved educational use of mineral specimens, collections, and localities.
* Support a semi-professional journal of high excellence and interest designed to appeal to mineral amateurs and professionals, through which *FM* activities may be circulated.
* Operating informally in behalf of minerals, mineral collecting, and descriptive mineralogy, with voluntary support by members.

The Mineralogical Record has agreed to an affiliation with the Friends of Mineralogy whereby it will publish its written material and news of its activities. The *Friends of Mineralogy* will support the *Mineralogical Record*, since the aims of both are similarly educational and directed toward better coordination of the interest and efforts of amateurs and professionals.

Co-Sponsor, with the Tucson Gem & Mineral Society and the Mineralogical Society of America, of the Annual Tucson Mineralogical Symposia.

Werner Lieber Photo Contest and Traveling Museum Exhibit

Sponsored by Friends of Mineralogy

A traveling Museum exhibit will be created from the best photographs submitted for the contest

Categories: Juniors, Amateur Adults—(a) Micro and (b) Macro Minerals, Professionals, and Digital/Computer-Enhanced Photography

Contest Rules:

1. Matted 8″ x 10″ print. Mat must be 11″ x 14″.
2. The photo must be related to the contest theme: Minerals of the Andes.
3. Each photo must have a caption with locality, bar scale or description of crystal size, photographer, category, and other information submitter deems relevant. Caption should be attached to back of mat.
4. Photos will be displayed at the 2003 Tucson Gem and Mineral Show. Photos will be judged by the FM board of directors during the annual board meeting. Winners will be announced at the FM annual meeting and awards presented at the TGMS Saturday night awards banquet.
5. All photos become the property of FM. Copyright will be retained by author, but FM has royalty free use.
6. A non-monetary award will be presented to the winners.
7. Contest deadline: November 1, 2002.
8. Mail submittals to Dr. Karen Wenrich, P.O. Box 5054, Golden, CO 80401—(303) 278-1218 (phone & fax); email: CrystalsUL@aol.com.

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Famous Mineral Localities:

THE BARRA DE SALINAS PEGMATITES

Minas Gerais, Brazil

Francisco Müller Bastos
Rua Bernardo Guimaraes 1645
Belo Horizonte, Minas Gerais 30000
Brazil

Brazilian tourmaline has been famous among collectors and gemologists since the 16th century. Among the oldest and greatest of all Brazilian localities is the district of Barra de Salinas, encompassing a gem-bearing pegmatite swarm that continues to yield superb specimens today.

LOCATION

The Barra de Salinas mines are situated 715 kilometers from Belo Horizonte, the capital of the state of Minas Gerais. They can be reached by taking highway B.R. 040 to the intersection with B.R. 135, then following that road to Salinas. The last 36 km is a dirt road. Barra de Salinas (actually a part of the municipality of Coronel Murta) is in northeastern Minas Gerais, amid one of the greatest concentrations of gem pegmatites in the world. Occupying an area of 1500 hectares (over 3,700 acres), the mining operation is among the world's largest and most famous gem producers.

HISTORY

The discovery of tourmaline in Brazil dates back at least to 1565 (Wilson, 1994); in that year the Swiss naturalist Conrad Gesner illustrated a prismatic crystal with rhombohedral termination which he identified as *smaragdus bresilicus*, "Brazilian emerald," a "prismatic species, striated, glass-like, leek-green, transparent." The first documented discovery came three years later, when Martim Carvalho decided to do some exploring after seeing some green stones that had been brought to Porto Seguro by Brazilian Indians. Shortly thereafter, Marcos de Azeredo Coutinho also found some Brazilian tourmaline. All of these early green tourmalines were thought to be emeralds, and were sent to Portugal, where some ended up in the crown of Nossa Senhora de Penha (Bastos, 1972).

Here in Brazil there is a legendary story about the famous *bandeirante* (explorer) Fernão Dias Paes Leme, who set out from São Paolo in 1712 looking for emeralds. He had heard rumors of a sparkling hill of gemstones hidden deep in the jungle, and of a place called *Vapabucu*, in the state of Minas Gerais (already known for its deposits of silver, gold and precious stones). He traveled from São Paolo through the Paraiba Valley, crossed Mantiqueira Hill, and investigated the Serra da Piedade ("Pity Hill"). During his

Figure 2. **Deep cut at the Cata Rica pegmatite.**

Figure 1. **Location map.**

seven years of exploration he established many small villages that still exist today, including Ibitiruna, Paraopeba, Sumidouro, Roça Grande, and Esmeraldas. After enduring many difficulties and deprivations, he finally arrived at the shore of Lake Vapabucu and dug beautiful green crystals with his own hands. The discovery was the supreme moment of his life.

The green crystals were sent to Sao Paolo and later to Lisbon, Portugal for identification, with the surprising result that they were actually green tourmaline. Green tourmalines from Brazil had commonly been referred to as "Brazilian emeralds" in the gem trade, until this misidentification was finally revealed.

I have studied many maps of the region explored by Fernão Dias Paes Leme, and have concluded that after he crossed the Jequitinhonha River he arrived at a place called Barra de Salinas, and there discovered the green crystals. (Proctor, 1985b, disagrees, suggesting instead the Serra da Safira, farther south).

Minas Gerais possesses immense mineral riches that have yet to be exploited. The Jequitinhonha River Basin crosses the northeastern part of the state, cutting through a region rich in deposits of precious stones. According to Paulo Mattos (personal communication), son of Telesforo Mattos, one of the early owners of the Barra de Salinas field, the deposits there were discovered by a man named Pego around 1880; Pego's descendants still live in the area. Around 1939–1940 a French geologist named Gilot arrived in the village of Teofilo Otoni, then traveled onward to the Jequitinhonha River area where he purchased some property on which he lived until 1942. His lands extended downhill to the river, ending in a semi-arid area near Barra de Salinas. Therefore it is possible that Gilot was the second man to come across the deposits.

In 1942, Gilot sold his property to Albino Ramos, who undertook some gem mining and initiated the first thorough exploration of the pegmatites in the Barra de Salinas area. Within a short time Ramos recovered an astounding 15 *tons* of tourmaline crystals. This production was all purchased at very low prices by local farmers. Smaller prisms of tourmaline, thought to be too small to have significant value, were discarded during mining, along with large quantities of black columbite which the miners took to be coal.

Ramos later sold the property to Telesforo Mattos. After Paulo Mattos received from Telesforo, his father, two 60-kilogram bags of gem-grade tourmaline found at a pegmatite called *Vieirinho* (see Fig. 5), he spent five years cutting and faceting the material.

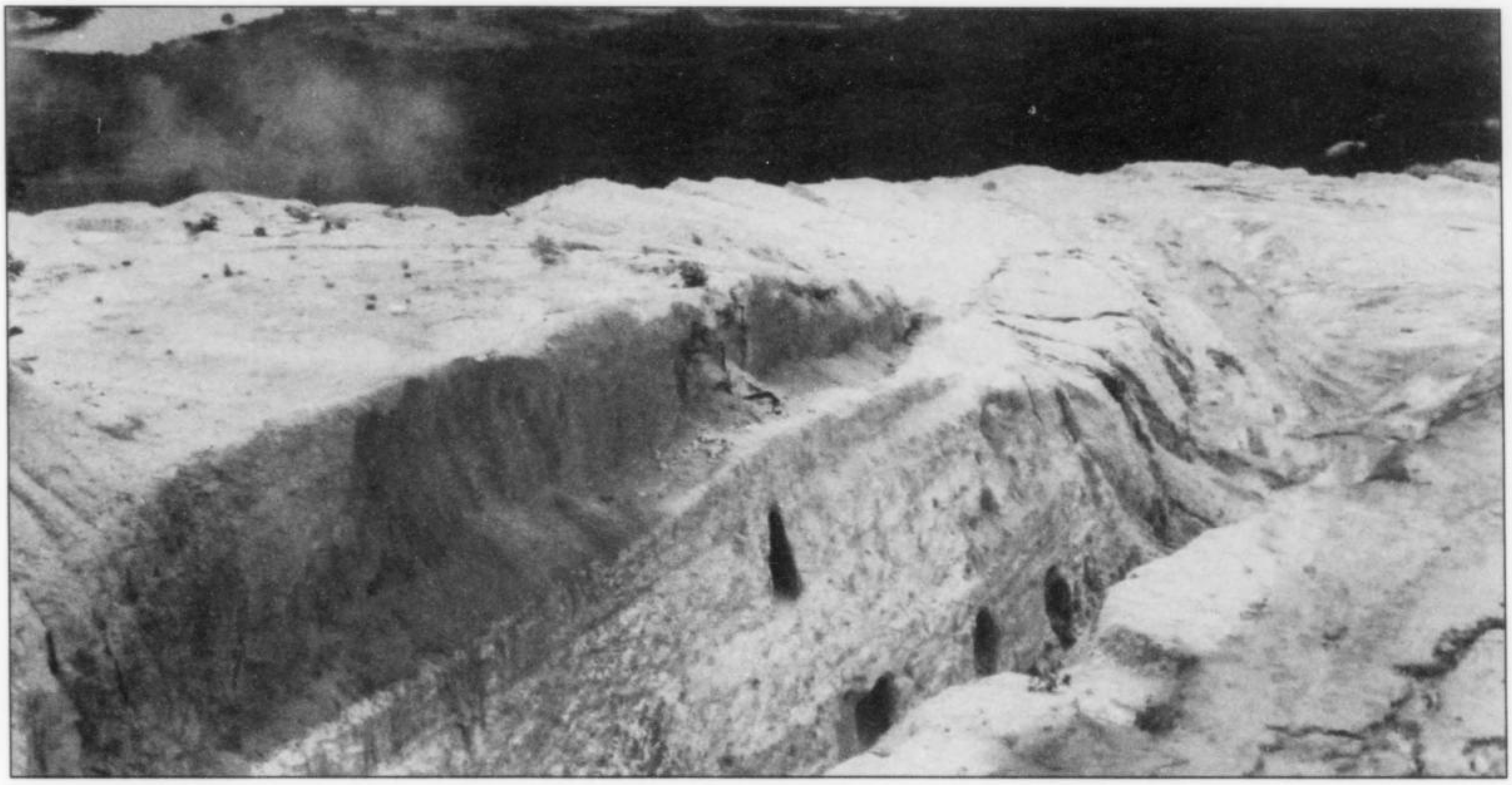


Figure 3. **A deep open cut at the Cata Rica pegmatite shows holes dug in the walls where gem pockets containing tourmaline were found.**

Telesforo Mattos recalled that one day a miner known as "Old Gomes" approached him with a proposition. Gomes had apparently figured out a pattern to the distribution of gem pockets at Barra de Salinas, and he claimed that, if given only one day to work in the mine, he would find a pocket of gem material to split with Mattos. Mattos agreed and, sure enough, in one day Gomes recovered 5 kilograms of the best gem-grade rubellite. Telesforo's son Paulo (personal communication) was an eye-witness.

In 1950, Telesforo Mattos sold the Barra de Salinas property to Antonio Pinheiro, and before the end of that year Pinheiro had extracted many fine tourmaline crystals from the Cata Rica pegmatite (see Fig. 5). That site is still producing gem material today. Pinheiro sold the property to Dr. Halley Freire Batista (Halba Comercio e Industria de Pedras Preciosas, Ltda.), and modern mining began there in late 1973. Since that time the mine has produced top-grade gem tourmaline as well as superb crystal specimens for museums and collectors.

Production was especially high from 1975 to 1984. For example, during this time the Vieirinho pegmatite yielded 20 kilograms of superb rubellite tourmaline. The Salto pegmatite, located at the confluence of the Salinas and Jequitinhonha Rivers, produced 6 tons of pale aquamarine beryl and cat's-eye tourmaline during 1983, along with 196 tons of mica (Halley Freire Batista, personal communication).

GEOLOGY and MINING

The complex pegmatite swarms of the Barra de Salinas area occur in pale reddish purple Precambrian schists. The individual pegmatite bodies vary in size and mineralogical composition, some containing predominantly beryl (mainly pink) and others tourmaline, along with the usual mica, quartz and feldspar. Most of the feldspar has decomposed to chalky white kaolinite which now hosts the gem pockets.

Bulldozers are often employed to cut through the quartz-mica-kaolinite bodies along an open face until signs of pocket mineral-

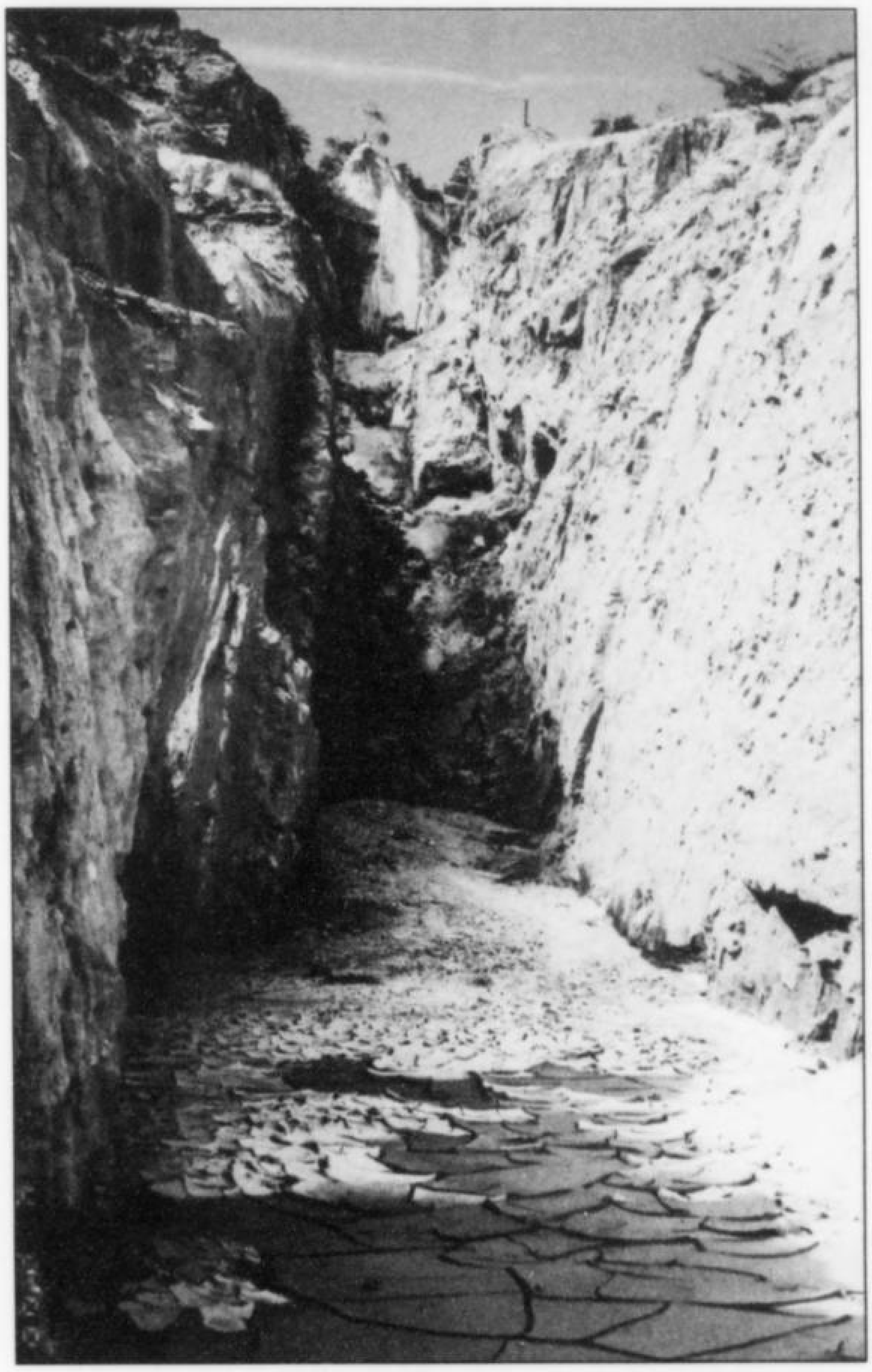


Figure 4. **Deep cut in a worked-out pegmatite.**

Figure 6. **The Vieirinho pegmatite.**

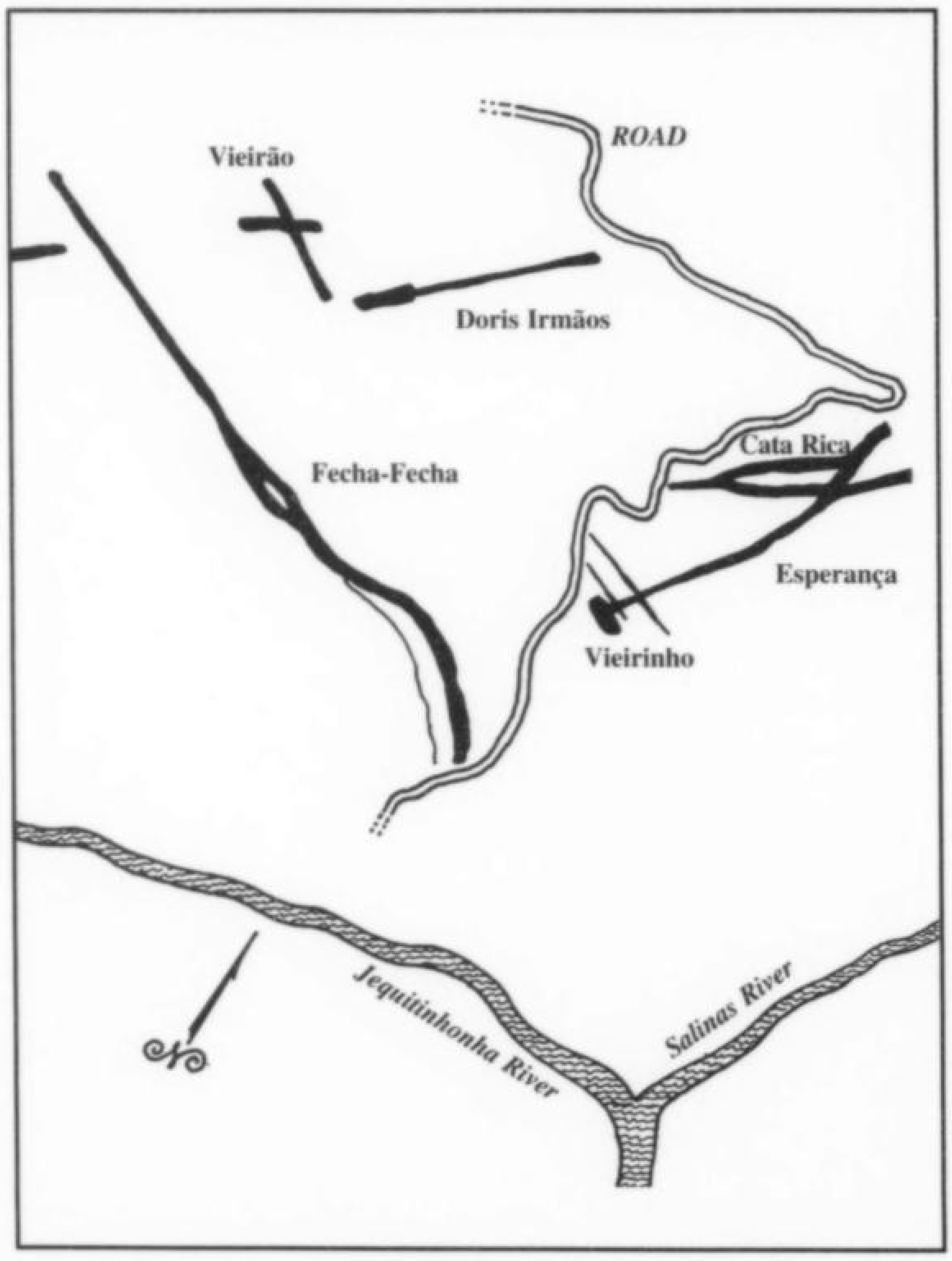


***Figure 5*. Sketch map of pegmatite workings in the Barra de Salinas area.**

ization appear, upon which all work is carried out carefully with hand tools. Lepidolite and smoky quartz are considered to be good indicators that a gem pocket is nearby. Alternatively the pegmatite veins are exploited by tunnels or by small open pits. Secondary alluvial deposits adjacent to the pegmatites are also worked for crystals.

Present-day mining operations are relatively mechanized, and the mines have electric power. High-pressure hydraulic cannons draw water from a reservoir and wash the kaolinite and soil away from the crystals. The resulting concentrate is placed in jigs and sorted by hand. Pneumatic drilling and blasting are also employed, and heavy equipment (bulldozers, scrapers, etc.) is used as necessary. For the soft alluvial deposits only hand tools are used.

Currently around 30 *garimpieros* work in the mine, even during the rainy season. There is still great potential for future production at Barra de Salinas, and fine specimens should reach the market, at irregular intervals, for many years to come.

MINERALS

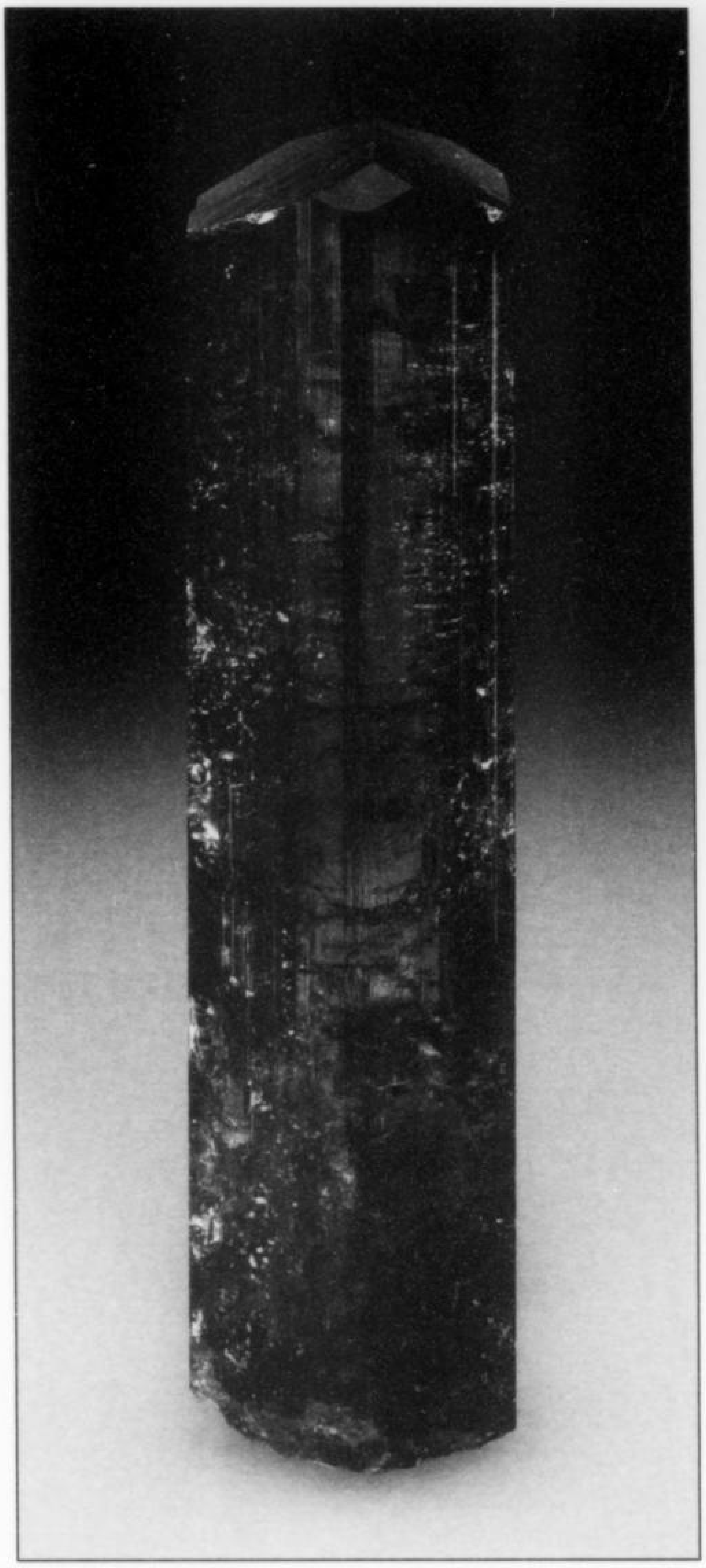
Beryl $Be_3Al_2Si_6O_{18}$

Beryl occurs in most gem pockets, sometimes as the dominant species and at other times greatly subordinate to tourmaline. The color is usually pink ("morganite"), but pale blue aquamarine is also found. The pink crystals are generally flattened on *c* and rather coarse, whereas the blue crystals are longer prismatic, often striated and with pyramidal terminations.

Some of the pink beryl can be treated by a proprietary process to produce a deep cobalt-blue or indigo-blue color similar to that of the famous Maxixe-mine beryl found in the Piauhy area in 1917. Pink beryls from other localities subjected to the same process do not undergo this color change, so there is clearly something unique about the pink beryl from Barra de Salinas (Bastos, 1975).

Tourmaline $WX_3Y_6(BO_3)_3Si_6O_{18}(O,OH,F)_4$

Tourmaline from the Barra de Salinas mines ranges in color from black to shades of pink-red, blue, green, brown, tan and colorless. At the Dois Irmaos and Vieirão pegmatites the tourmaline occurs with spodumene and lepidolite. At the Fecha-Fecha pegmatite the crystals of green tourmaline all seem to show



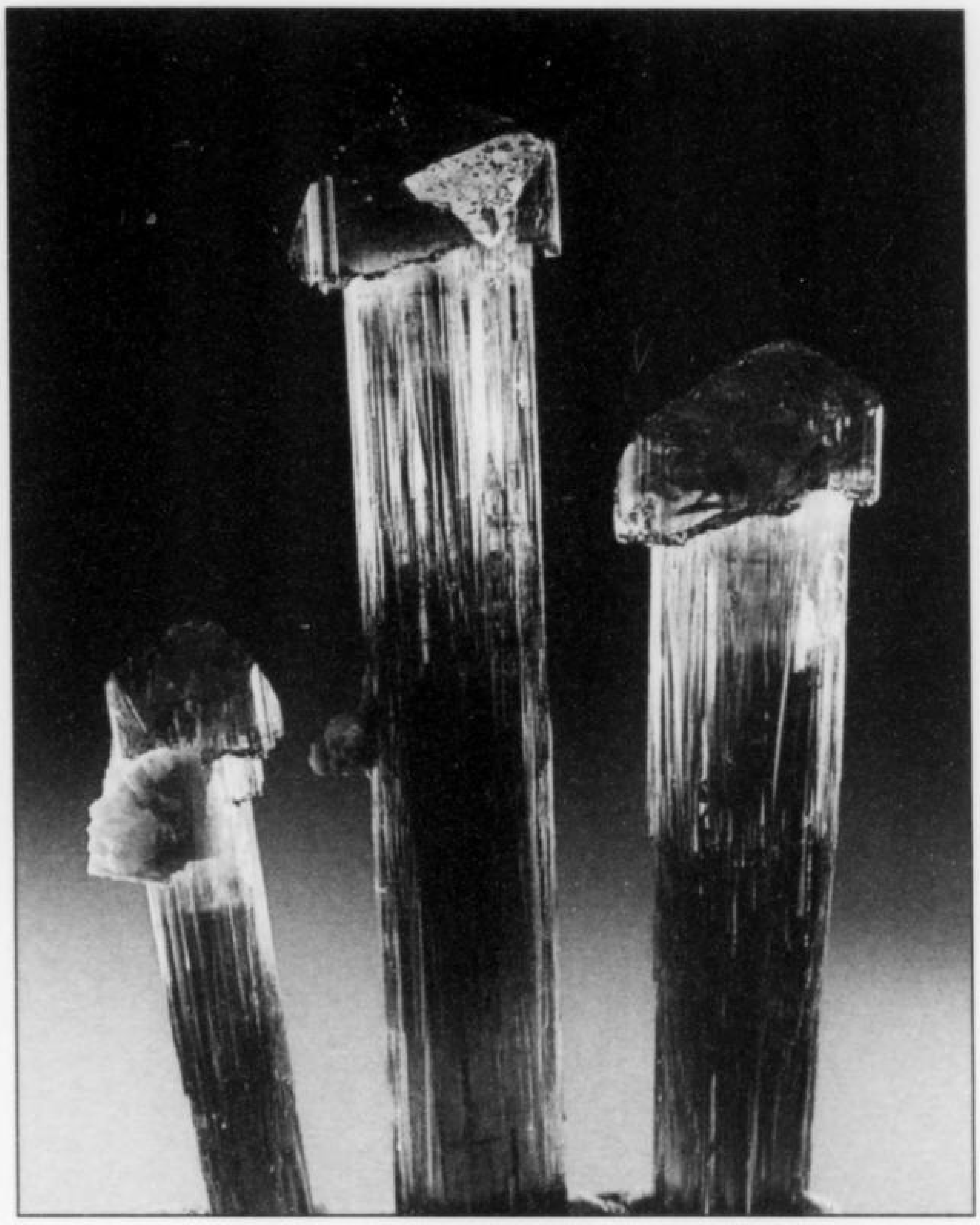
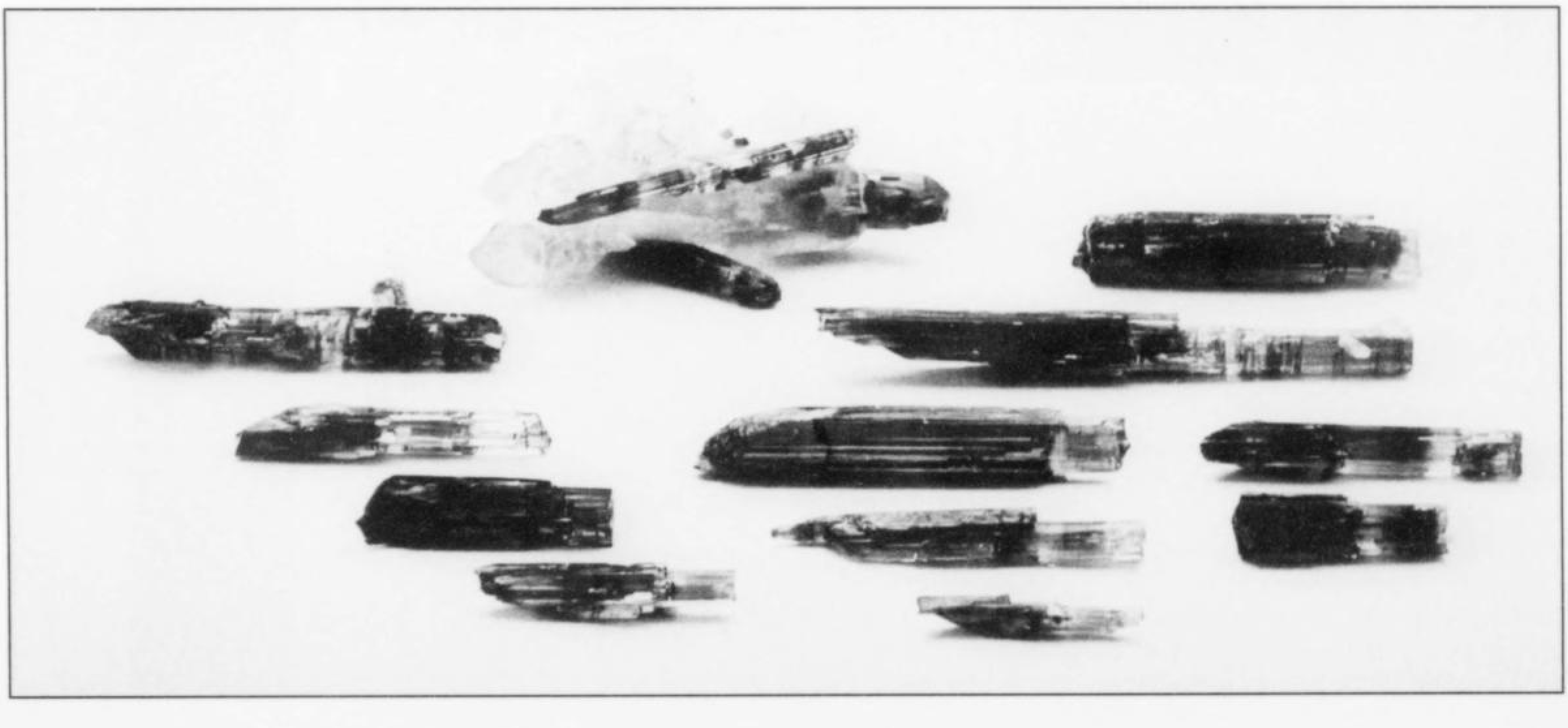
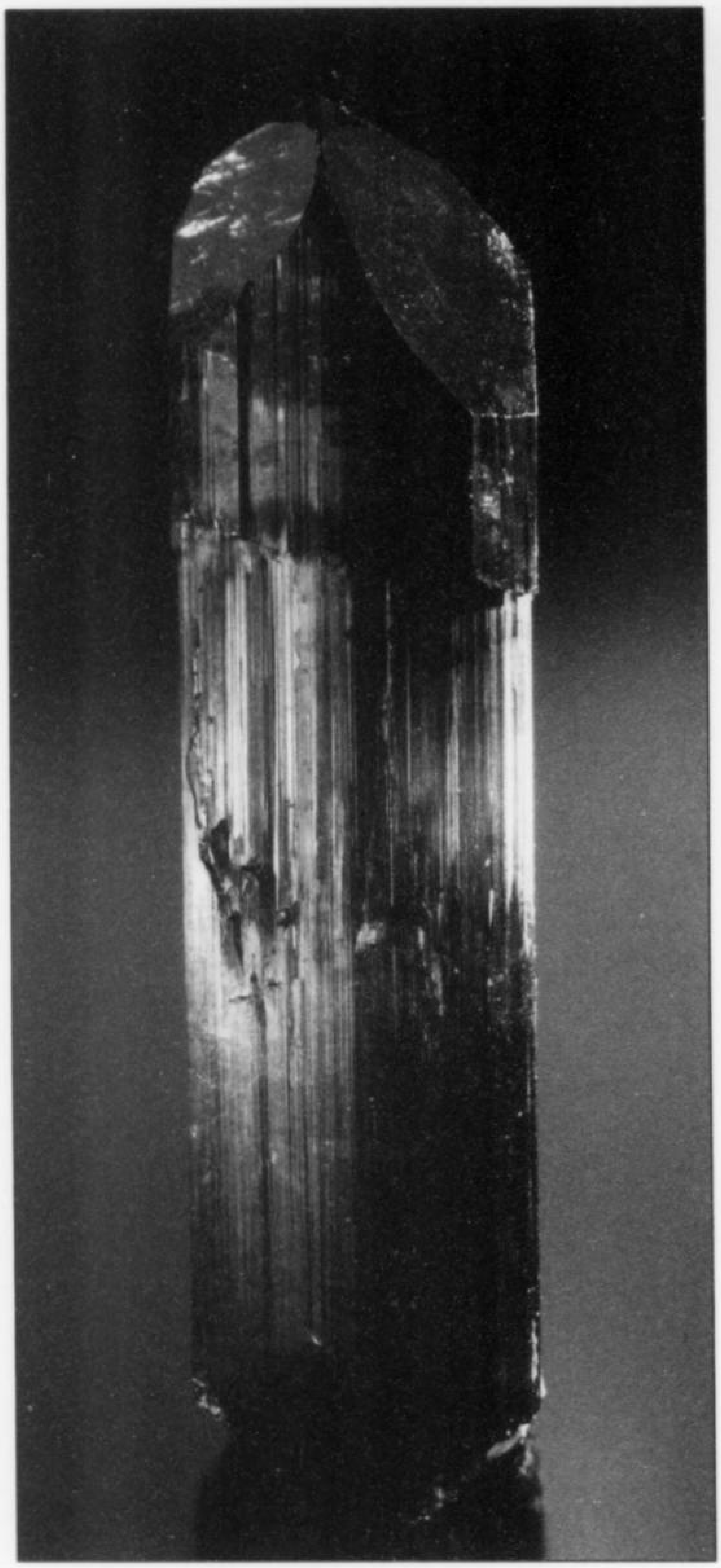


Figure 8. Elbaite scepter crystals to 10.5 cm, from Barra de Salinas. Most of the green outer layer has been dissolved away (from the bottom up!) by corrosive pocket solutions, leaving the pink and tan interior zones. Ken Roberts specimens; Wendell Wilson photo.

Figure 7. Red elbaite crystal, 12.5 cm, from Barra de Salinas. Steve Smale collection; Jeff Scovil photo.

Figure 9. Red and green elbaite crystals to 10 cm, from a pocket in the Barra de Salinas area.





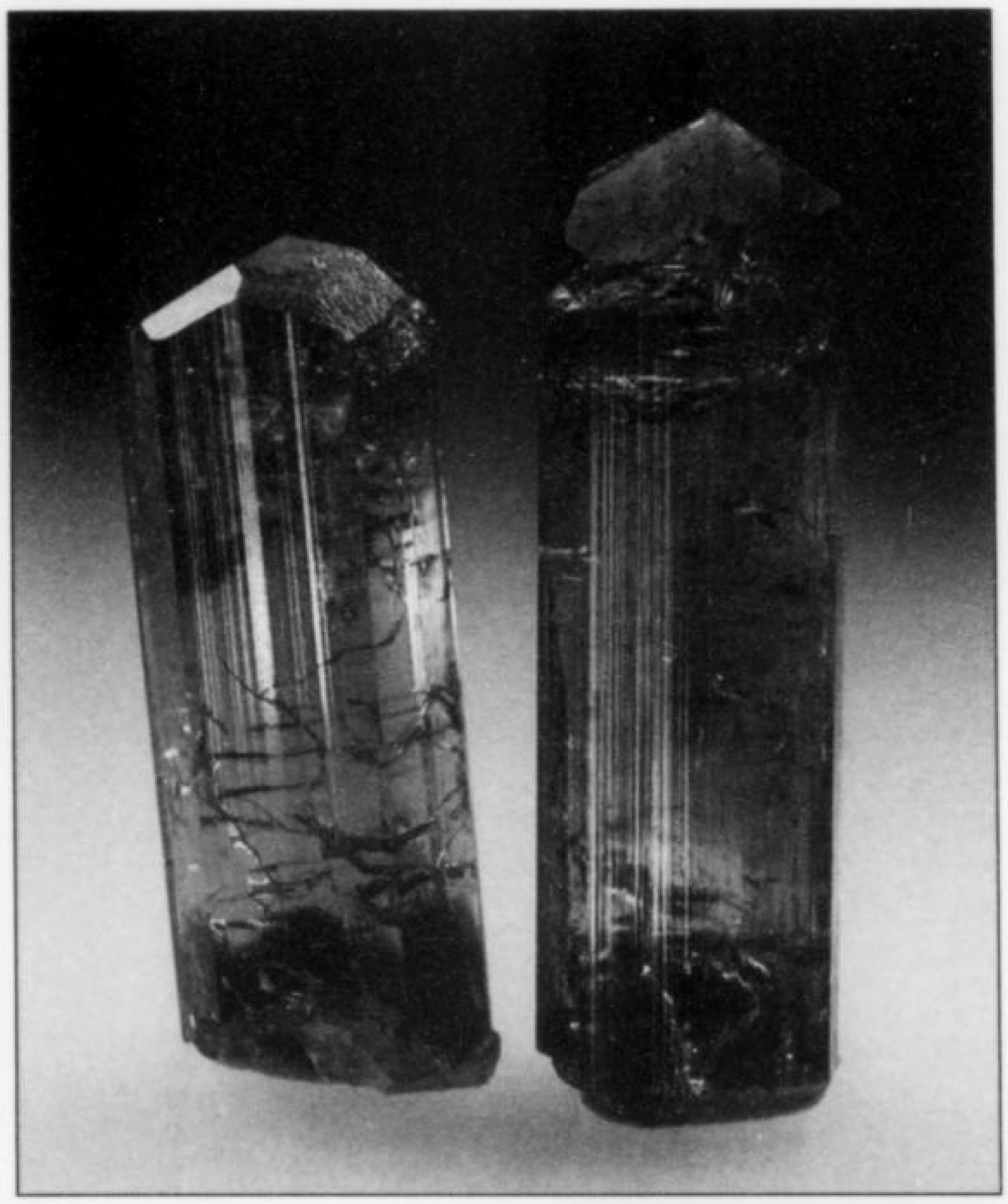


Figure 10. (above) **Green and pink elbaite crystals to 3 cm, from Barra de Salinas. Tim Sherburn collection; Wendell Wilson photo.**

Figure 11. (left) **Blue, pink and green elbaite crystal, 6.6 cm, from Barra de Salinas. Gene Meieran collection; Jeff Scovil photo.**

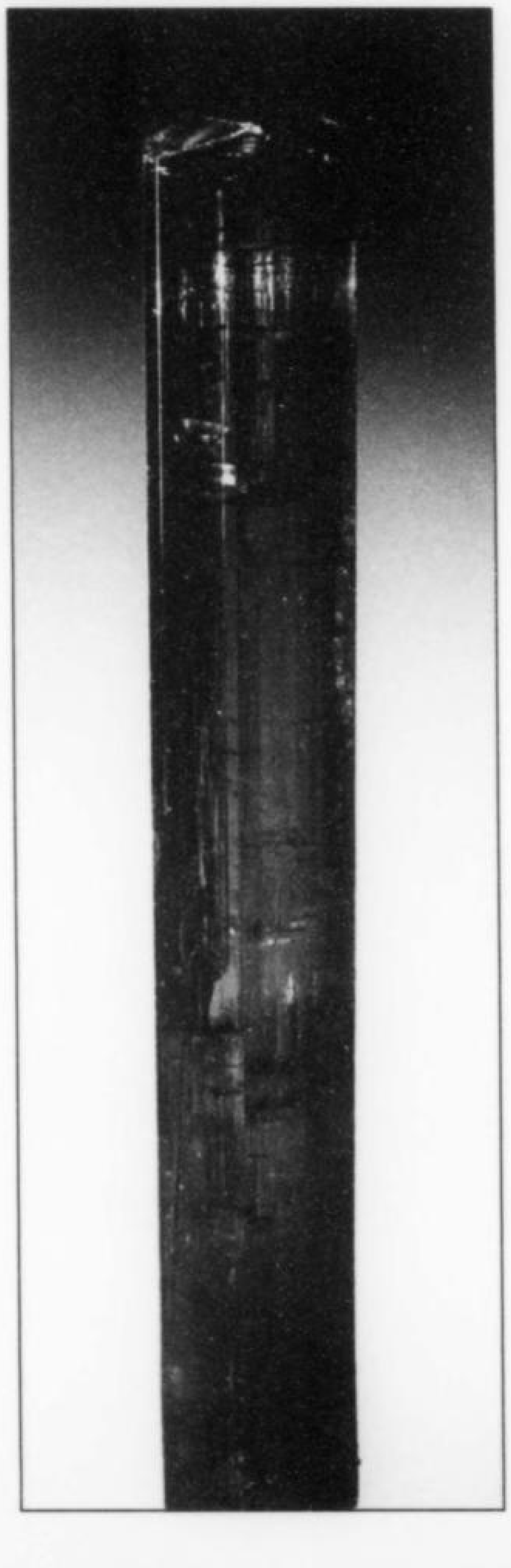


Figure 12. (right) **Red elbaite crystal, 10 cm, from Barra de Salinas. Harvard Mineralogical Museum collection; Wendell Wilson photo.**

pyramidal terminations. At the Vieirinho pegmatite a single pocket yielded 50 kilograms of "watermelon" tourmaline (pink cores surrounded by white to green surface zones).

The Cata Rica pegmatite is currently the most productive, yielding tourmaline (mostly elbaite) in a wide variety of colors, as well as pink and pale aquamarine beryls. Individual tourmaline crystals commonly show several colors, zoned along the *c*-axis or concentrically, and may also exhibit a cat's-eye effect in places.

The color of many Barra de Salinas tourmalines can be enhanced (for gemological purposes) through heat treatment. Brown crystals will commonly turn a beautiful rose-red at 250° to 400° C. Some dark green crystals achieve a cleaner color at 300° to 400° C, whereas others require heating to as high as 700° C. Classic deep bottle-green crystals do not change color at any temperature.

Morphologically, Barra de Salinas tourmaline crystals exhibit an overwhelming tendency to be terminated by multiple rhombohedron forms rather than the basal pedion (tourmaline being trigonal

Figure 13. **Elbaite crystal, 27 cm, found at the Cata Rica pegmatite in 1933.**

and hemimorphic). Crystals are generally striated along the prism faces, parallel to the *c* axis.

Elbaite crystals from the Cata Rica mine commonly show an etch-generated scepter habit wherein the green outer layer has been partly dissolved starting from the crystal base and working toward the termination. This phenomenon is related to the hemimorphic nature of tourmaline, making the surface of one termination more susceptible to dissolution than the other. An all-green crystal, in a corrosive solution, would tend to "burn down" from one end like a cigar. Apparently the green elbaite outer zones are more soluble than the red or tan cores, and dissolve preferentially, leaving scepters. Scepters of this type are well-known from other localities as well.

Eight different species of tourmaline have been tentatively identified from Barra de Salinas (which may be a record for a single locality or district). The identifications were performed on gem rough and cut stones through the application of gemological techniques (refractometer, polariscope, dichroscope, microscope, heavy liquids, inclusion studies according to the techniques of Eduard Gubelin, etc.), using published data and identified examples in the collections of the author and the Ouro Preto School of Mines as standards for comparison (see Bastos, 1992). No chemical analyses were employed, so the results must be considered provisional. The species we have identified are as follows:

Elbaite $Na(Li,Al)_3Al_6(BO_3)_3Si_6O_{18}(OH)_4$
Liddicoatite $Ca(Li,Al)_3Al_6(BO_3)_3Si_6O_{18}(O,OH,F)_4$
Uvite $(Ca,Na)(Mg,Fe^{2+})_3Al_5Mg(BO_3)_3Si_6O_{18}(OH,F)_4$
Dravite $NaMg_3Al_6(BO_3)_3Si_6O_{18}(OH)_4$
Schorl $NaFe^{2+}_3Al_6(BO_3)_3Si_6O_{18}(OH)_4$
Povondraite $NaFe^{3+}_3Fe^{3+}_6(BO_3)_3Si_6O_{18}(OH,O)_4$
Buergerite $NaFe^{3+}_3Al_6(BO_3)_3Si_6O_{18}(OH,F)_4$
Chromdravite $NaMg_3(Cr,Fe^{3+})_6(BO_3)_3Si_6O_{18}(OH)_4$

The vast majority of colorful, collector-grade crystals are elbaite; gemmy, dark yellow crystals of a magnesium-rich elbaite have also been identified. Schorl, of course, is opaque black. Dravite and uvite are colorless to pale brown. Chromdravite is a dark chromium green. Liddicoatite is typically dark brown, although some rare blue crystals have also been found.

Associations include beryl, microcline, albite, phlogopite, muscovite, biotite, quartz and lepidolite, as well as secondary kaolinite. Common inclusions are mica, albite, quartz, pyrite and (from the Esperança pegmatite) iridescent rutile.

Other Species

Blue topaz occurs at Barra de Salinas in small to large, perfect crystals, similar in appearance to the topaz from Marambaia,

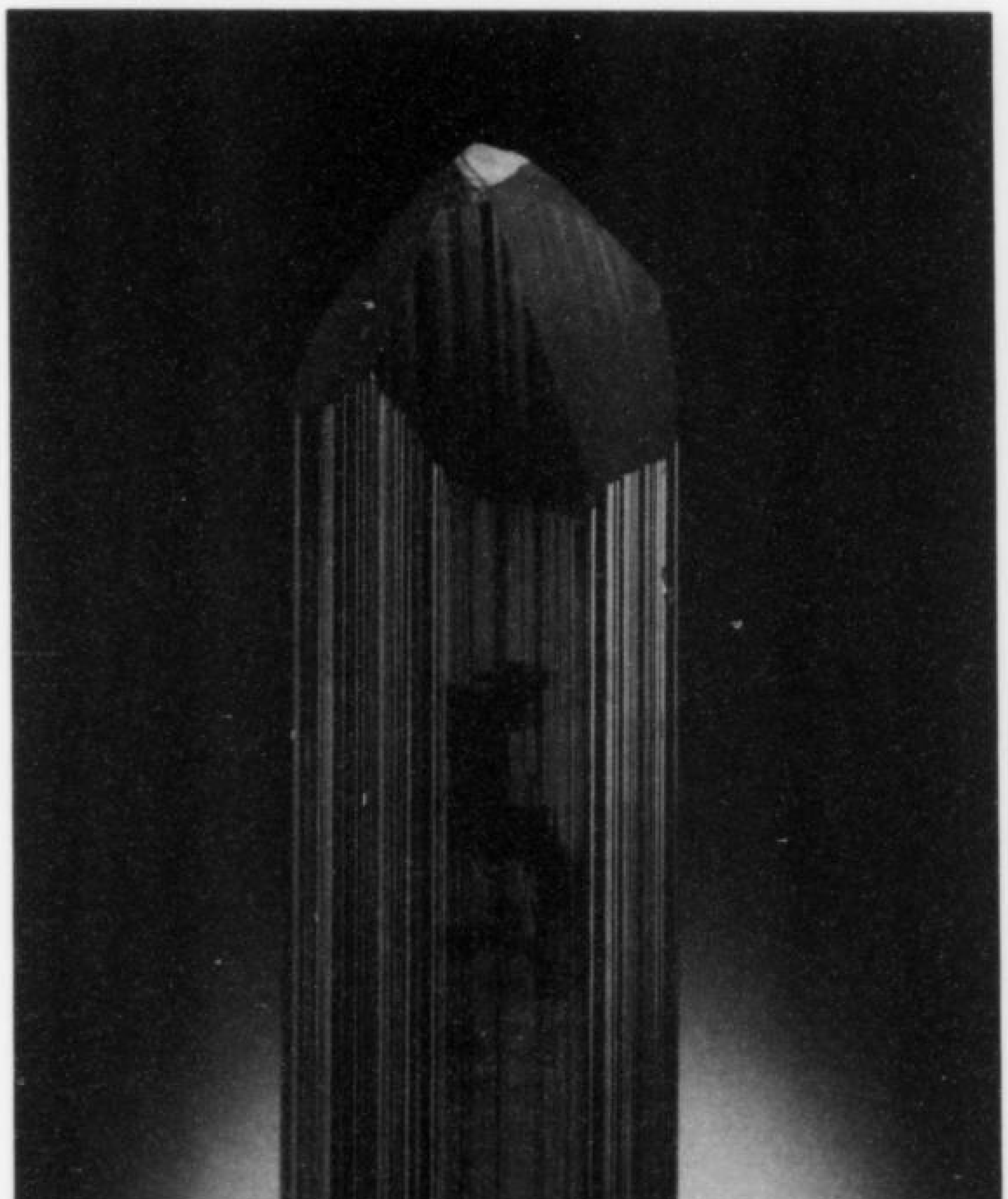


Figure 14. **Green elbaite crystal with pink base, 9.5 cm, from Barra de Salinas. Gene Meieran collection; Jeff Scovil photo.**

Minas Gerais. Garnet is common as massive, coarse-grained material and as crystals on quartz. Purple spodumene ("kunzite") crystals and small twinned crystals of pyramidal cassiterite are also known. The columbite minerals tend to occur as massive, compact aggregates which actually do bear some resemblance to coal.

ACKNOWLEDGMENTS

All photos, except as noted, were provided courtesy of Halba Comercio e Industrias de Pedras Preciosas, Ltda.

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Collector Profile:

JOHN JAGO TRELAWNEY

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Mineral collectors of the "old school," especially in California, remember Jack Jago as a brilliant, if idiosyncratic, mineral collector with an eye for beauty and rarity, and a penchant for visiting remote areas around the world. He donated his superb mineral collection to the Smithsonian in 1965 and his excellent collection of gemstones to the Natural History Museum of Los Angeles County in 1988. Today many of his finest pieces can be seen on public display at these institutions.

On April 21, 2001, the mineral and gem community lost one of its legends. "Jack Jago," as he was best known for most of his life, was a man of slight physical stature, but a formidable personality who left an indelible impression on all who knew him. A remarkable intellect, he was passionate about music, art, literature and, of course, minerals and gems. His love of beauty and lifelong quest for knowledge certainly were both keys to his success as a mineral and gem collector.

John Bernard Jago was born on April 1, 1909 in Livorno, Italy. His mother, Harriet Benfield, was an American of Polish descent and his father was Cornish. When Jack was about four, his parents divorced. In late 1915, shortly after the outbreak of World War I, his mother brought him and his two-year-younger sister Beatrice ("Nini") from Italy to the San Francisco area, where her parents and three other siblings had already settled. Harriet's brother, Bernard ("Ben") Benfield, who was to be a guiding influence and benefactor to the Jago family, insisted that they settle in a small town, as it would provide a better atmosphere in which to raise young children. So it was that they came to live in Palo Alto, California.

Young Jack Jago distinguished himself as a true child prodigy on the piano, rising quickly to the concert level. At 15 he headed back to Europe, where he attended boarding school in Switzerland. His experiences in Europe as a youth no doubt contributed to his refined and somewhat European manners. His early globetrotting also primed his linguistic talents. Bilingual from the start in Italian and English, the languages of his youth, he later grew to be fluent

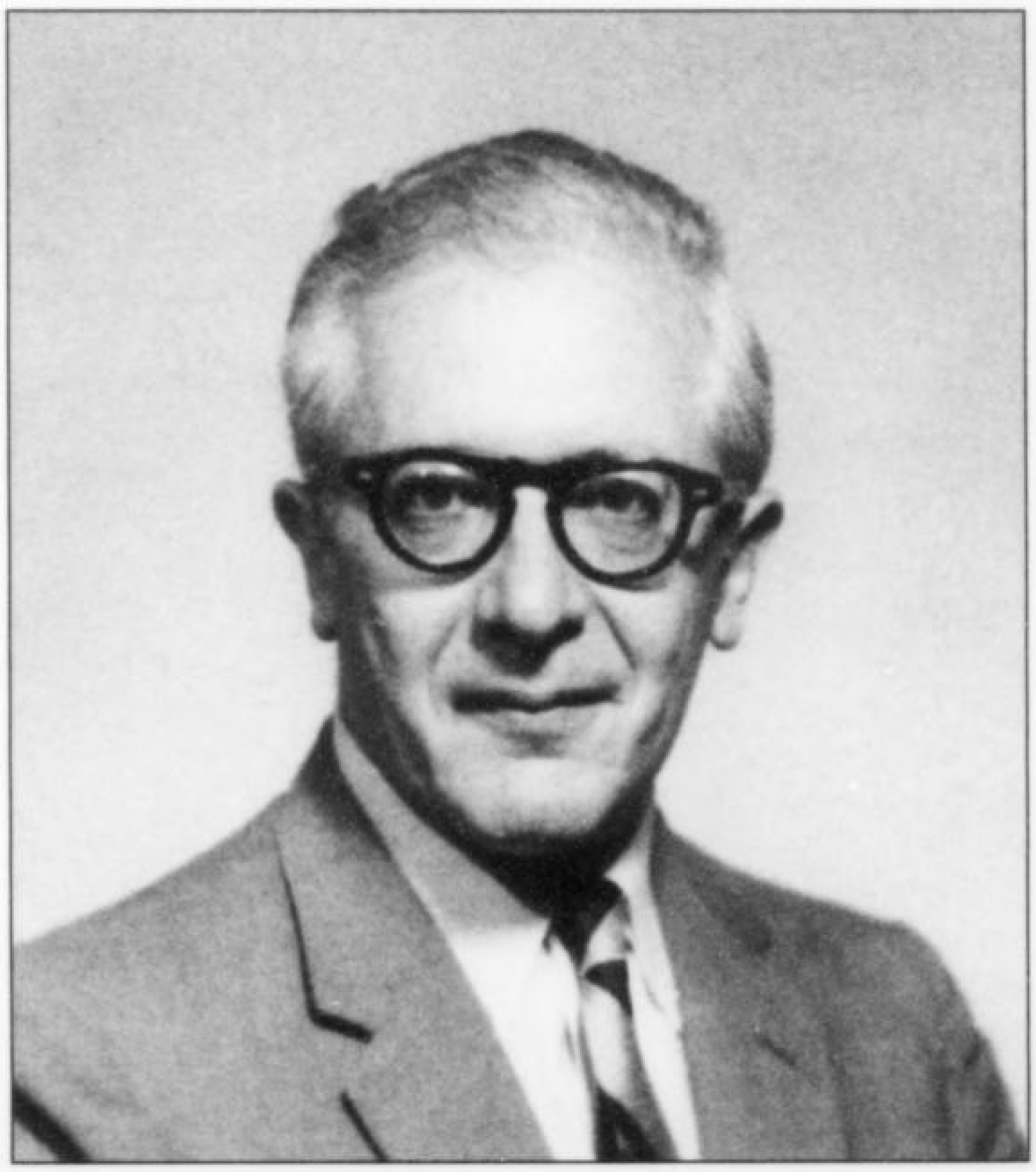


***Figure 1.* John Jago Trelawney, 1960's.**

Figure 2. **John Jago Trelawney in Johannesburg, South Africa, 1972.**

in Spanish, French, German, Greek and Latin and was passable in Portuguese, Russian, Japanese and a few African dialects. After his 65th birthday, he was tutored in Chinese, attaining competence in more than 2000 characters.

Jack returned to California to attend college and law school at Stanford, receiving his law degree in 1933. In 1934, through a recommendation from his law professor, he got a job with the National Recovery Agency (NRA) in Washington, D.C. After that he went into private practice in the San Francisco area specializing in tax and estate planning. His spirit of adventure led him to Manila in the Philippines with his best friend from law school, Finley Gibbs. After a year of living there, he headed back to the U.S. During World War II he worked for Military Intelligence decoding and translating Japanese messages. After the war it was back to law, living in San Francisco and taking care of his aunt and mother.

His individual practice flourished and grew to include the specialized area of maritime law. His apartment at Mason and California Streets on Nob Hill was decorated in rather grand style, including (of course!) a Steinway concert grand piano. The apartment also had the flavor of a private museum, with Far Eastern art including screen paintings, ceramics, metal ware, sculpture and carvings. A magnificent library reflected his love of the literary arts, especially poetry. Jack's restless spirit led him to travel extensively and he made friends in many parts of the world.

In the late 1960's his Nob Hill apartment building was purchased and annexed by the historic Fairmont Hotel. Jack took an apartment on Pacifica for a couple of years as he phased out his law practice. He seriously considered moving to Mexico City and went so far as to purchase a lot near the Reforma, where he built an elaborate 10,000 square-foot house that included a wine cellar and servants' quarters. Ultimately, however, he decided that living in Mexico City didn't suit him. He sold the nearly finished house and opted to move back to his roots in Palo Alto. In 1972 he bought a condominium at 101 Alma Street, where he lived for the last 29 years of his life.

At the time of his retirement in 1972, Jack legally changed his name from John Bernard Jago to John Jago Trelawney. The significance of the name "Trelawney" was not clear to most people who knew him and he apparently enjoyed maintaining a certain mystique about it. He once explained to me that it could be traced to a marriage in Penzance, Cornwall, between the Jago and Trelawney families and that the transposition of Trelawney and Jago was in accord with 19th-century Cornish usage. I suspect that he may have been doing some storytelling because family members are not aware of this connection. When Jack's personal secretary for the last 15 years of his life asked him about the origin of the name, he told her that he took it from the character of Squire Trelawney in Robert Louis Stevenson's pirate classic *Treasure Island.*

Jack—the Mineral and Gem Collector

Jack's interest in minerals clearly started early. According to Dick Thomssen, Jack's first mineral specimen was given to him in Italy when he was about six years old. It was a zeolite (gismondine) from a quarry near Rome, and Jack later gave that specimen to Dick who still has it. Jack told me that he was first exposed to mineral collecting when he received a set of minerals assembled by the well-known Palo Alto mineral dealer R. M. Wilke; Si Frazier recalls Jack relating that, as a boy, he frequently visited Wilke's shop.

Jack didn't have the resources (or probably the time) to devote to serious mineral collecting until the 1940's. Si Frazier notes that Jack's interest in minerals was apparently reawakened when he encountered a colorful mineral dealer who went by the name of Chuckawalla Slim. The overweight, bearded dealer was charming, but a bit of a con artist. He traveled about in a large trailer and had a large assortment of lovely (though overpriced) specimens. Si remembers Scott Williams commenting on how Jack had been taken by Slim.

Jack was not one to take a superficial approach to anything that really interested him. He immersed himself in mineralogy, learning all that he could. He took mineralogy courses from Adolf Pabst at Berkeley and hired Brian Mason to teach him optical crystallography. As Si Frasier recalls:

> He had a deep interest in crystallography and mathematics, both of which he tutored me on. He also knew more about semantics and etymology than anyone else that I have ever met. I have always felt that he really would have liked to have been a professor. He enjoyed teaching and lecturing, and I shanghaied him a number of times to give presentations to a group of serious amateur mineralogists that Bill Nisson and I organized that usually met on the Cal (Berkeley) campus.

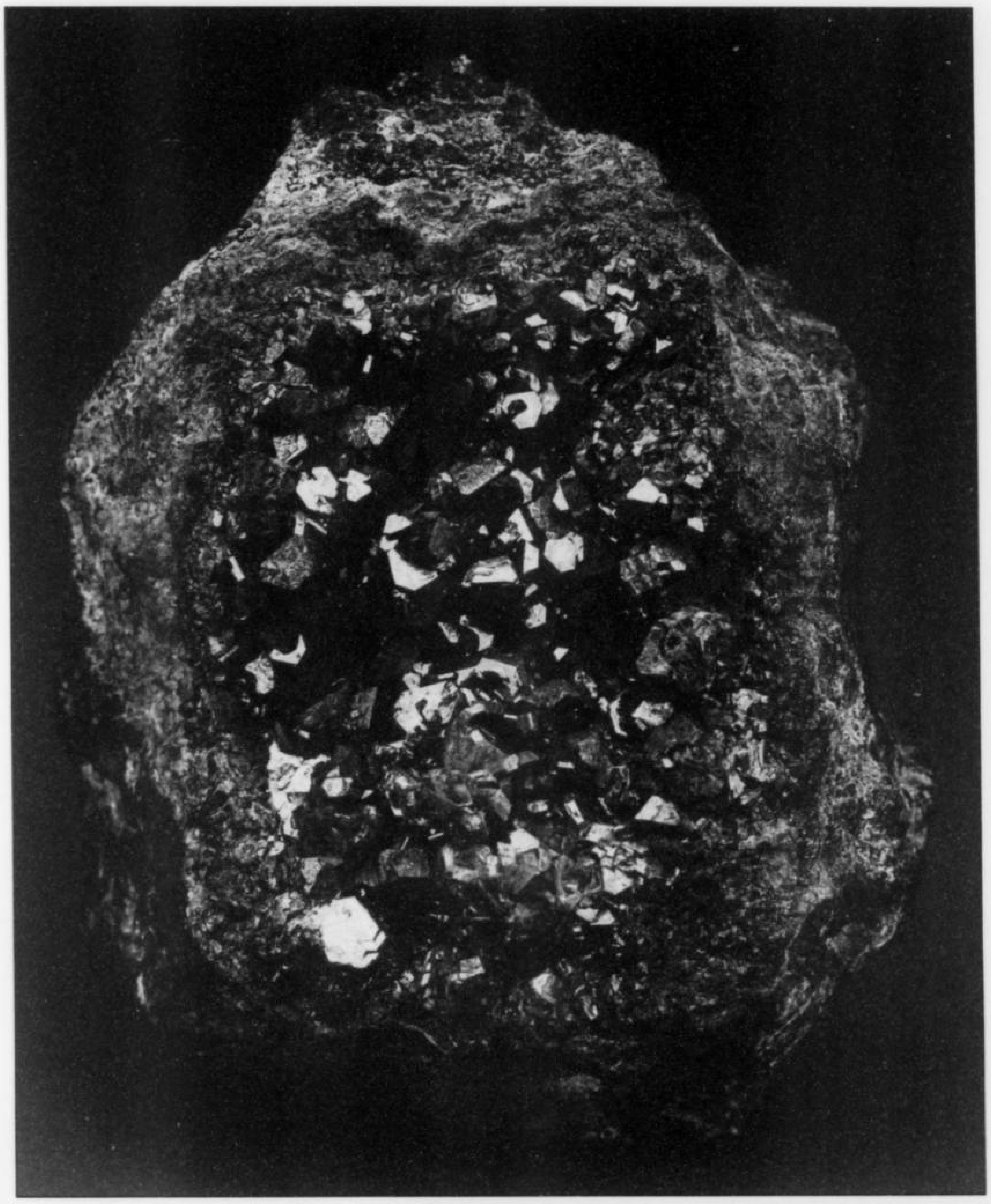
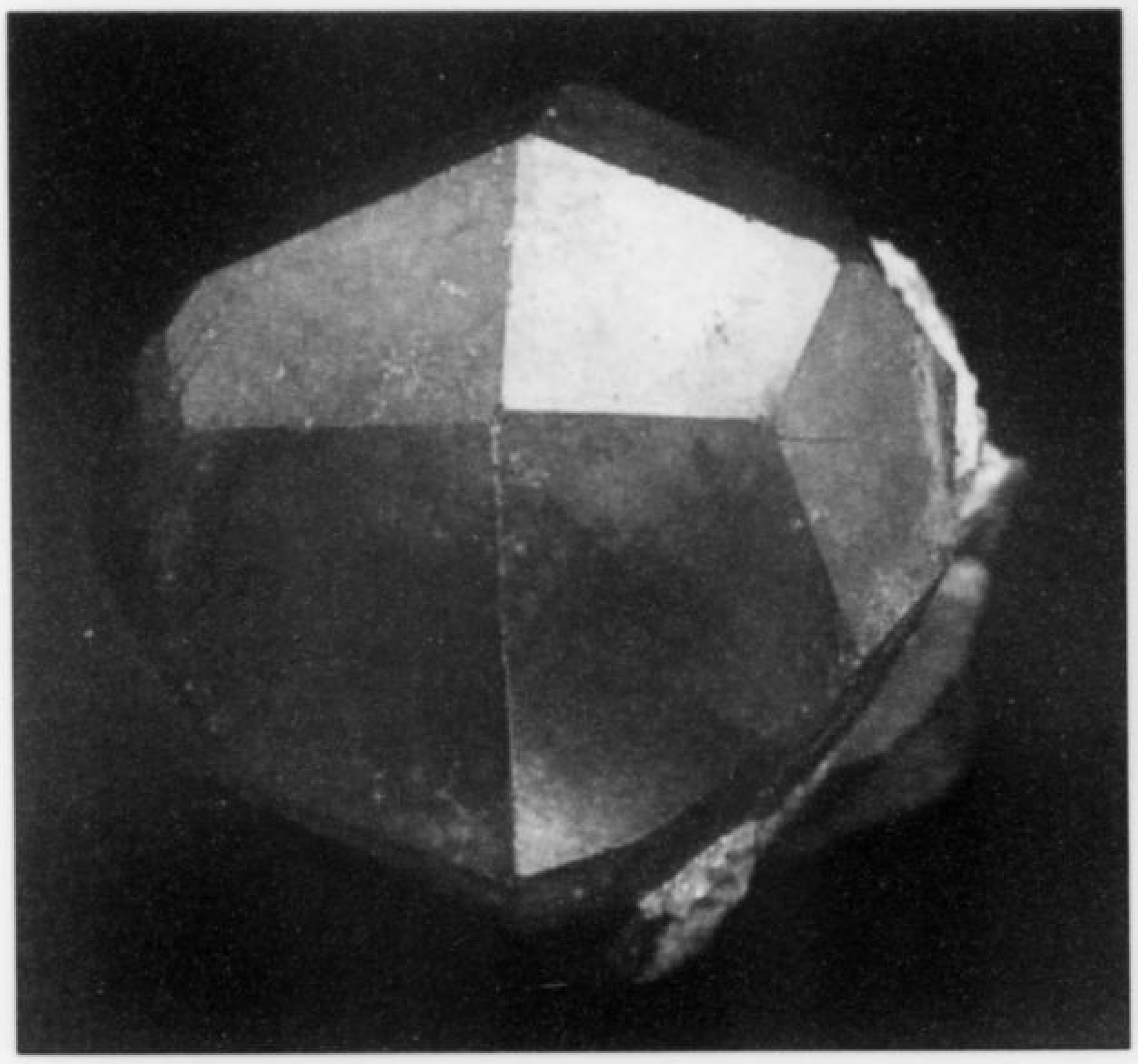


Figure 3. **Beudantite crystals with carminite in chalcocite, 7 cm, from Tsumeb, Namibia (JJT Collection, NMNH specimen 137643 and photo).**

Figure 4. **Spessartine crystal, 3 cm, from the Pedra Bonita mine, Rio Grande do Norte, Brazil (JJT Collection, NMNH specimen 137315 and photo).**



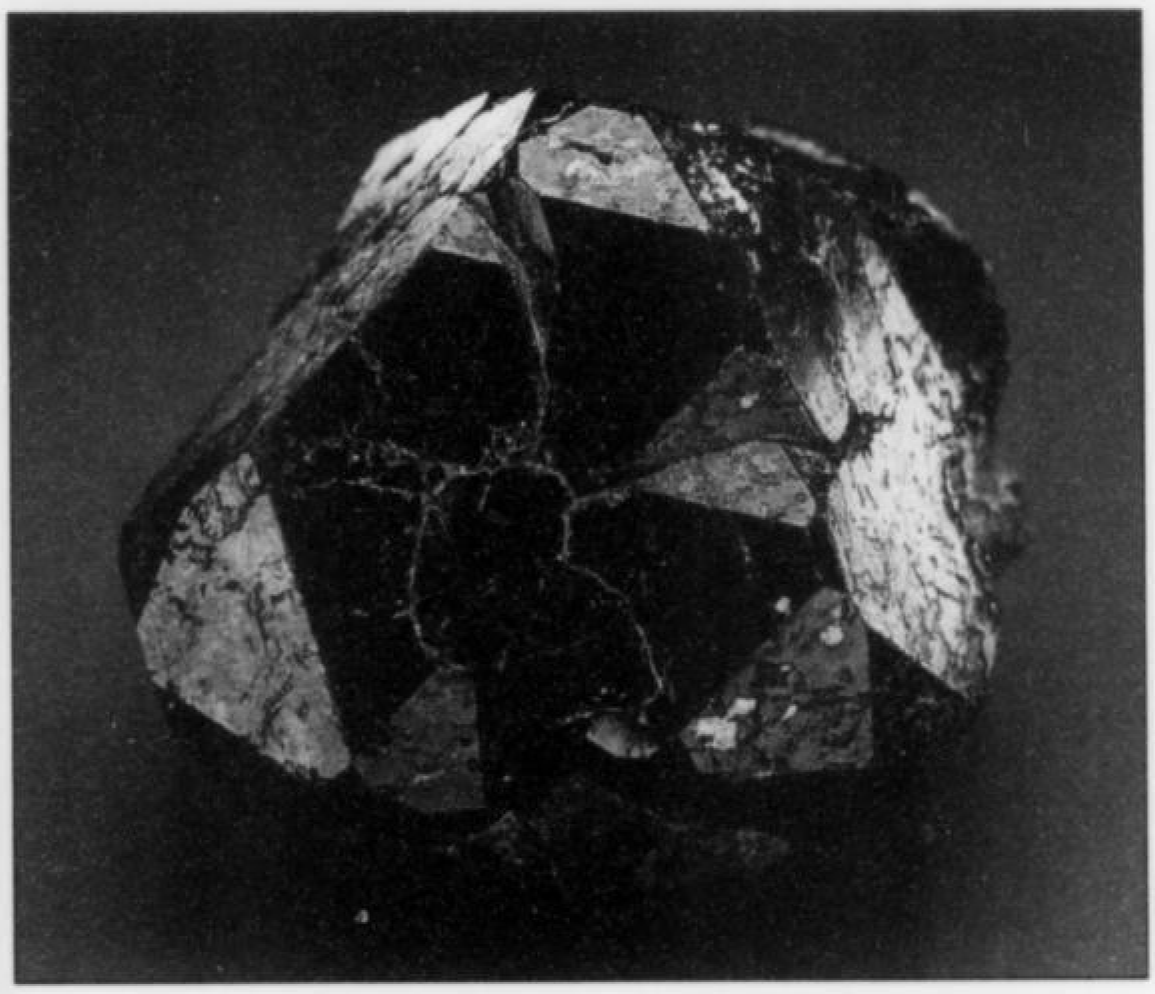


Figure 5. **Spinel crystal, 7 cm on edge, from Antanimora, Madagascar (JJT Collection, NMNH specimen 140293 and photo).**

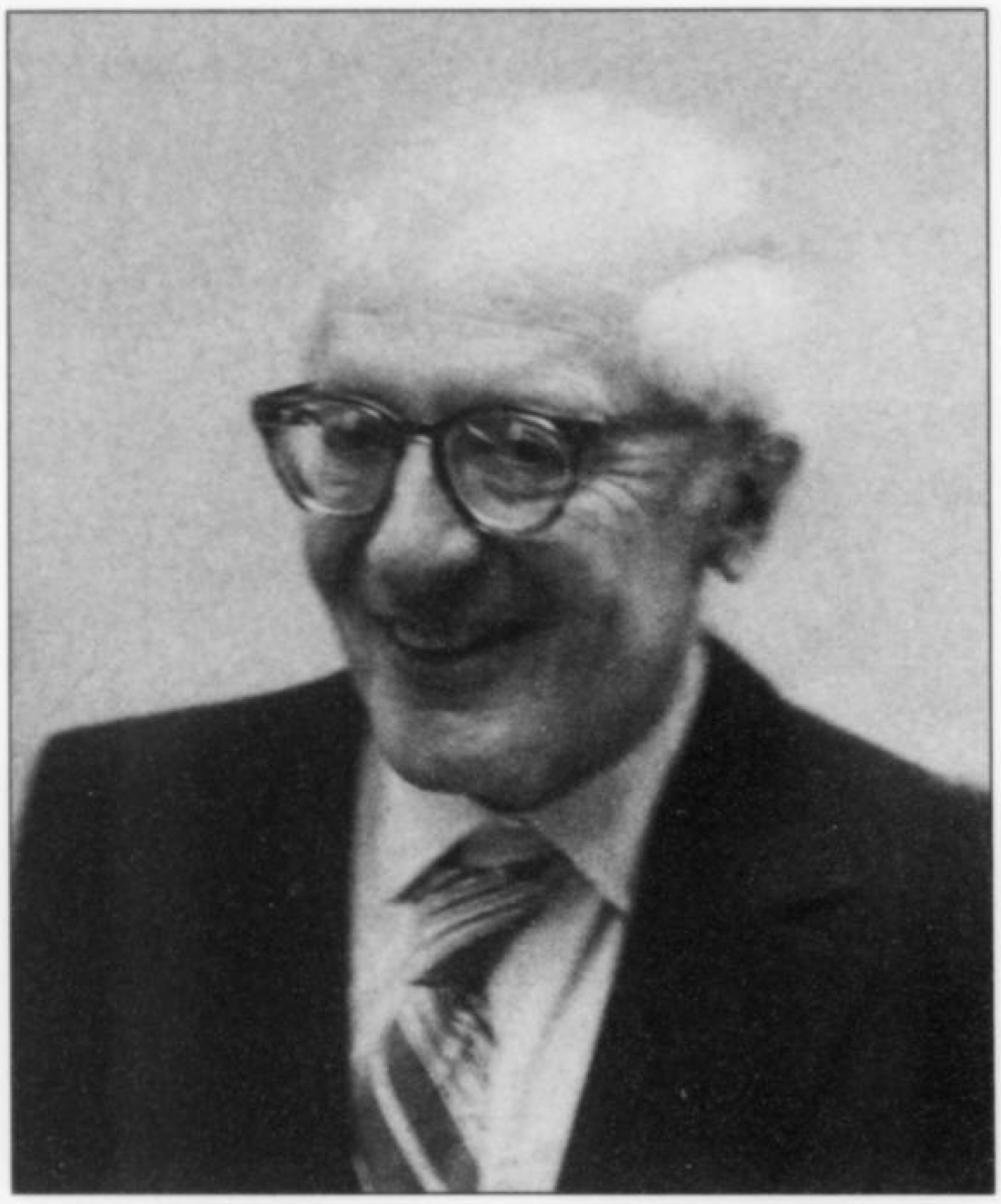


Figure 6. **John Jago Trelawney, early 1970's. Photo courtesy of Dona Leicht.**

George Burnham remembers when Jack showed up at his door and introduced himself one day in early 1950. He proposed that George join him on a collecting trip that would circle the Atlantic, through Europe, Africa and South America. In those days, just four years after starting his mineral company, Burminco, George didn't have the resources to undertake anything so ambitious. Despite Jack's enthusiasm, George declined and thought he had heard the end of it. He hadn't. Every week or so Jack would call and urge him to reconsider, while presenting more details of the involved travel plans he was developing. Jack's persistence and persuasive abilities eventually won out.

The expedition they undertook later that year is still remembered by many in the mineral world and certainly deserves a place in mineralogical lore. George arranged financing for his expenses through a couple of local collectors who were promised the pick of his acquisitions as return on their investment. He kept a diary of letters that he sent to his underwriters. Dick Bideaux has a copy of that diary, and Rock Currier once said that reading those letters turned him in the direction of becoming a mineral dealer and visiting exotic places.

The trip, a mix of collecting, buying and museum visiting, began in New York City on July 2, 1950. They collected fluorite at St. Lawrence, Newfoundland; then headed to Iceland for zeolites. In Norway they visited Kongsberg, Evje and Kragero and in Sweden they made the obvious stop at Långban. Heading south, their next stops included Brussels, London, Cornwall and Paris. At the Lengenbach quarry in Switzerland, they enjoyed more collecting; then in Italy they visited Florence and Rome, and finished off Europe with a stop in Greece.

The trip took a more adventuresome turn as they entered Africa via Egypt, then flew on to Uganda on a BOAC 3-deck flying boat. At this point they split up, George heading to Kenya, Tanganyika (now Tanzania) and Mozambique and Jack to Madagascar and the Belgian Congo (Democratic Republic of the Congo). They got back together in Johannesburg, South Africa, for Christmas. From there, Jack apparently headed back home, while George pressed on to Southwest Africa (now Namibia) and Brazil.

Jack showed us what it takes to be a great collector—the drive to go that extra mile. In Bill Smith's words: "He was indefatigable in his pursuit of fine specimens, and he had both the money and the social graces needed to capture his prey." Mimi Merrill echoes "Jack was completely focused on minerals and had the superb taste, the intelligence, and the money to carry that focus into one of the finest mineral collections in the world.

Jack's fine-tuned sense of aesthetics did not prevent him from also appreciating the rare and ugly members of the mineral kingdom. Ralph and Mimi Merrill (*Minerals Unlimited*) once asked Jack what his most expensive specimen was. He hauled out a large, but not very attractive crystal of "*ampangabéite*" (samarskite) and told them that in order to acquire the crystal he had to buy the mine in Madagascar from which it came. According to Dick Bideaux, Jack paid to work the Iveland, Norway, thortveitite locality, from which he kept two large cigar-shaped crystals. He told Dick that during the Korean War he was visited by a government official who told him that scandium was a critical

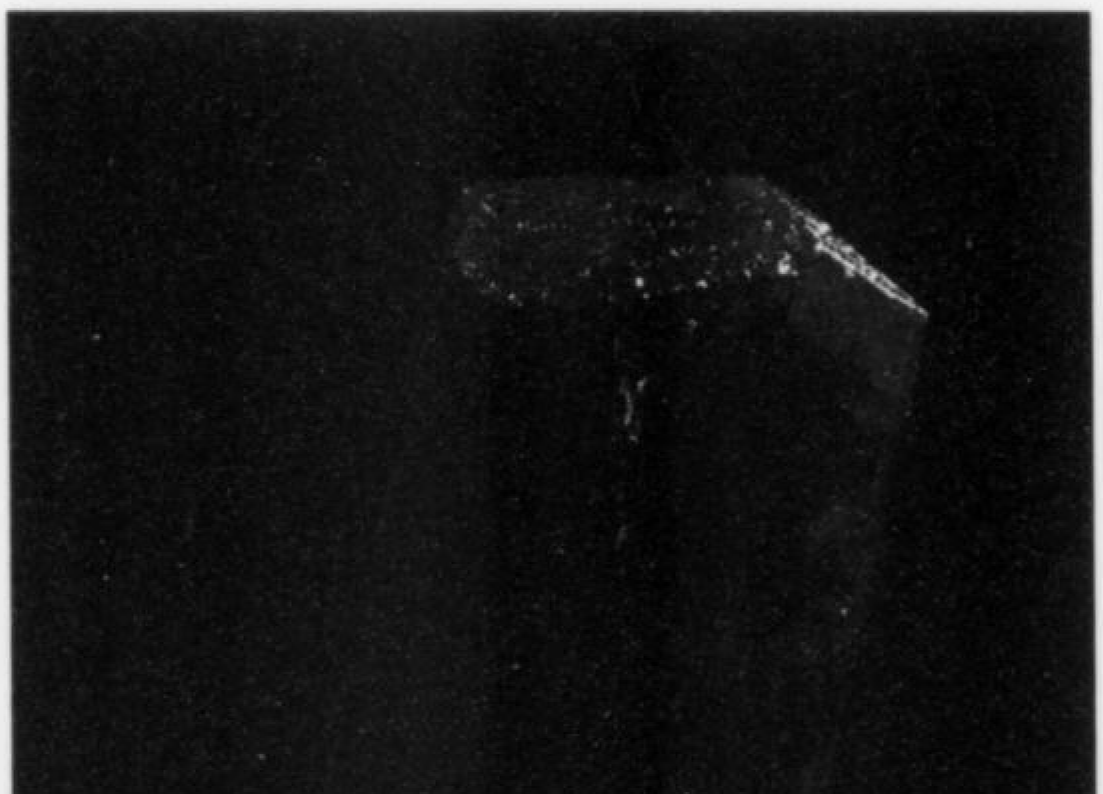


Figure 7. **Proustite crystal, 8.6 cm, from Chañarcillo, Chile (JJT Collection, NMNH specimen 142235 and photo).**

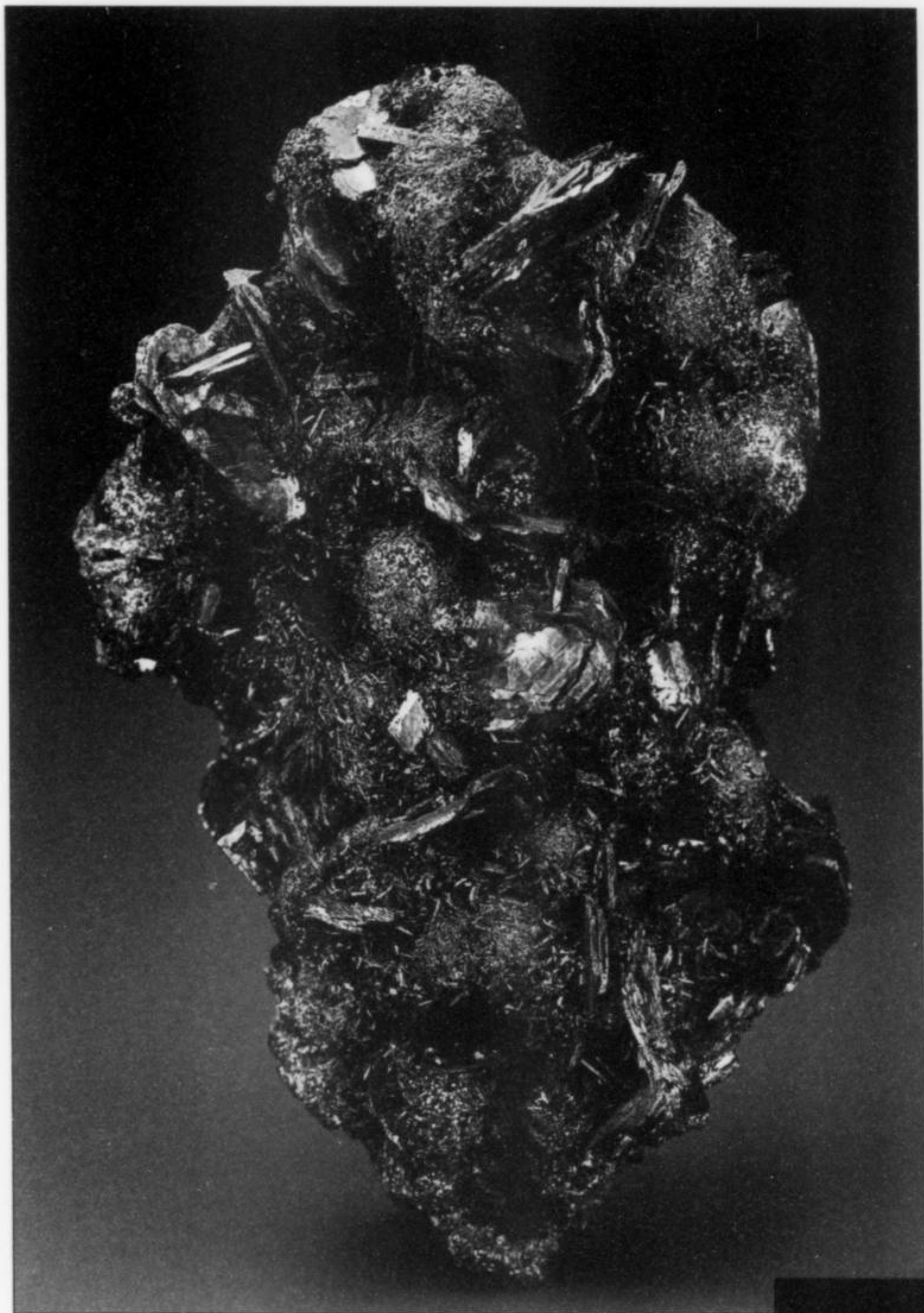


Figure 8. **Plagionite with franckeite and acicular boulangerite, 7.5 cm, from Oruro, Bolivia (JJT Collection, NMNH specimen 138883 and photo).**

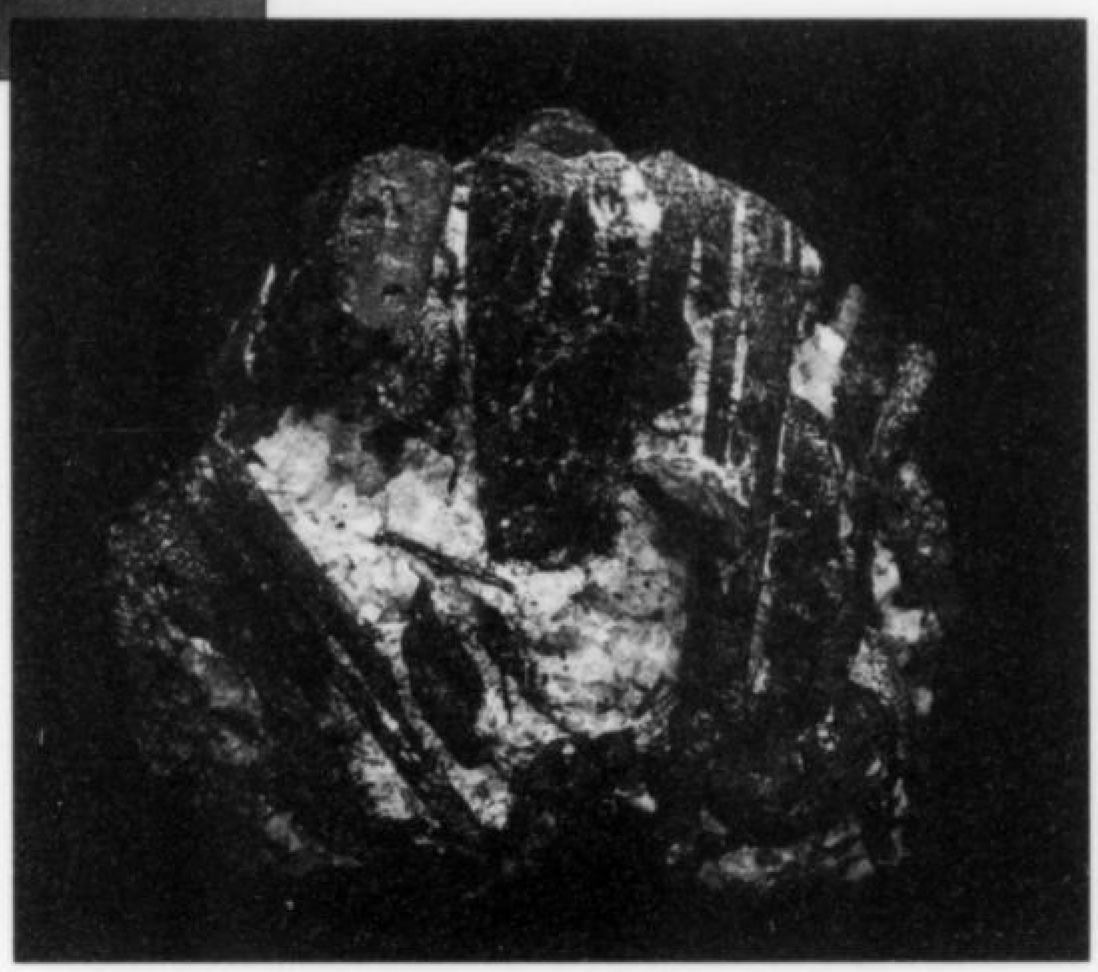


Figure 9. **Chalcostibite crystals to 5 cm altering to azurite, from Rar el Ans, Cherrat Morocco (JJT Collection, NMNH specimen 143940 and photo).**

material and then confiscated one of the crystals. The lead-iron silicate-chloride mineral jagoite from Långban, Sweden, was named for him in 1957 by R. Blix, O. Gabrielson and F. E. Wickman, in recognition for research grants that he provided to the Swedish Museum of Natural History for the study of Långban minerals.

Jack built his mineral collection largely through purchases, but also enjoyed field collecting with friends. Chuck Trantham recalls that Jack collected nissonite at the type locality in San Benito County, California, with Charles Chesterman, pumpellyite and omphacite near Cazadero, California, with George Switzer and Al McGuinness, and parahopeite at Broken Hill, Zambia, with Al McGuinness and Luis Leite.

Dick Bideaux offered this commentary on parts of Jack's collection:

> He had Russian and Madagascar minerals when nobody else in the U.S. had such connections. . . . I know he had the best Tiger diaboleite crystal (It was stolen; I have his postcard on that subject still.) and Dick Jones sold Jack the best Old Yuma mine wulfenite crystal collected to that time—over 2 inches. I've looked at it again lately, and it still seems pretty good to

Figure 10. **John Jago Trelawney shortly before his death in 2001.**

me. I recall his St. John's Island peridot as extra large and fine, and also a big yellow transparent orthoclase from Madagascar. His big betafite from Madagascar—I haven't seen better. He told me it was on a mine manager's desk, who said he would give it to Jack if he could tell him what it was—like shooting fish in a barrel.

Jack's close friendship with Dr. George Switzer may have gone back to the 1940's when Switzer was one of Magnus Vonsen's protégés in Petaluma, California. Dr. Switzer later joined the staff at the Smithsonian Institution and became Curator of Minerals after Dr. William Foshag died in 1956. Bill Smith remembers being introduced to Jack by Switzer in 1955. Bill was the closest collector to the Centreville, Virginia, prehnite and apophyllite occurrence and Switzer thought that Jack would enjoy seeing what was coming out. Bill recalls Switzer describing Jack as the finest collector in the United States.

Jack and Bill Smith hit it off at this first meeting and remained close friends for many years. Bill offers this insightful commentary on Jack:

> Jack's personality and character were unusual. He was very intelligent and he constantly sought fresh knowledge; he read very widely, attended lecture series, and he tried to stay abreast of current events. But he seemed to have his knowledge poorly organized, and I think he would have been a poor litigator. He loved beauty in all things, but strangely, he was very pessimistic. When we had our Saturday lunches in the late fifties he would divest himself of his fears of nuclear war, or social upheaval. He would press me to give my real assessment of the geopolitical scene, as if a GS-13 mathematician in the Washington suburbs would be privy to the high counsels of state. But he was very observant, and for the most part, most enjoyable to converse with. He was enthusiastic about many things, and he had a lot of get-up-and-go. He had beautiful, somewhat European manners, and he detested those with bad manners. I believe he had spent considerable time at a boarding school in Switzerland, or perhaps France, and it showed.

One fact about Jack did not take much insight to recognize. In the words of Si Frazier "he was one of the most frightening drivers I have ever ridden with. Several times our group invited him on field trips. I quickly learned to try to avoid any discussions of math or crystallography when he was driving. It was good that his Olds 98 was not equipped with a blackboard." Mimi Merrill recalls that "going across the Bay Bridge with him was an indelible adventure. He traveled it at about 25 miles an hour—and even in the 1950's, that was a bit harrowing!" Bill Smith notes that "his eyesight had deteriorated by then (the early 1980's), but he still drove, much to my dismay. Even when his eyesight was much better, he was a terrible driver, perhaps the worst I have ever ridden with; he was oblivious to all other traffic. The gods had clearly destined him for a long life."

Ralph Merrill recalls an interesting conversation between Dr. Clifford Frondel and Switzer at a mineral symposium in the San Francisco area. In reference to one of Jack's specimens, Frondel asked Switzer "Do you have as good a specimen of this?" Switzer grinned and replied, "Yes, that one!" since by then Jack had promised his collection to the Smithsonian. The actual formal donation of the collection didn't take place until 1965, by which time Paul Desautels was curator. The National Museum of Natural History 1965 Annual Report states "John B. Jago of San Francisco donated his collection of minerals, numbering nearly 4000 specimens and generally considered to be the finest contemporary private collection in the United States."

The ranking of Jack's collection as the finest in the country was certainly a matter of opinion rather than an obvious fact. Viewed by today's standards, the collection probably wouldn't be nearly as impressive. As Bill Smith points out: "In his time he had the best private collection in the U.S. [But] his collection would not now be considered of the top rank, primarily because so much mineralogical beauty has poured out in the last half of the twentieth century." Mimi Merrill contends that "the mixture of beauty and rarity represented in the collection merits its designation as 'the best' in the U.S." On the other hand, John White, who cataloged the collection when it arrived at the Smithsonian, comments that "there just were not that many exhibitable Jago specimens," and feels that the collection pales in comparison to the Canfield and Roebling collections, two of the most important mineral collections ever acquired by the Smithsonian.

While the donation took place in 1965, Jack took advantage of a law in effect at that time which allowed him to retain physical

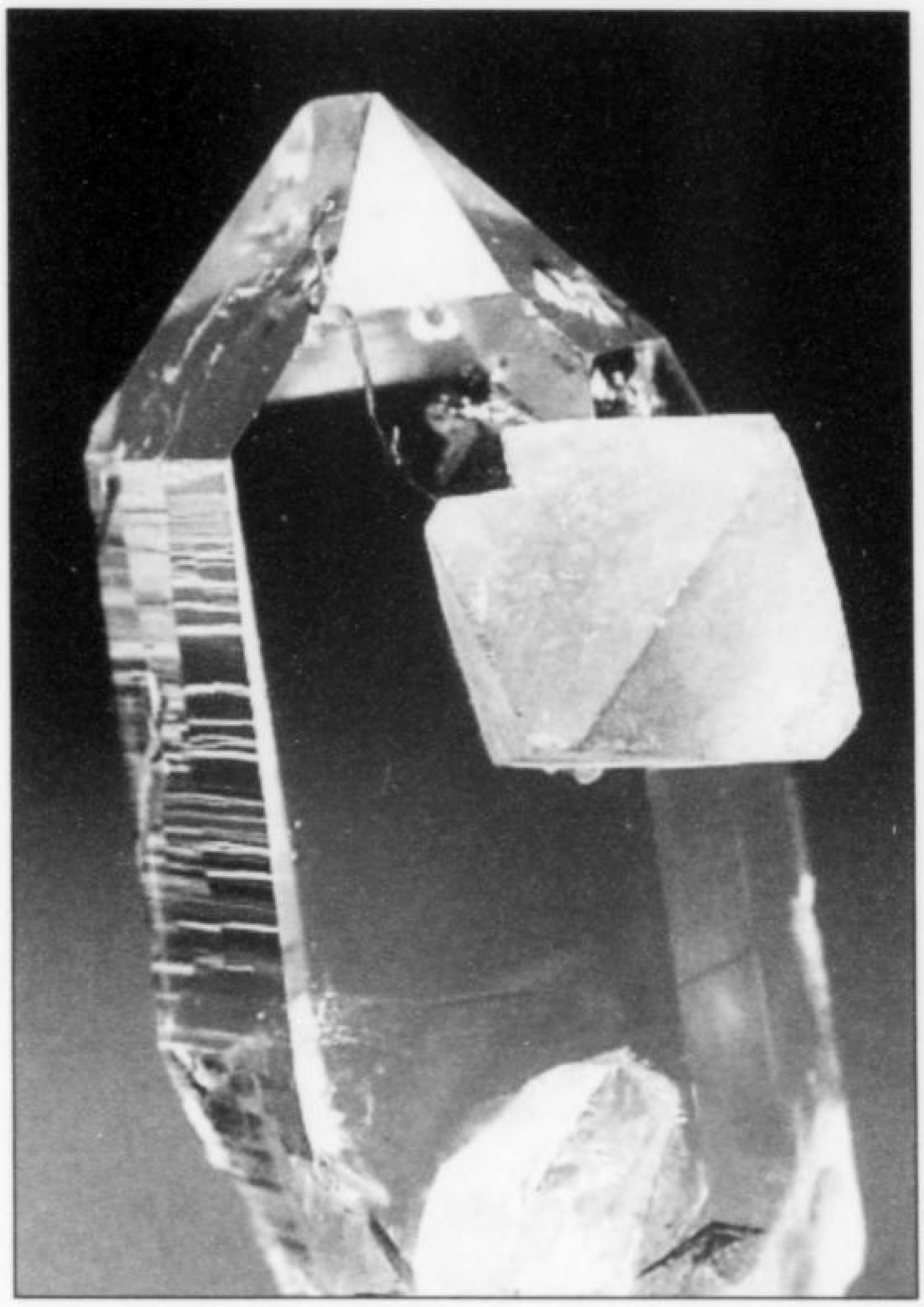


Figure 11. **Fluorite crystal, 1.7 cm on edge, on quartz from Uri, Goschenertal, Switzerland (JJT Collection, NMNH specimen 137592 and photo).**

possession of the collection indefinitely. He continued to display the collection in his office as he had for many years. After he closed his office in 1972, some of the specimens were displayed for a time in the old Ferry Building in San Francisco. (While the collection was there, some specimens, including the diaboleite, were apparently stolen.) After that, he arranged temporary storage at the U. S. Geological Survey facility in Palo Alto.

In 1977, Paul Desautels finally convinced Jack to transfer the bulk of his collection to the Smithsonian. John White and Dick Thomssen packed and transported most of the specimens cross-country in a rental truck. Jack retained a portion of the collection, including about two hundred of the smaller specimens. These he kept in a display case in his apartment, and over the next decade or so he added to them; but his focus had now turned to gemstones. Over the course of the next decade, Jack pursued gems with the same intensity and awareness of quality and aesthetics that had marked his mineral collecting endeavors.

In the years following the transfer of his mineral collection, a sad deterioration in the relationship between Jack and the Smithsonian took place. This is not the proper forum to air the details of a dispute that left both sides feeling bitter. Suffice it to say that it caused Jack to look elsewhere for a home for the fine gem collection that he was assembling. I met Jack for the first time in late 1987 when he contacted me at the Natural History Museum of Los Angeles County concerning the possible donation of his gem collection. The negotiations were straightforward and, after he had arranged for a careful, methodical and conservative evaluation of the collection, he donated it in late 1988. Subsequently, he purchased a few additional pieces for the museum at my request.

Jack's gem collection (described by Kampf, 1989) included 180 stones. All of these were colored gemstones, with one exception, an F-color flawless diamond. The collection stood out for its quality and variety. It proved to be an excellent fit with the museum's holdings, and most notably added many fine gems from East African occurrences that had been lacking in the museum's collection. In all, 100 stones (over 55% of the collection) were placed on exhibit immediately and remain there to this day.

In the display case in his condominium Jack still had roughly 200 mineral specimens already given to the Smithsonian, to which he had added a roughly equal number. The magnitude 7.1 Loma Prieta Earthquake on October 17, 1989, made quite a mess of the case. Several of the specimens were a total loss and the damage to a number of others was significant, but overall the collection fared reasonably well. However, the quake took a greater toll on Jack's interest in the minerals. After sifting through the mess and setting things back in reasonable order, he no longer found any satisfaction in gazing at the minerals. Who could blame him!

A few years later, Jack corresponded with Dr. Jeffrey Post, now Curator of Minerals at the Smithsonian. By then at least some of Jack's resentment toward the Smithsonian had subsided and Post

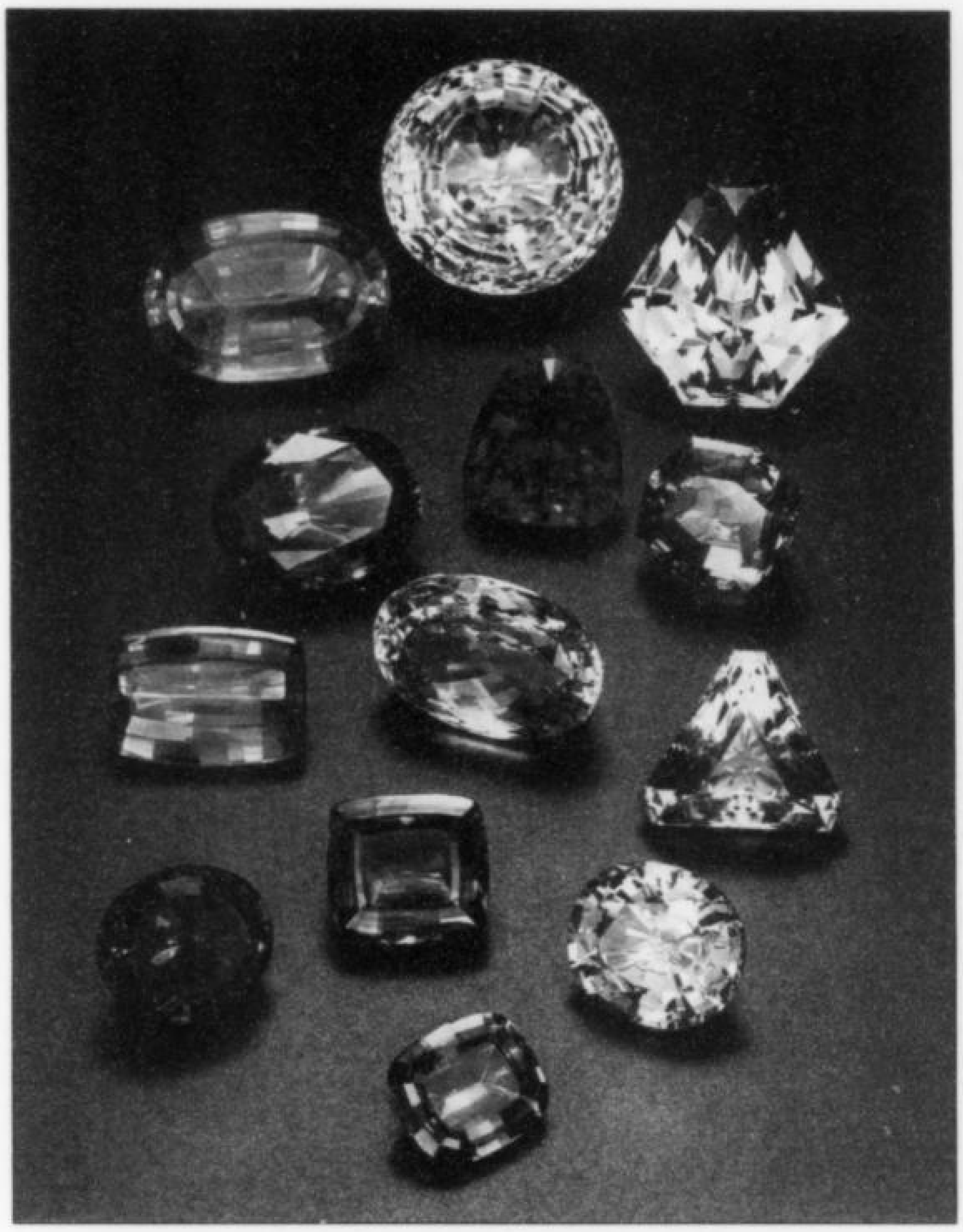


Figure 12. **A selection of some of the finer gemstones in the Trelawney Collection, by row from left to right: [Row 1] yellow Brazilian chrysoberyl, 79.85 cts.; Brazilian kunzite spodumene, 121.62 cts.; pink California elbaite, 62.99 cts.; [Row 2] green Colombian fluorite, 39.49 cts.; Tanzanian "malaya" garnet, 42.33 cts.; Burmese olivine, 45.08 cts.; [Row 3] yellow Kenya scapolite, 27.03 cts.; Madagascar morganite beryl, 45.3 cts.; Brazilian "imperial" topaz, 30.03 cts.; [Row 4] blue-gray Burma spinel, 25.33 cts.; blue Brazilian elbaite, 21.63 cts.; Tanzanian tanzanite zoisite, 28.41 cts.; [Bottom] East African chromian elbaite, 11.32 cts. Photo by Harold and Erica Van Pelt.**

succeeded in smoothing relations. As a result, Jack decided that the specimens that he had acquired since the original donation to the Smithsonian should go to the Smithsonian as well.

During the last few years of Jack's life, he saw his old friends less and less. His failing memory made things difficult for him and for those still close to him. He still could reminisce about some of his earlier interests and exploits, but the details had become blurred and his short term memory had become particularly poor. It is sad that Jack's often pessimistic outlook, particularly prevalent during this period, prevented him from truly appreciating the many positive things that he had accomplished in his life, including his impact on the mineral world.

ACKNOWLEDGMENTS

Many people deserve recognition for their help with this article. Those in the mineral community include Dick Bideaux, George Burnham, Rock Currier, Si Frazier, Jeanne Mager, Ralph and Mimi Merrill, Bill Smith, Dick Thomssen, Chuck Trantham and John White. Jack's nephew Dr. Warren Dickinson, a geology professor at Victoria University of Wellington, New Zealand, and Jack's closest living relative, verified family history. His dear friend Diane Gibbs, wife of his Stanford buddy Finley Gibbs, helped to fill in some of the details of Jack's early life. Jack's personal secretary for the last 15 years of his life provided more recent details.

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THE DEE NORTH MINE, ELKO COUNTY, NEVADA

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Just 4 kilometers north of the now famous Meikle mine barite occurrence, another underground gold mine, the Dee North mine, has recently produced attractive barite crystals in a wide variety of habits and colors. Glamis Gold, Inc., owner of the property, has been extremely cooperative in permitting professional collectors entry to the workings; consequently many superb specimens have been preserved.

INTRODUCTION

Nevada is quickly becoming famous among mineral collectors for its contemporary production of fine, crystallized barite specimens. The premier locality is, of course, the now well-known Meikle mine, Elko County (Jensen, 1999a), where exceptional examples of yellow to yellow-orange barite were recently recovered. Other notable occurrences include the Northumberland mine, Nye County (Kokinos and Prenn, 1985), the Hecla Rosebud mine, Pershing County (Jensen, 1999b), the Murray mine and vicinity, Elko County, and now the Dee North mine, also in Elko County. Specimens from Dee are unique in appearance and will provide a handsome addition to any collector's cabinet.

This new occurrence is situated at the northernmost point of the Carlin Trend gold belt, a 55-km long zone of world-class gold deposits located in northeast Nevada. This region of the state, known as the "Nevada high desert," is comprised of numerous

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Figure 1. **A view of the Dee open pit, at the bottom of which is the Dee North portal and surface facilities (center), and the Barrick Storm adit portal (to the right).**

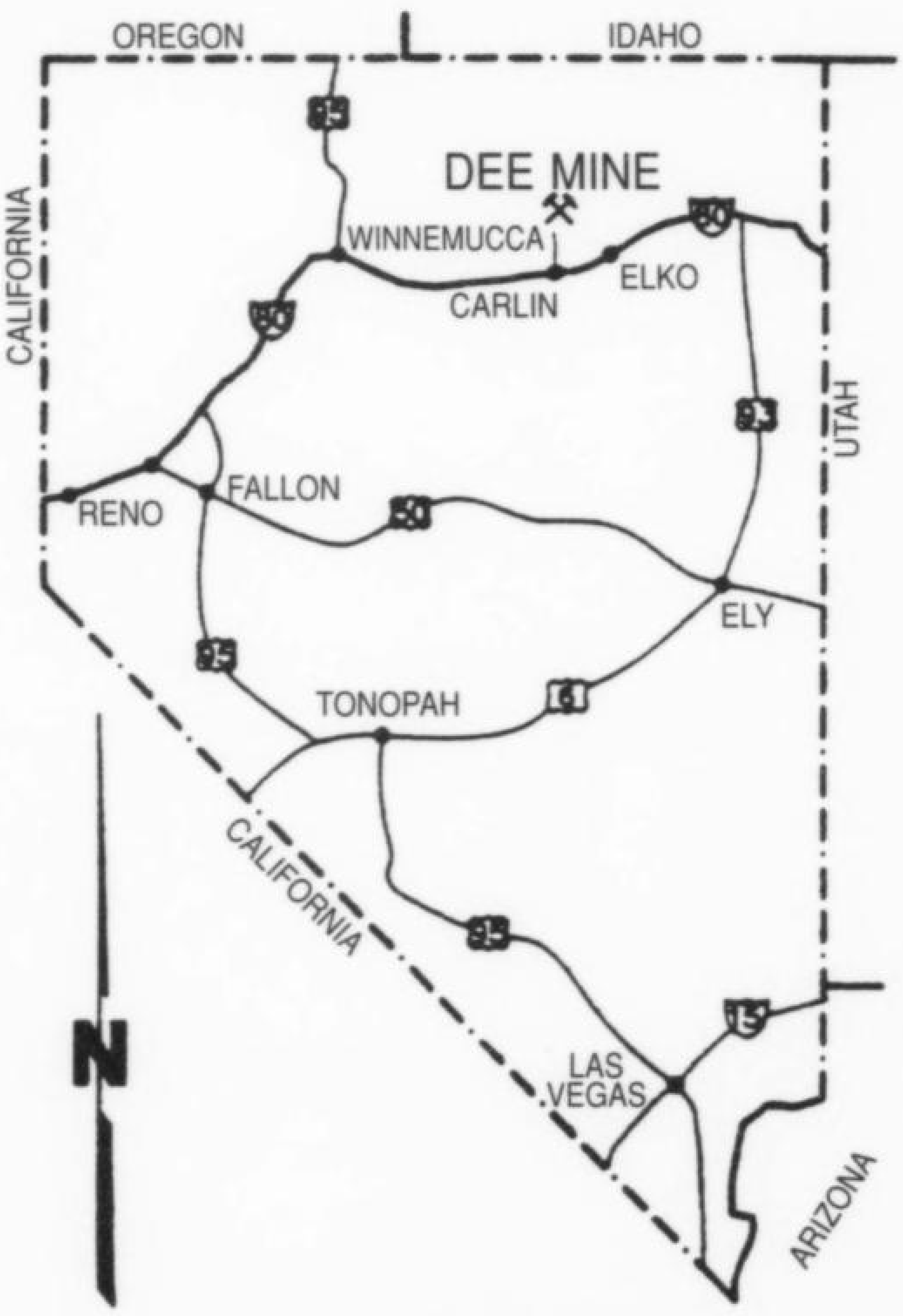


Figure 2. **Location map.**

north-south-trending mountain ranges and intervening alluvium-filled valleys (the Basin and Range tectonic province). The sagebrush grows tall here, thanks to the often wet and cold winters, and thick stands of aspen trees and stubby pine trees are plentiful among the meadows in the higher elevations of the mountains. The entire area is alive with mining activity day and night, as surface (open pit) operations as well as numerous underground shafts and inclined ramp. Elko, a picturesque town of about 40,000 inhabitants and home to most of the people involved in this mining, is located about an hour's drive southeast of the mines. In response to the currently low market price of gold, the larger mining companies are trying to boost revenues by increasing gold production. Rates of over 500,000 tons of ore per day have been achieved. Huge investments have been made in the construction of mills, water treatment facilities, maintenance shops, access roads, and all the other costly necessities required to carry on such large-scale activity. At night, the sky above the mines glows a dull orange and can be seen for many kilometers.

The Dee mine began as a smaller operation back in 1984, and was developed first as an open pit. The deposit was initially discovered in 1981 by the late Whitney DeLaMare, a project geologist for Cordex Exploration Company. (DeLaMare's nickname was Dee, and hence, the mine name.) Relative to other Carlin Trend deposits, it is not particularly large. Over the years, 80 million tons of rock were moved and 682,000 ounces of gold produced from the deposit. Ore occurs as low-grade disseminated (micron-sized) gold in a series of impure carbonate host rocks. Following a mineralogically rather uninspiring period as an open

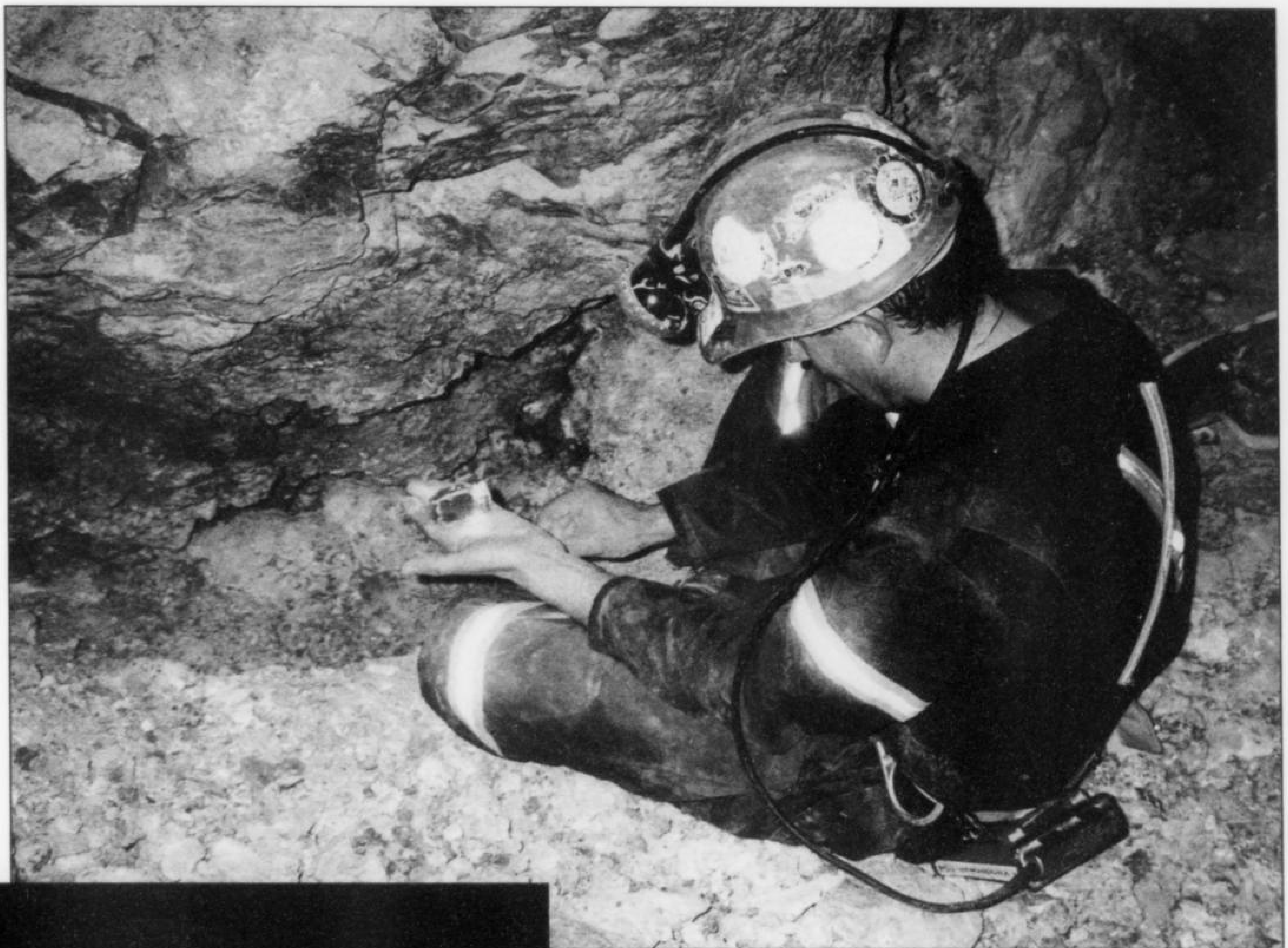
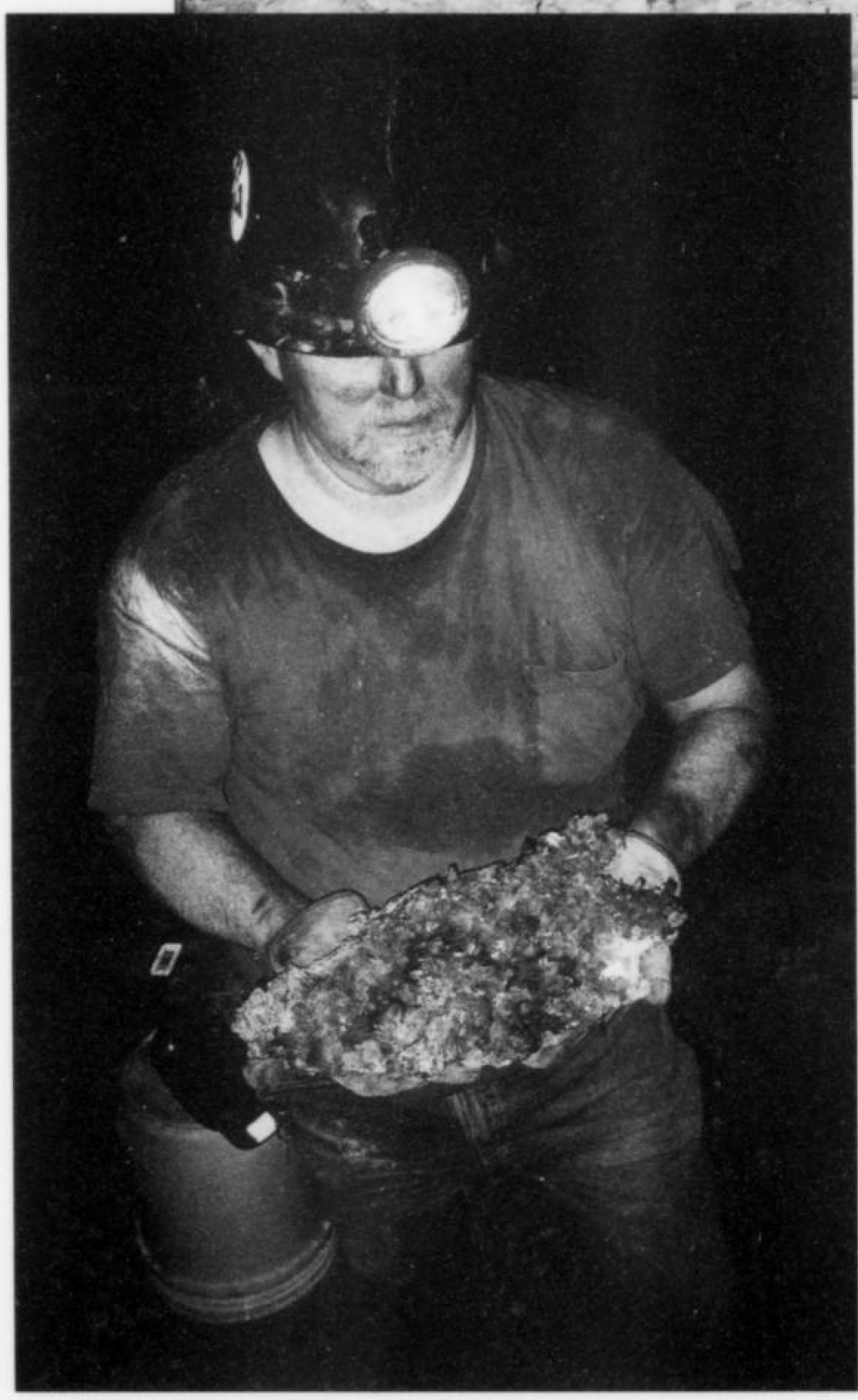


Figure 3. **The barite specimen shown in Figure 12, freshly collected.**



pit mine, an inclined ramp was driven from the bottom of the pit to intersect several pods of deeper, slightly higher-grade orebodies. It was during this activity, beginning in October of 1999, that interesting mineral specimens of crystallized barite began to be encountered. At this time, the new underground mine was named the Dee North mine.

There is no town near to the Dee mine. In this part of the state, there are long distances between towns and few paved roads, and it is often possible to look 70 km in all directions and not see another living soul. There are two chief routes to Dee, one from Battle Mountain 78 km to the southwest, and the other from Carlin 56 km to the southeast. Traveling east from Battle Mountain on Interstate 80, the Dunphy interchange is reached in 35 km; from there the high-speed Boulder Valley gravel/dirt road continues due north 43 km to the mines. Coming from Elko and Carlin on Interstate 80, the route proceeds north out of Carlin (on paved State Route 776) 34 km to the old Carlin mine and mill. At this point, the road changes to dirt (heavily impregnated with magnesium chloride to minimize dust and improve stability) and continues another 15 km to the immense Barrick Goldstrike properties. A "belt" route around the east perimeter of this property gives access to the Dee mine, after passing through one guard shack inspection point, crossing the main Post/Betze open pit haul road, and navigating south and west

Figure 4. **A freshly mined slab of golden barite crystals from the Dee North mine (held by one of the authors, Dan Crackel of the Glamis Gold Company).**

***Figure 5.* A barite-lined cavity; note the drill steel in the foreground for scale.**

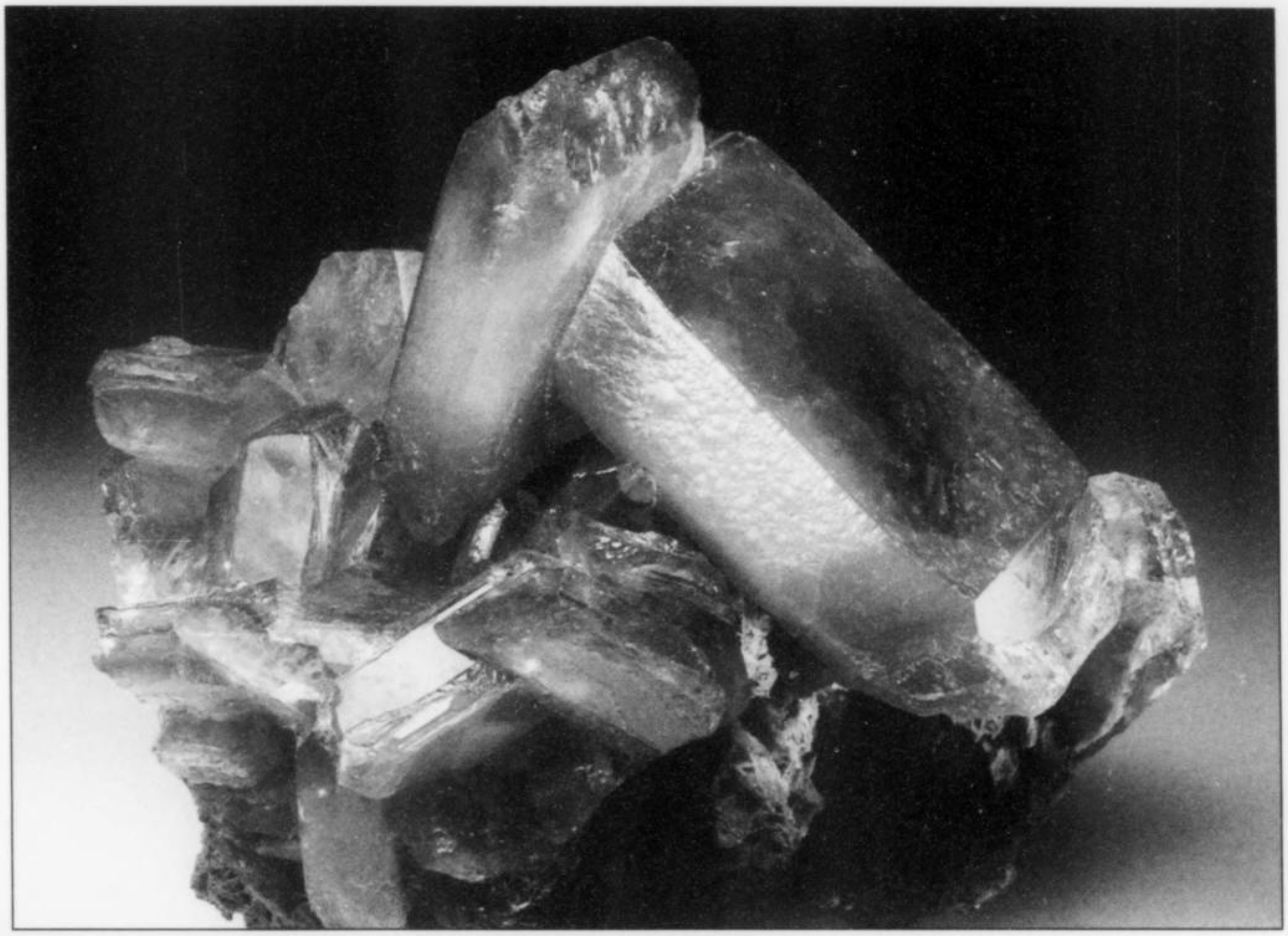
***Figure 6.* A barite crystal cavity narrowly missed by the emplacement of a rock bolt.**

of the Rodeo and Meikle mine shafts. The Dee turnoff is about another 7 km.

The modest surface facilities of the Dee mine, including the mill and administrative offices, are tucked at the foot of a small ravine parallel to a large waste rock dump. A security fence borders the entire property and personnel are present 24 hours a day, seven days a week.

At the present time, all mining has ceased at Dee, both in the open pit and underground workings, and the operation is essentially closed. The last ore was mined from the Dee North underground project in December of 2000. Currently, mill processing of remaining ore stockpiles and reclamation and recontouring of the heaps and dumps are the chief focus of activity. Additional work underway includes berming off of most haul roads, dismantling and selling used mining and milling equipment, and removal of all supporting machinery and facilities for the underground operation. The number of personnel in the workforce has also been greatly reduced and only a small crew is now present. For these reasons, it is understandable that the remaining staff simply does not have the time or resources to host any more visitors, invited or otherwise, to the property.

The Dee pit proper is a relatively large excavation measuring



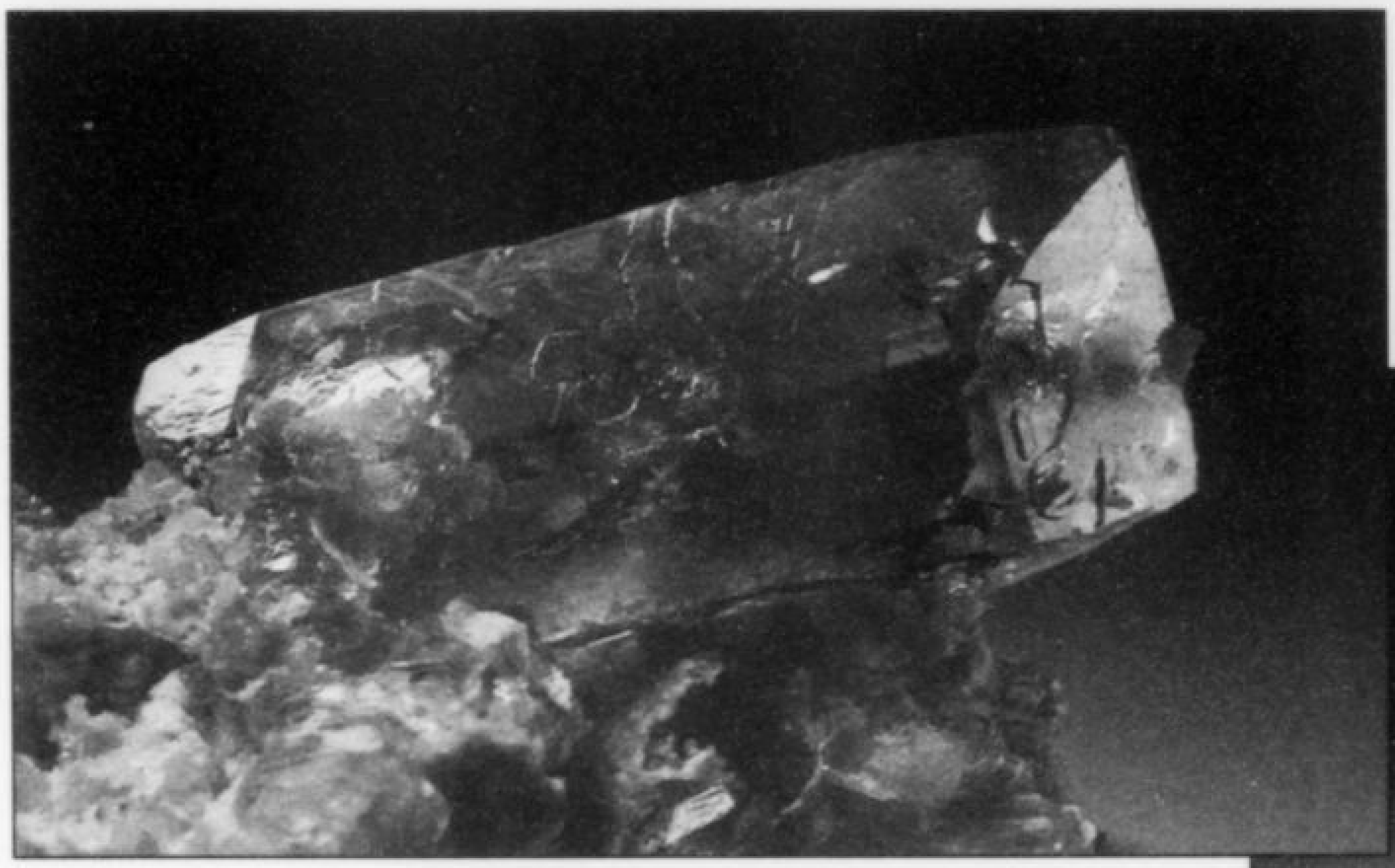
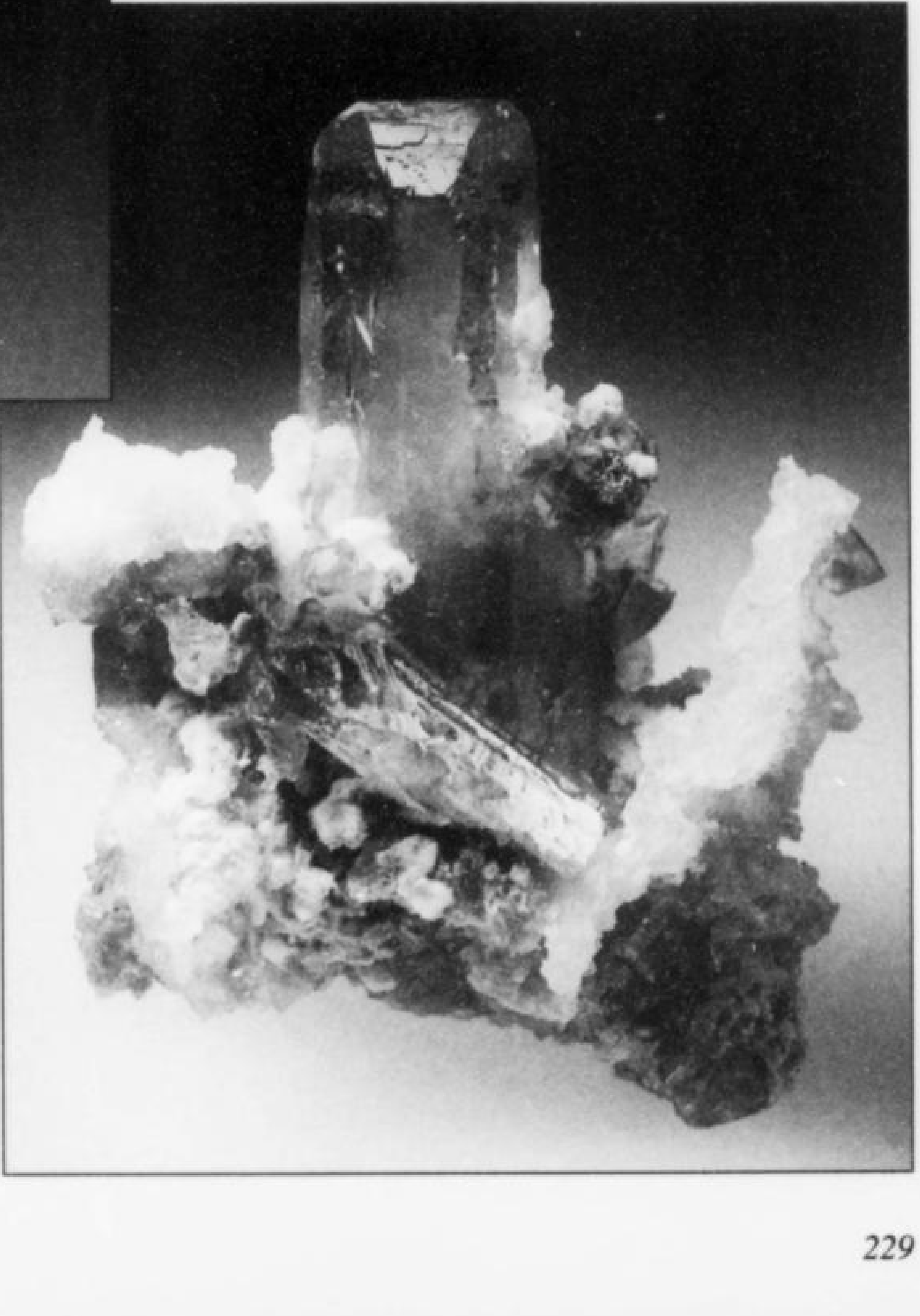


Figure 7. **Cluster of golden barite crystals up to 4 x 5.5 cm, from the Dee North mine. Jensen collection; Wendell Wilson photo.**

Figure 8. **Yellow barite crystal, 3.2 cm, with quartz, from the Dee North mine. Jensen collection; Wendell Wilson photo.**

Figure 9. **Yellow barite crystal, 2.2 cm, with white quartz, from the Dee North mine. Jensen collection; Wendell Wilson photo.**



approximately 1000 meters long by 800 meters wide, with a total depth of 280 meters. Benches were cut at regular intervals of 18 meters (60 feet). At the north end of the pit, very near the bottom, the Dee North incline enters the pit wall through a steel-reinforced portal. Temporary service facilities were placed nearby. A contract mining company was chosen to perform the actual mining work, driving the incline, several spiral ramps, crosscuts, and stopes. Ore was found in a series of generally downward-stepping pods, these being numbered sequentially as stopes, from zone 1 near the portal to zone 14 at the very bottom. The largest stope, in zone 5, produced about 200,000 tons, and is currently a spectacular unsupported underground space. Groundwater was not encountered at all (as expected), due to the large cone of depression formed in the water table from the tremendous pumping efforts of

Figure 10. **Sharp, pale yellow barite crystals to 2.5 cm, on matrix, from the Dee North mine. Jensen collection; Wendell Wilson photo.**

Barrick to keep their nearby Post/Betze pit operational. Relatively high rock temperatures were discovered in the Dee North mine, particularly in the zone 11 and zone 14 stopes, in connection with rubbly fracture zones emitting various gases, including ammonia and carbon monoxide. A vent raise, pulled from zone 14 to the upper levels, helps to provide adequate ventilation. As it is, however, current air temperatures reach around 40°C (105°F), with very high humidity. (These conditions are quite similar to those encountered at the nearby Meikle mine barite occurrence.)

Another underground portal is also present at the bottom of the Dee pit, one bench higher and slightly to the south of the Dee North mine. This adit was driven by Barrick, in a mutual agreement with Glamis Gold, Inc., in an effort to access predicted orebodies of the nearby Rossi property owned by Meridian Gold. This incline, collared in April of 1999 and called the Storm adit, was driven for a total distance of about 600 meters, passing completely beneath the Dee North workings. It was completed in December, 1999 after Barrick satisfied their contractual obligation to Meridian.

GEOLOGY

The Dee mine proper is located in the Bootstrap district, in the SW 1/4 of section 34, T37N, R49E. The deposit is a classic Carlin-type orebody, characterized by microscopic gold in Paleozoic sedimentary rocks that display varying degrees of structural control over mineralization (Lapointe *et al.,* 1991). Thin-bedded calcareous siltstones of the Devonian Roberts Mountains Formation and thick-bedded Bootstrap limestone are locally exposed in a window (the Bootstrap window) through the overlying cherts, shales, and limestones of the Ordovician Vinnini Formation (Lapointe *et al.,* 1991). These strata are cut by many steep north-trending faults and intruded by quartz latite to dacite dikes which have been pervasively altered (Bentz *et al.,* 1983). The Paleozoic rocks are overlain to the north and west by Tertiary volcanic rocks (Evans and Mullens, 1976).

Gold mineralization at Dee is bounded by two thrust faults which created a broad zone of sheared and brecciated carbonate and calcareous siltstone. This section was receptive to mineralizing fluids and is host to most of the ore in the deposit. Alteration consists of both silicification and argillization. Later oxidation has penetrated to a depth of about 185 meters.

Based only on the close geographic proximity of Dee to the identical, but much larger Post/Betze, Meikle, Genesis/Blue Star, and Capstone deposits, it seems reasonable to assume that the age of mineralization is similar: 8.5 to 9.5 million years (Arehart *et al.,* 1993). Controversy still exists over this relatively recent age determination, however, and some researchers suggest that the mid-Tertiary would be a more likely time of mineralization.

MINERALOGY

The mineralogy of the Dee North mine is relatively simple, consisting of essentially only five species: barite, calcite, goethite (limonite), pyrite, and quartz. Undifferentiated clays are present throughout certain of the host rocks and along fault zones, but will not be discussed in this report. Barite is the species of major interest to collectors, and is widespread throughout the mine. Calcite is far less abundant, occurring only in the lowest workings and stopes. Quartz is common, especially in vuggy and rubbly breccia zones exposed in the spiral ramp near the bottom of the main incline. Pyrite is inconspicuous, but is probably present as a minor constituent of most of the exposed rocks. Goethite is a locally common oxidation and acid alteration product.

***Figure 11.* Golden barite crystals to 5.7 cm, sculpted by interrupted growth in places, on matrix from the Dee North mine. Jensen collection; Wendell Wilson photo.**

Barite $BaSO_4$

The Dee North mine will certainly be remembered among collectors for its production of well-crystallized barite, in excellent specimens from thumbnail size up to large cabinet plates more than 60 cm across. Very little, if any, barite was found during mining of the open pit, and it appears that the species is confined largely to the underground workings. The western half of the mine contains the major pockets and fracture fillings of barite, chiefly along north-trending and northeast-trending structural zones. Two significant vugs have produced the majority of specimens, these having crystals of a distinctly chisel-shaped habit. Many additional vugs occur, some of which reach enormous sizes, but which have not yielded specimens as prolifically as the two pockets mentioned above. There appears to be a possible zonation with respect to crystal morphology and increasing depth, chisel-shaped examples giving way to more flattened and elongated tabular crystals in the lowest stopes. The crystals from the lower workings also become larger and more intense in color, and locally exhibit castellated (overgrowth) tips, similar to barite found in the huge calcite-filled caverns at the nearby Meikle mine (Jensen, 1999a). Based on simple mineralogical characteristics, it would seem highly likely that both deposits (Dee North and Meikle) owe their origins to the same or very closely related hydrothermal systems.

The chisel-shaped crystals have been collected from two vug systems at the northernmost reaches of the mine, from exposures high on the back (ceiling) of the main haulage decline. The larger of these two pockets measured approximately 4 meters long by 1 meter wide by several meters high. Most of it has by now been removed by blasting; the only portions of this pocket remaining are high on the back, about 5 meters above the sill, where open spaces lined with brilliant brownish crystals can still be seen penetrating far into the country rock. This vug has produced the largest number of specimens taken from the mine, although most of these are of only mediocre quality. For the most part, crystals from this pocket tend to be tan to pale brown in color, and lightly to heavily included and/or corroded with a late-stage, powdery, fine silica (quartz) sand. The finest pieces, from the uppermost walls and ceilings, consist of plates, knobs, and ridges of brilliant, translucent, pale brown-yellow crystals to 2.5 cm. Rare, doubly terminated, single floater crystals were also found on small ledges or between knobs. Finely divided particles of red iron oxide (goethite?) form inclusions in selected specimens. All crystals from this vug, and the yellow pocket described below, are elongated along the orthorhombic *a* axis, and consist of the two prisms, $d\{101\}$ and $o\{011\}$, and the pinacoid on $c\{001\}$, plus some minor modifications.

About 30 meters further down the decline from the brown barite vug, another fractured zone containing crystals is exposed. Here, several pockets of varying size contain deeper yellow and more transparent, lustrous, chisel-shaped crystals. A fine vug on the back about 1.0 x 1.0 x 0.5 meters in size was emptied by the original blast during mining, however, an even better pocket was narrowly missed very close to this. Here, slight probing with a fingertip disclosed a soft and highly altered area with a few small pieces of glassy yellow barite. Further work and enlargement of this opening revealed a small pocket full of loose floater clusters of brilliant yellow-orange crystals to about 8 cm. The pocket then widened into an open hole lined with large plates and knobs of spectacular, clean, undamaged crystals. The floor was covered by loose specimens, from thumbnails up to one large plate 35 cm across, all of which were removed before extraction of the wall and ceiling specimens. Some of the individual crystals stand up from the matrix and are perfectly transparent, yellow, and razor sharp. The largest examples reach almost 7 cm in length and are predominantly euhedral, doubly terminated singles. These occurred either nestled among drusy prismatic crystals, or as discrete "lozenge-shaped" tablets lying squarely on top of crystal-covered plates. A large number of very fine specimens were collected from this pocket, some of which are the finest examples of barite from the deposit.

Along the ribs of the spiral incline leading down to the bottom of the mine, the rocks are heavily silicified and replaced by quartz. Fortunately for the ease of collecting, earlier dissolution (small cave formation) had occurred, accompanied by repeated periods of brecciation. These events formed numerous vugs and rubbly zones, some of which are up to 5 meters deep and several meters thick. One of these pockets is extremely interesting geologically and deserves a more detailed discussion. This vug, on the left rib of the incline, consists of two lens-shaped, gently dipping openings separated by a pillar of fractured siliceous breccia. There is a natural open space, varying from about 0.5 to 1.0 meters between the smooth ceiling and rubble-covered floor. A close examination reveals that the rubble consists predominantly of loose breccia blocks, consistently averaging about 1 meter in diameter. Smaller size rock is generally absent, such that open holes exist between these large boulders. Shining a miner's lamp into these holes, one can look down for at least 2 meters. Locally, on top of these breccia blocks is a porcelaneous to finely crystalline, spongy, clean white quartz capping or layer about 20 cm thick. This material consists of very porous, sparkly, fine drusy quartz forming branching, cavernous, and arborescent clumps and blocks very much resembling white coral. It appears that development of this siliceous mat took place following earlier dissolution and collapse of the main pocket. Because much of the drusy quartz is present as small rounded spherules, some of which are hollow, it is possible that the mat formed at a very low temperature, as almost a colloidal precipitate. The last mineral to crystallize in the sequence was barite, being for some reason preferentially confined to the coral-like quartz. Unfortunately, the occurrence of barite is not widespread. On the other hand, very aesthetic examples of deep yellow, chisel-shaped and tabular crystals to 4.9 cm have been found perched on the snow-white coral-like quartz. These specimens exhibit superb contrast with the matrix and make truly attractive collector pieces.

A second, rather common habit for barite from the Dee North mine is as flattened, more tabular crystals, observed chiefly from two other locations. The first of these occurs along the left rib of the zone 13 access drift, as a narrow breccia body about 2 meters long at the sill which opens up into a steeply dipping pocket issuing forth a steady flow of hot, humid air. A crystal "as large as a small Snickers candy bar" was found here during original mining of the stope (Frank Elkins, personal communication, 1999). Close examination of this area revealed a large, open crack extending downward 2 meters, the floor of which is comprised of a thick filling of loose pocket contents. Spectacular, caramel-orange, locally lustrous, tabular crystals to 7.1 cm across have come from here. These crystals are flattened on the pinacoid along the *c* axis and exhibit curving prism faces on *d*(101) and *o*(011), similar to small TV screens. The majority of specimens in this large pocket, however, are unfortunately included with corroded fragments of siliceous pocket debris. In addition, there were at least two periods of barite crystallization, producing locally unattractive overgrowths. Tectonic movement within the pocket after completion of crystallization further broke up and damaged many pieces. The combination of these events rendered most specimens undesirable.

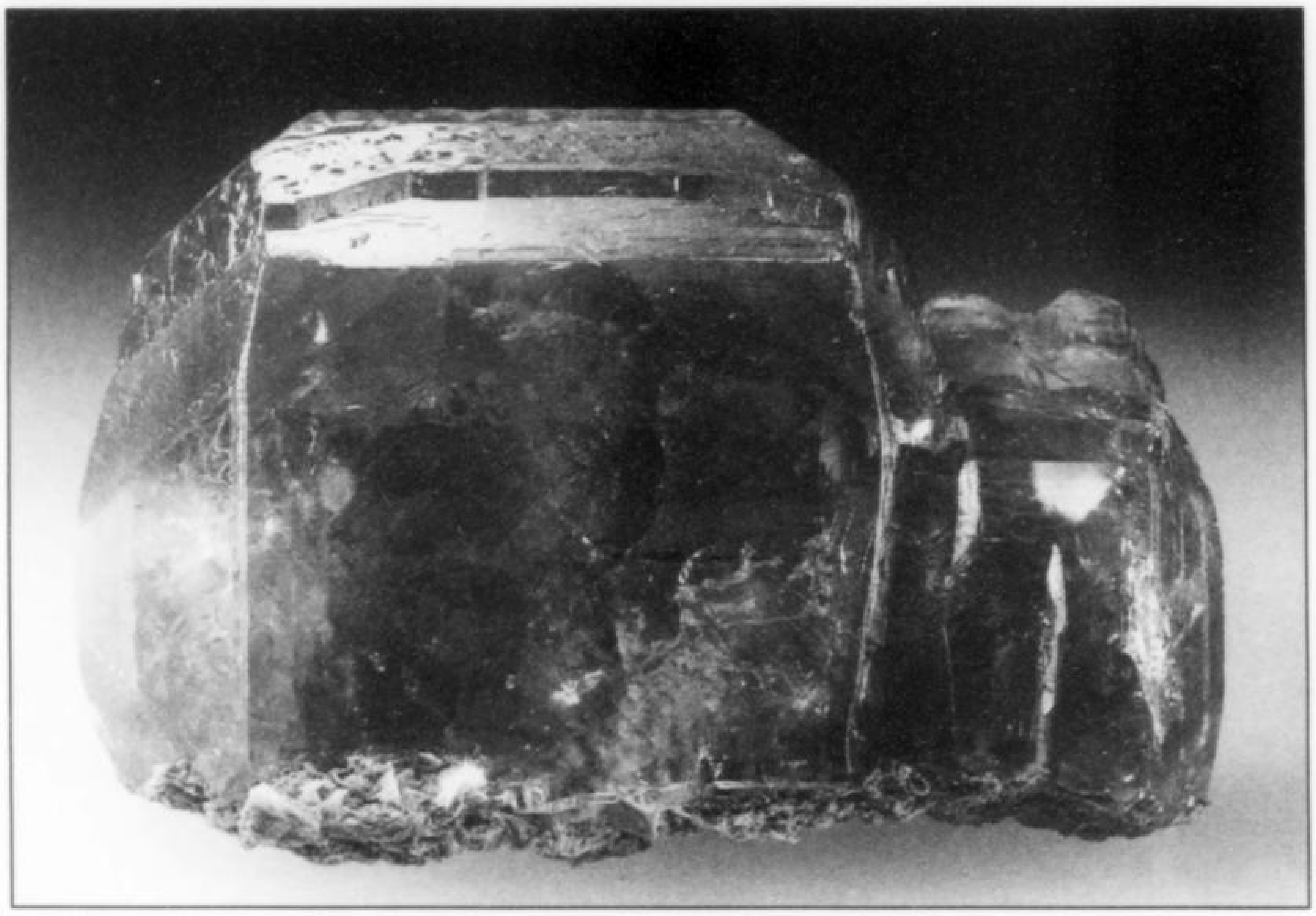


Figure 12. **Large golden barite crystal, 7.2 cm, from the Dee North mine. Jensen collection; Wendell Wilson photo.**

Another area for these more tabular crystals occurs along both ribs of the zone 14 access drift at the bottom of the mine. Here, the vugs are smaller, ranging up to about 1 meter in diameter. Because of the hot ambient temperature here and the high humidity, this is a difficult area in which to collect for protracted periods of time and one can become quickly dehydrated. Many of the crystals are of good size, however, averaging about 4 cm, but are locally corroded or poorly formed. Tabular, chisel-shaped and flattened elongated individuals are found here, most of which have a very good, deep yellow-orange color. Some fine examples have been collected which exhibit transparent yellow-orange tabular crystals to 2 cm perched on knobs of lustrous drusy quartz crystals, associated with dusty coatings of sparkly calcite crystals. Other noteworthy specimens display late-stage overgrowths on the terminations of elongated tablets, in a castellated fashion. And yet other specimens have been found coated with calcite which, when etched away in acid, reveals lustrous yellow barite tablets containing milky white diamond-shaped internal phantoms.

Calcite $CaCO_3$

Calcite is surprisingly uncommon in the underground workings, and is found chiefly in the lowest portion of the mine, in the zone 14 stope and access drift. The species occurs both as fracture and vug fillings, and, in open spaces, forms druses of colorless to pale green, stubby, scalenohedral crystals to about 1 cm. It has also been found as a partial to complete drusy overgrowth on barite crystals.

Goethite α-FeO(OH)

Goethite, as brown to reddish stains and fracture fillings, is locally common in selected areas of the mine. It has formed primarily as a result of the oxidation of pyrite.

Pyrite FeS_2

Large pods up to 20 cm across of brownish, fine-grained, massive pyrite occur sporadically in altered rock in the large vug of brown, chisel-shaped barite off the main incline, as well as elsewhere throughout the mine. Drusy crusts of small, lustrous, octahedral crystals to 2 mm were also collected from narrow fractures in siliceous rocks exposed in the stopes.

Quartz SiO_2

In addition to widespread silicification of most of the rocks exposed in the Dee North mine, vugs containing crystals have also been found locally. The best of these are along the ribs of the spiral ramp leading to the bottom of the incline. Here, open pockets to about 50 cm in diameter are commonly lined with locally brilliant drusy crusts of crystals to several centimeters thickness. Rare single crystals to 15 cm have also been found in these pockets, but are milky white and generally slightly corroded. Also, small epimorphs to 1 cm of quartz formed on tabular barite occur uncommonly.

An apparently unique type of quartz, in white coral-like clumps and mats, is present in a very large vug along the rib of the spiral ramp near the bottom of the main incline. (This occurrence is described above in the barite discussion.)

A peculiar rock texture composed of a remnant quartz boxwork is also locally abundant, and has provided a most receptive depositional environment for barite. In these areas, quartz originally filled numerous small fractures in the silty limestone country rock, which itself was subsequently leached away leaving only the insoluble silicate. Today, large blocks of this spongy material are found which can be easily lifted with only one hand due to their tremendous amount of open space and porosity. In vugs, cubic meters of this pale brown material occur, looking much like wicker basket work.

DISCUSSION

The question has been asked why this region of the state is host to such a large number of noteworthy crystallized barite occurrences. The most likely explanation lies ultimately in the constituents of the geosynclinal Paleozoic host-rocks which are widespread here. These are composed of thick sequences of interbedded shales, siltstones, and limestones, all of which were deposited in deep water marine environments. Bedded (massive) syngenetic lenses of barite which are also common throughout the sediments have been one of the United States' premier sources of industrial barite. In fact, in the vicinity of the Dee North and Meikle mines, numerous surface prospects and pits were exploited for bedded barite during the "barite boom" of the 1950's. With the formation of very large near-surface hydrothermal systems in this area during the Tertiary, the sedimentary rock package was subjected to circulation of large volumes of hot water. These fluids had a range of effects on the geology of the region: large-scale alteration of the sediments, dissolution of carbonate-bearing strata producing caves and breccia bodies, and mobilization and redeposition of a wide variety of minor components of the sediments themselves, including gold and barite. It is believed that these circulating paleogeothermal systems simply intersected bedded barite lenses in the sediments, dissolved the barite, and later redeposited it in structurally prepared favorable fractures, vugs, and open spaces. Remnants of this process may still be seen today in the underground mines where hot rock conditions (following dewatering) have been exposed.

The cause of the yellow coloration in barite from deposits in this area of the state remains unknown. It is possible that finely divided particles of petroleum (as bitumen) are trapped in the crystals, as in the orange and yellow calcites from the famous Elmwood mine in Tennessee. Since some of the Paleozoic shales exposed in the Carlin Trend are sooty black and highly carbonaceous (organic-rich), a legitimate source for hydrocarbons is available. A transmission electron microscopy (TEM) study would help to test this theory.

CONCLUSION

The current project of barite collecting at the Dee North mine has been an educational, enjoyable, and rewarding venture for all concerned, and a number of beautiful specimens have been preserved and made available to collectors because of the cooperation and trust between mining company and outside collectors. Long after all the mines on the Carlin Trend have been depleted and closed, and the fervor of intense activity has ceased, the sagebrush will grow back and the lonely Nevada wind will once again blow clean across the land. The only really tangible memories of this crazed human pursuit will be the mineral specimens being collected today. Particularly significant specimens in the hands of appreciative and admiring collectors will be passed on to future generations. And with them, the legacy of mining in the American West will also be perpetuated. Unquestionably, the Dee North mine barites will be a part of this legacy.

ACKNOWLEDGEMENTS

This study was made possible by the consideration, patience, and understanding of the Dee mine owner, Glamis Gold, Inc., and their representatives. In today's mining and business climate, their positive attitude toward mineral specimen recovery and collectors is relatively unusual and highly commendable. There is clearly an understanding in the organization of the scientific and aesthetic value of crystallized mineral specimens; the group's cooperation in permitting outside individuals entry to the mine for the sole purpose of collecting is truly admirable. Their open and trustworthy working relationship with professional collectors is a model that other mining companies could profitably emulate. Their ready assistance with any type of mechanical underground equipment (including diesel tractors, scissors-lifts, and ventilation fans), their drilling and blasting to expose additional mineralogical occurrences, and their offer of the use of surface facilities, were all unbelievably kind, helpful and beneficial. Their businesslike understanding that the collector needs to make a fair profit, too, was a prime factor in pricing the specimens for payment upon removal from the property. A finer working relationship between mining company and mineral collector would be hard to find. It should always be remembered that essentially all specimens from the locality which reach the market owe their preservation to the generous and intelligent policies of Glamis Gold, Inc. and the Dee North staff.

The kind and patient efforts of Tom Cordova in sharing his time and knowledge of the locality were essential to success, and his contributions are genuinely appreciated. Bill Vanderwall, who had a keen eye and interest in preserving specimens during his time at the mine, made knowledgeable contributions. Frank Elkins also helped out with numerous collecting efforts at the mine and his consistently kind and intelligent assistance are appreciated. Wendell Wilson produced the specimen illustrations throughout the text. Joe Hartsel and Lane Griffin assisted with selected field collecting and their pleasant companionship is noteworthy. Both Molly Gardner and Joanne Newton are thanked for their assistance with the hard-copy preparation of the manuscript.

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Pseudomorphic Melanophlogites from California

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Melanophlogite, the tetragonal pseudocubic polymorph of SiO_2, is known from at least five localities within the Franciscan Formation of the Coast Ranges, California. One of these localities (Mount Hamilton) has provided the best crystals and the only modified crystals ever discovered.

INTRODUCTION

Melanophlogite (SiO_2 plus organic compounds) and its chalcedony (quartz) pseudomorphs, have been identified from at least five localities in California, notably within the geologically diverse Franciscan formation of the Mt. Diablo and Coast Ranges. This rare pseudocubic polymorph of SiO_2 has been the object of considerable study since its description by Von Lasaulx in 1876 (Skinner and Appleman, 1963).

Although melanophlogite is considered to have a cubic structure, studies of material from two localities (Chvaletice, E. Bohemia, Czech Republic and Mount Hamilton, California) have shown the presence of a tetragonal superstructure (Žák, 1975). This supercell is thought to be the result of structure-stabilizing guest molecules trapped within the open clathrate structure during crystallization (Kamb, 1965). When the structure-stabilizing effect of these guest molecules is removed by a natural weathering mechanism, the melanophlogite structure collapses and inverts to a higher density form of silica, namely chalcedony (quartz). This naturally occurring phenomenon has been the case for melanophlogite from several of the California localities.

HISTORY

Skinner and Appleman (1963) gave an extensive historical account of melanophlogite research from 1876 through 1891. The name *melanophlogite* is derived from the fact that the mineral turns black after heating. This color change is due to the thermal breakdown of organic guest molecules within the open structure. Classical localities for melanophlogite are the old Sicilian sulfur deposits, in particular those at Racalmuto in Agrigento Province and at Lercara in Palermo Province, Italy.

Žák (1967, 1972) has studied the crystal chemistry of melanophlogite from Chvaletice (E. Bohemia), Czech Republic. This locality provided material which has substantially contributed to the understanding of the crystallography and transformation twinning of melanophlogite (Žák, 1972, 1973, 1975). Cooper and Dunning (1972) described the first United States (California) occurrence of exceptional melanophlogite crystals; these show modification of the cube edges and a visible internal hopper-shaped growth pattern. Since 1972, several other California localities for melanophlogite have been discovered; their descriptions are presented here.

Figure 1. **Typical coverage of single and intergrown water-clear melanophlogite crystals, up to 1.5 mm along an edge (Mount Hamilton). G. Dunning photo and sample.**

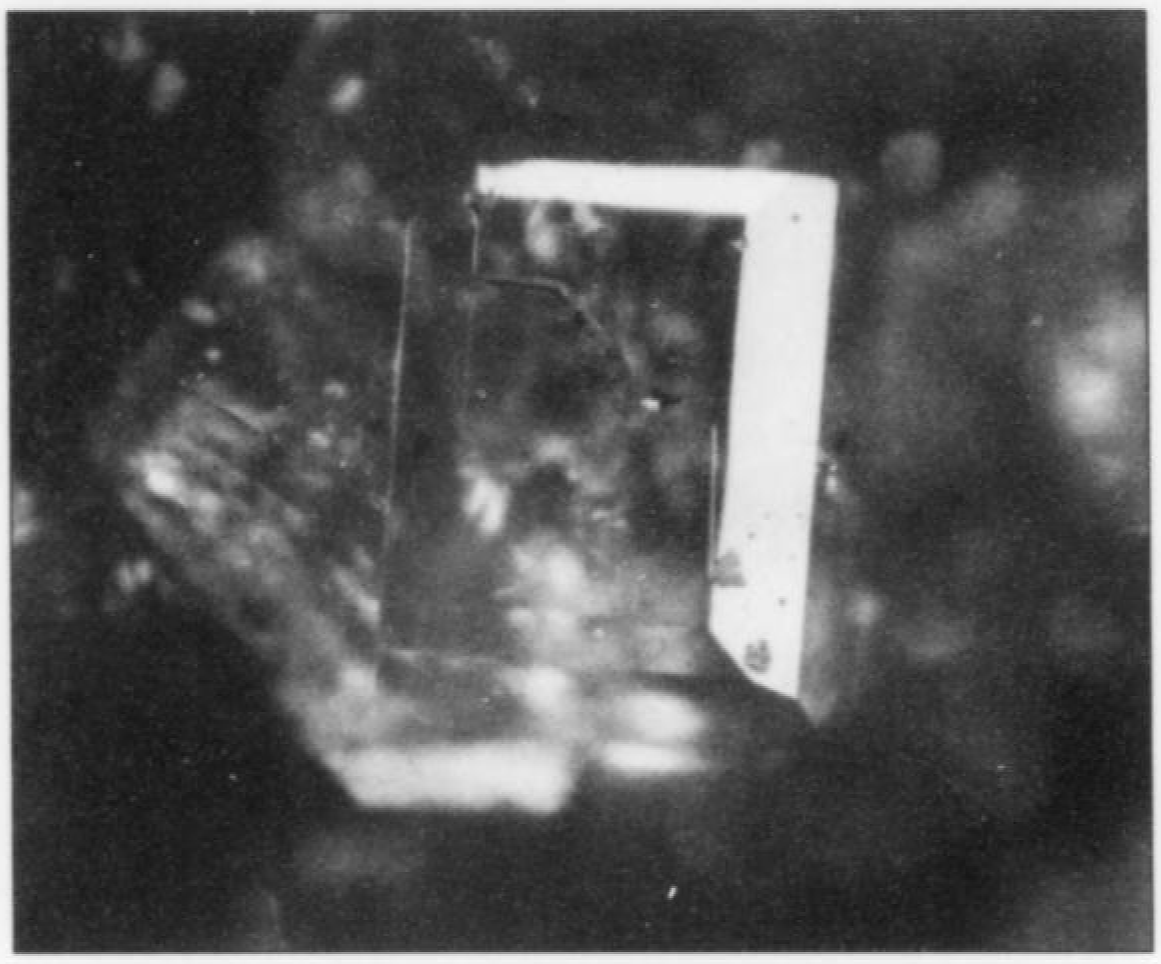

Figure 2. **Water-clear melanophlogite crystal, 0.5 mm, showing the tetrahexahedral {012} form along four edges. (Mount Hamilton). G. Dunning photo and sample.**

PROPERTIES

Twinning

Žák (1972) has shown by optical and single-crystal X-ray studies that cubes of the Chvaletice melanophlogite are composed of six pyramids, whose apices meet at the center of the cube; the pyramid bases constitute the cube faces. These pyramids are composed of fine tetragonal tablets, growing parallel with their bases together. This unusual growth habit can be observed as zoning by directing a light beam horizontally into the crystals at a critical angle or by examining them under polarized light. The vertical axis of each pyramid is common and perpendicular to the corresponding cube face. Identical optical effects were observed in melanophlogite from Sicily by Bertrand (1880), Friedel (1890) and Skinner and Appleman (1963). Žák (1972) suggested that the adjoining pyramids and the lamellae in them probably represent a form of twinning.

Žák (1973) defined the transformation twinning of the Chvaletice melanophlogite by a rational fourfold twin axis [001] of the tetragonal cell. He found that this twinning is due to a tetragonal distortion of a cubic cell, which can be explained in terms of a 180° rotation about [201] of the tetragonal supercell. This twin law, however, failed to explain lamellae parallel to {201} of the tetragonal supercell previously observed by Žák (1972). These lamellae can now be successfully explained by another twin law with {201} twin planes, and are the direct result of the distortion of a pseudocubic tetragonal cell. Žák (1975) found a tetragonal superstructure, identical to that observed in the Chvaletice melanophlogite, in crystals from Mount Hamilton, California.

Structure

Studies by Appleman (1965) and Kamb (1965) have shown that melanophlogite possesses a clathrate-type structure. This structure consists of SiO_4 tetrahedra sharing corners to form five-membered and six-membered rings, which define large polyhedral cages in the shapes of pentagonal dodecahedra and tetrakaidecahedra. Guest molecules, in the form of aliphatic hydrocarbons, H_2O, CO_2 and S, may occupy these cavities in the clathrate-type framework structure. The number and type of guest molecules trapped in the structure during growth appears to be directly related to the mineral's stability in nature. Upon exposure to ultraviolet light or to heating, the structure of the tetragonal pseudocubic melanophlogite first transforms to the cubic structure and then collapses and inverts to silica phases higher in specific gravity, such as cristobalite or chalcedony.

The several California occurrences of chalcedony pseudomorphs after melanophlogite (described here) would strongly suggest that the number and type of stabilizing guest molecules were critical to the mineral's structural stability. After crystallizing, the metastable structure begins to lose its stabilizing molecules and inverts to a quartz-type phase upon exposure to a weathering mechanism over an unknown period of time. The exact mechanism which triggers this inversion is not fully known but may be related to ultraviolet radiation exposure. It is interesting to note that the California melanophlogites contain very little, if any, sulfur in their structure. Chemical analyses show that the melanophlogites from Italy, however, contain appreciable sulfur (Skinner and Appleman, 1963; Žák, 1972).

Chemistry

The crystal chemistry of melanophlogite has been under study since the mineral was first described in 1876. Von Lasaulx (1876) and succeeding workers established the composition of melanophlogite essentially as SiO_2. However, the presence of organic matter, S and H_2O was puzzling. It was suggested at an early date that the organic matter was a mechanically incorporated pigmenting agent which caused the color zones in the crystals and gave the mineral its peculiar thermal properties (Skinner and Appleman, 1963). Between the years 1880 and 1918, considerable work was done on both the chemistry and optical properties of melanophlogite.

The first detailed chemical examination of melanophlogite was reported by Skinner and Appleman (1963) on material from the Sicilian sulfur deposits. They also concluded that melanophlogite is essentially SiO_2. Infrared-absorption studies confirmed the presence of abundant hydrocarbon compounds in the mineral, but specific compound identification proved impossible. The presence of H_2O and CO_2 was also confirmed. Sulfur was reported as total SO_3, but the specific molecule in the structure was not determined.

Figure 3. **Single melanophlogite crystal, 0.7 mm, showing the trapezohedral faces (112) and (121) at one corner with four tetrahexahedral edge faces (Mount Hamilton). G. Dunning SEM photo and sample.**

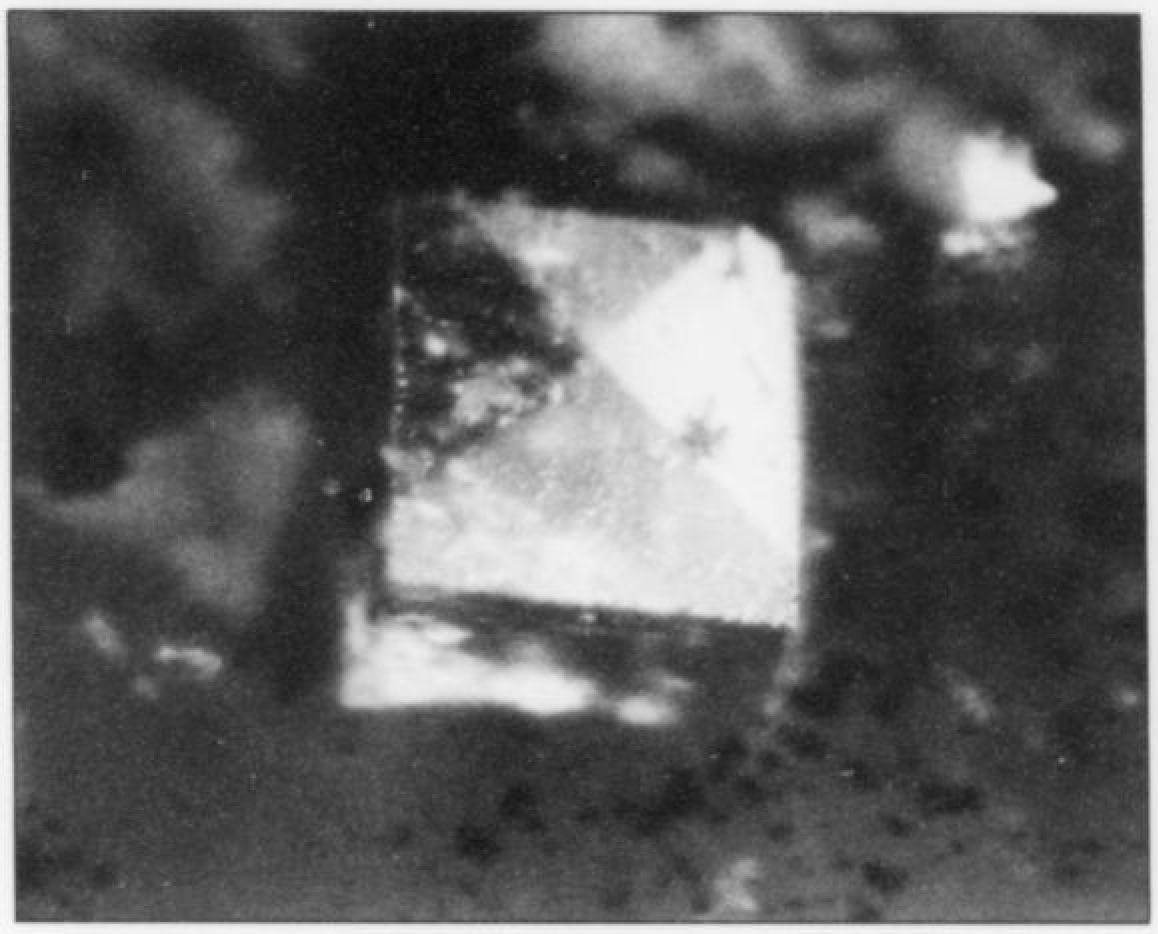

Figure 4. **Single melanophlogite crystal, 0.5 mm, showing the four-fold pyramidal growth pattern (Mount Hamilton). G. Dunning photo and sample.**

The solving of the crystal structure of melanophlogite by Kamb (1965) and Appleman (1965) gave fresh insights into the role of the organic chemicals present in the melanophlogite analyses reported in the literature.

Žák (1972) made an important contribution to the crystal chemistry of melanophlogite from Chvaletice, Czech Republic. Sulfur, silicon and oxygen were determined by neutron activation analysis, carbon and hydrogen by microchemical methods from powdered samples, and silicon and carbon by electron microprobe analysis. A formula for the Chvaletice melanophlogite, based on 46 SiO_2 per unit cell (Kamb, 1965), was found to be ~ 46 $SiO_2 \cdot C_2H_{17}O_5S_{0.9}$. Žák (1972) suggested that the following element combinations can be present in the guest molecules: C + H ± S ± O, H + O, C + O, and S ± O ± H.

The chemical analysis reported by Skinner and Appleman (1963) for the Racalmuto melanophlogite can be represented by the general formula 46 $SiO_2 \cdot C_{2-3}H_{23}O_5S_2$.

GEOLOGICAL SETTING

All of the California melanophlogite localities occur along the Coast Ranges (Franciscan Formation), which are composed of late Jurassic, Cretaceous, Tertiary and Quaternary sediments, volcanics and shallow intrusive bodies (Bailey *et al.*, 1964). These sediments and volcanics are highly fractured and folded, often showing local intrusion by serpentinite masses. Local fluid metamorphism has altered portions of the serpentinite to small bodies of silica-carbonate rocks. Low temperature silica-rich fluids, containing organic and other molecules, formed stable melanophlogite at temperatures below 112°C, the melting point of sulfur. Although not a condition of formation, melanophlogite may occur associated with mercury mineralization. This mercury mineralization is generally confined to silica-carbonate rocks within the Franciscan Formation that have experienced multiple hydrothermal events, one of which formed melanophlogite. Subsequent fluids have deposited carbonates such as calcite and dolomite over melanophlogite. In rare instances, minute quartz crystals have formed over the melanophlogite in addition to thin coatings of opal or chalcedony.

LOCALITIES

Mount Hamilton, Santa Clara County

The Mount Hamilton locality, previously described by Cooper and Dunning (1972), hosts some of the best melanophlogite crystals known for the species. Not only are these crystals of exceptional size, but so far it is the only locality where visible crystal forms other than the cubic* faces have been observed. The water-clear crystals, measuring up to 5 mm along an edge, are generally simple or multiple intergrowths. Modification of the cube edges by the tetrahexahedron form {012} is well-developed on

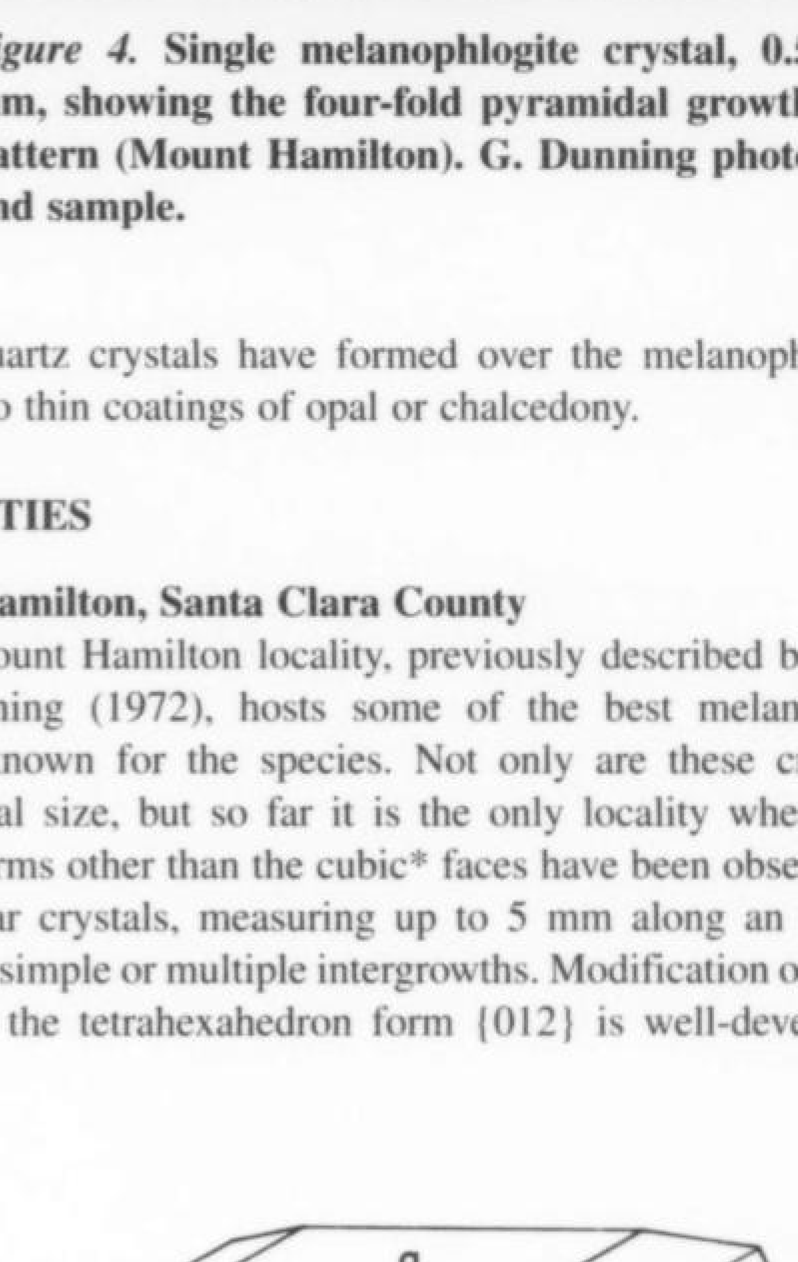

Figure 5. **Idealized crystal drawing of melanophlogite showing the development of the tetrahexahedral {012} form (Mount Hamilton).**

*The morphology is described here in terms of a cubic cell, and the forms identified on that basis by simple inspection, with the understanding that the species is actually pseudocubic.

about 10% of the crystals. In addition, another modification was observed during a recent SEM examination of the crystals. A single crystal was found showing two {*hkl*} corner modifications, which were identified as the faces (112) and (121) of the trapezohedron form {112}.

An unusual internal hollow "hopper-shaped" structure characterizes the growth sequence of the mineral. The cube face above this hollow void is very thin and easily broken. Off-center variants are common, even within intergrown crystals. Also, the six-fold pyramidal growth pattern may be observed when a light source is focused through the crystals.

Žák (1975) has determined a tetragonal supercell with a = 26.82 Å and c = 13.37 Å (space group $P4_2/nbc$) for the Mount Hamilton crystals. Upon heating to 1050°C, this structure reverts to a cubic cell with a = 13.4 Å (space group $P4_232$). He suggested that formation and stabilization of the tetragonal superstructure is directly related to the type, quantity and position of guest molecules present in the open clathrate structure during crystallization.

Only a small percentage of the Mount Hamilton melanophlogite crystals has shown inversion to quartz. Crystals with a cloudy rim yield a quartz X-ray pattern. These particular crystals were recovered in an area routinely exposed to direct sunlight along the roadcut. The majority of the crystals, however, were recovered along a vertical vein covered with soil rich in organic matter.

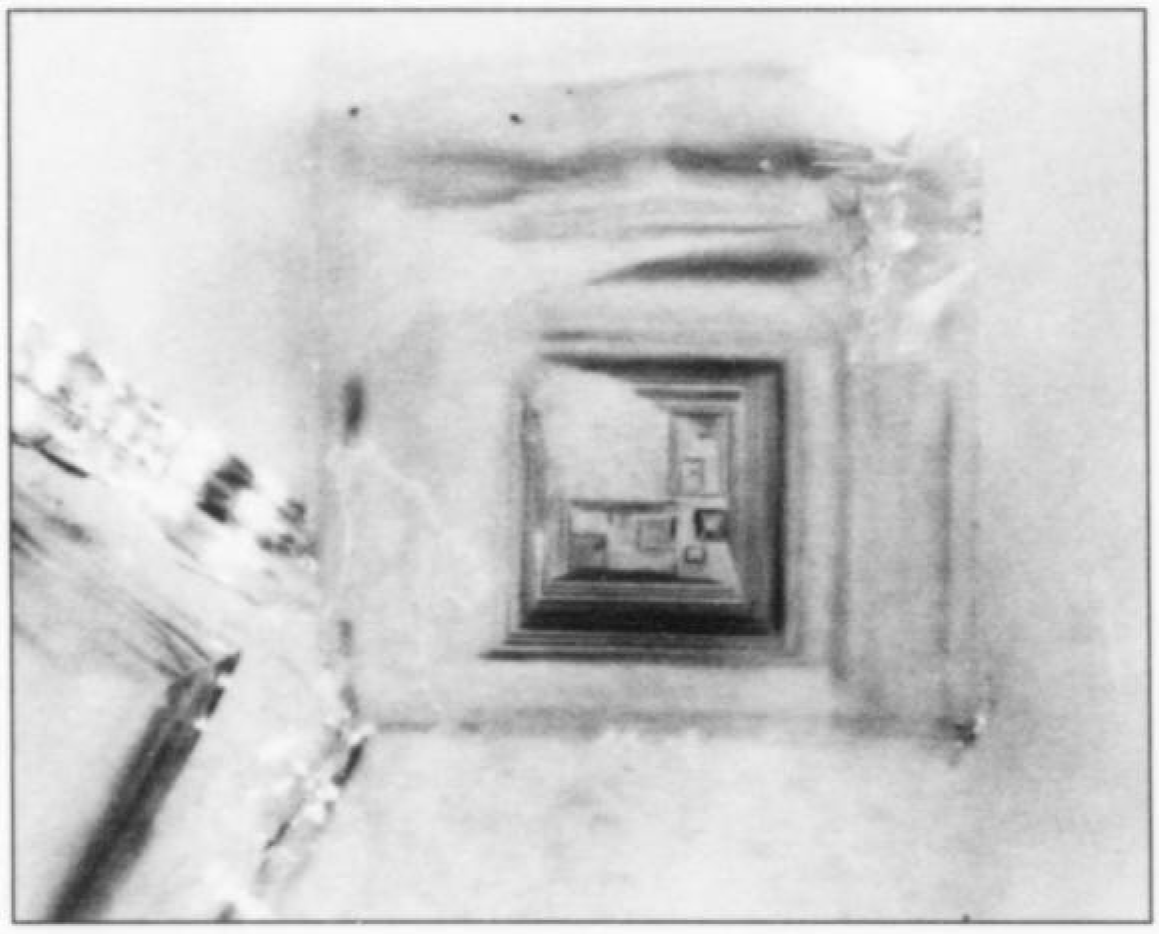

***Figure 7.* Melanophlogite crystal, 0.6 mm, showing primary and secondary hollow hopper-shaped internal growth interruptions along the pyramidal crystal planes (Mount Hamilton). G. Dunning photo and sample.**

***Figure 6.* Melanophlogite crystal, 1.0 mm, showing the hollow hopper-shaped internal growth interruptions along the pyramidal crystal planes (Mount Hamilton). G. Dunning photo and sample.**

Recently Nakagawa *et al.* (2001) presented data on the crystal structure of Mount Hamilton melanophlogite. In their description of the structure they established the position of the stabilizing constituents within this very open-structured mineral. A new formula which includes the stabilizing molecules is given as $46SiO_2 \cdot 6M^{14} \cdot 2M^{12}$, where $M^{14} = N_2, CO_2$, and $M^{12} = CH_4, N_2$. The Mount Hamilton melanophlogite transforms at 65° C to the cubic form, β-melanophlogite. However, this transformation temperature varies with the locality.

Borges Quarry, Napa County

An unusual occurrence of what appeared to be a clear cubic mineral associated with chalcedony and dolomite was discovered in 1981 by Mr. Clive Matson of Oakland, California. This find was made at the inactive Borges quarry, on American Canyon Road

***Figure 8.* Intergrown quartz pseudomorphs after melanophlogite, 0.2 mm, with opal and dolomite (Borges quarry). G. Dunning SEM photo and sample.**

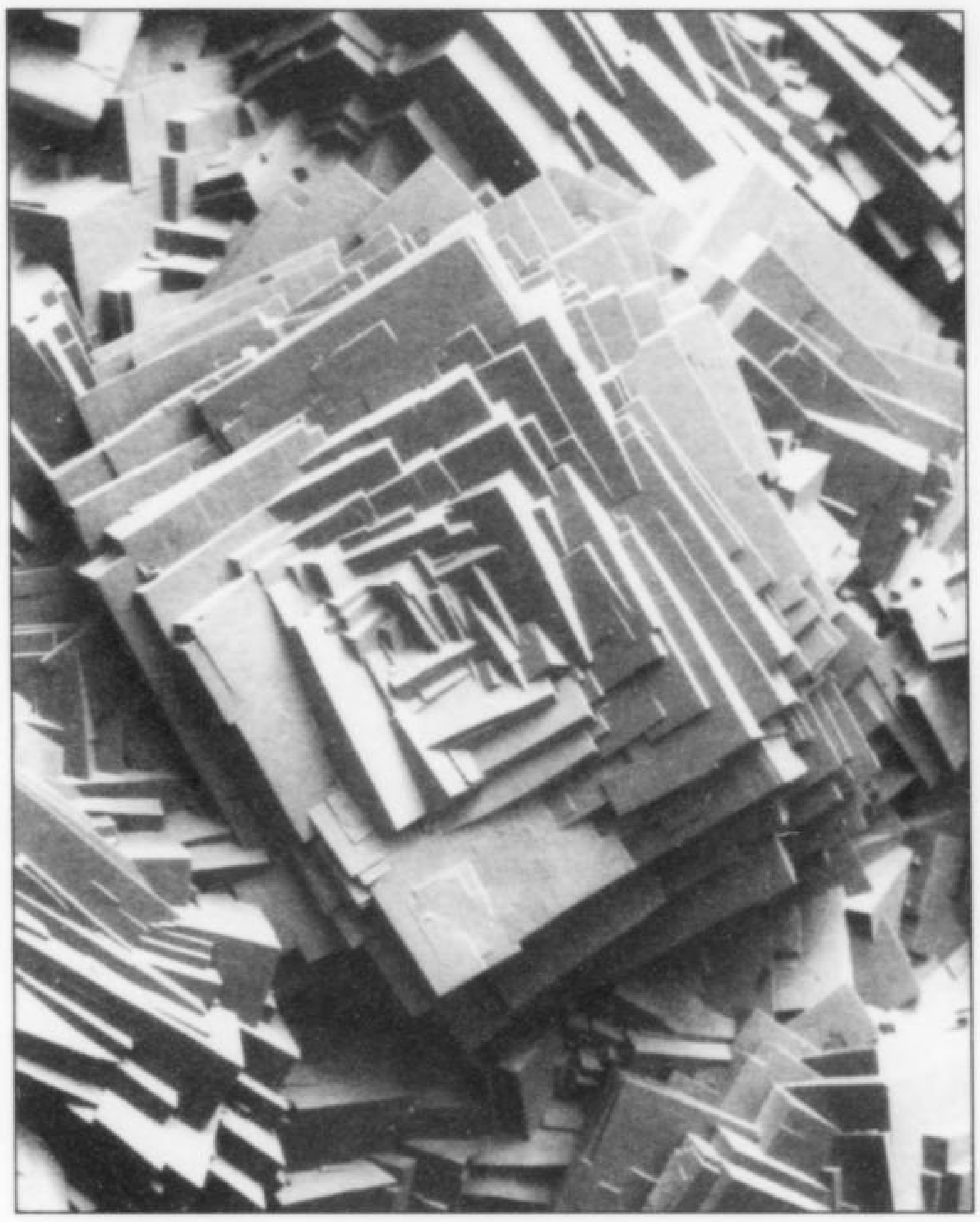

Figure 9. **Complex spiral intergrown quartz pseudomorphs after melanophlogite, 1 mm (Borges quarry). G. Dunning SEM photo and sample.**

Figure 10. **Intergrown quartz pseudomorphs after melanophlogite, 0.3 mm, with partial chalcedony overgrowths (Clear Creek mine). G. Dunning SEM photo; J. Cooper specimen.**

near Vallejo, Napa County. The cubes were examined optically by the late Dr. Francis Jones, who determined their refractive index to be 1.535, which is within the range for chalcedony (Jones, 1987). The outward appearance of these cubes resembles the usual stepped growth habit of melanophlogite from other localities. An X-ray powder-diffraction analysis of the mineral was consistent with quartz. These crystals may be considered quartz (chalcedony) pseudomorphs after melanophlogite.

Clear Creek mine, San Benito County

During field work at the Clear Creek mercury mine, San Benito County, several samples of what appeared to be small unmodified cubes covered with an opaline material were discovered in rocks at the open pit. These crystals were further investigated by optical tests and found to be a mixture of melanophlogite and a fibrous form of chalcedony. The host rock is a low-grade silicified serpentinite containing cinnabar and native mercury.

Vaughn mine, north of Hollister, San Benito County

The Vaughn mine is located about 5 km north of the Stayton district, Hollister, California. This mine, once worked for cinnabar in the late 1800's, was developed by a shallow inclined shaft about 10 meters deep which explored a silicified, mercury-bearing, hydrothermally-altered, pale tan-colored serpentinite. Scattered around the mouth of the inclined shaft and down the slope are many small rocks covered by what appeared to be very fine drusy quartz. Upon further examination using the SEM, this "drusy quartz" was found to consist of abundant, complex interpenetrating cubes. A subsequent X-ray powder pattern identified the cubes as quartz. These "cubes" may best be described as quartz pseudomorphs after melanophlogite.

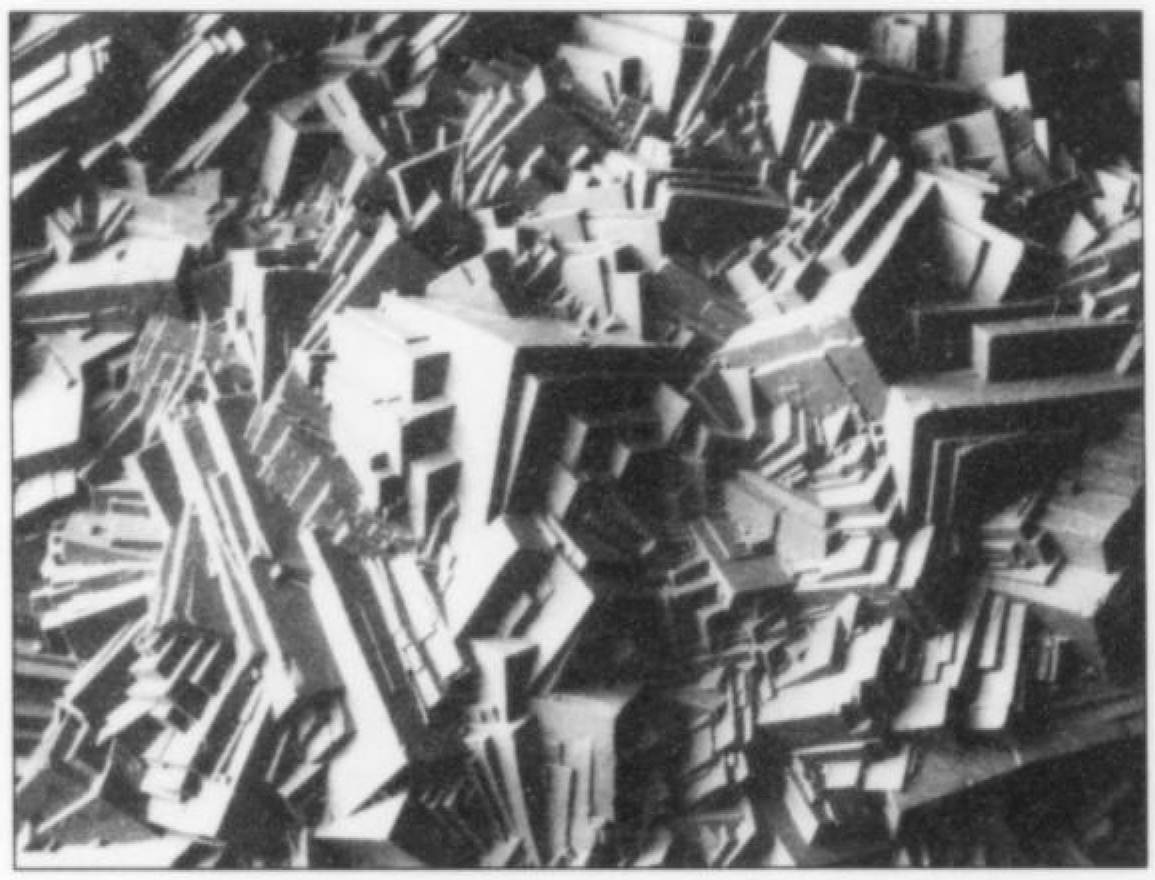

Figure 11. **Complex intergrown quartz pseudomorphs after melanophlogite, 0.25 mm (Vaughn mine). G. Dunning SEM photo and sample.**

Pescadero Beach, Pescadero, San Mateo County

In 1960, Mr. George Shokal of San Carlos, California, collected a float sample of what appeared to be a type of basalt from the beach at Pescadero. This sample, which washed ashore from an underwater formation, was identified as a vesicular black metavolcanic rock containing calcite and chalcedony. The groundmass is composed essentially of hornblende. When etched with formic acid to remove the calcite, both rounded masses and distinct cubes

Figure 12. **Single quartz (chalcedony) pseudomorph after melanophlogite, 0.2 mm, in hornblende-rich metavolcanic rock (Pescadero beach). G. Dunning SEM photo; G. Shokal specimen.**

were observed within several of the vesicles. At high magnification, the surface of the rounded masses is seen to consist of abundant intergrown cubes. Optical tests indicate an index of refraction near chalcedony for both types. The cubes, which average 0.2 to 0.3 mm on an edge, show fine intergrowth features typical of melanophlogite. This mineral may best be termed a chalcedony (quartz) pseudomorph after melanophlogite. This is the first observation of pseudomorphic melanophlogite from a metavolcanic rock. Jakeš and White (1972) give a thorough study of hornblendes from calc-alkaline volcanic rocks of island arcs and continental margins.

ACKNOWLEDGMENTS

We thank the following individuals for their contributions to this paper: Mr. Clive Matson, Oakland, California, who graciously conducted a collecting trip to the Borges quarry to obtain representative samples of melanophlogite; Mr. George Shokal, San Carlos, California, who kindly provided samples of melanophlogite from Pescadero Beach for study, and the late Dr. Francis Jones, who provided many stimulating discussions on melanophlogite and other forms of silica.

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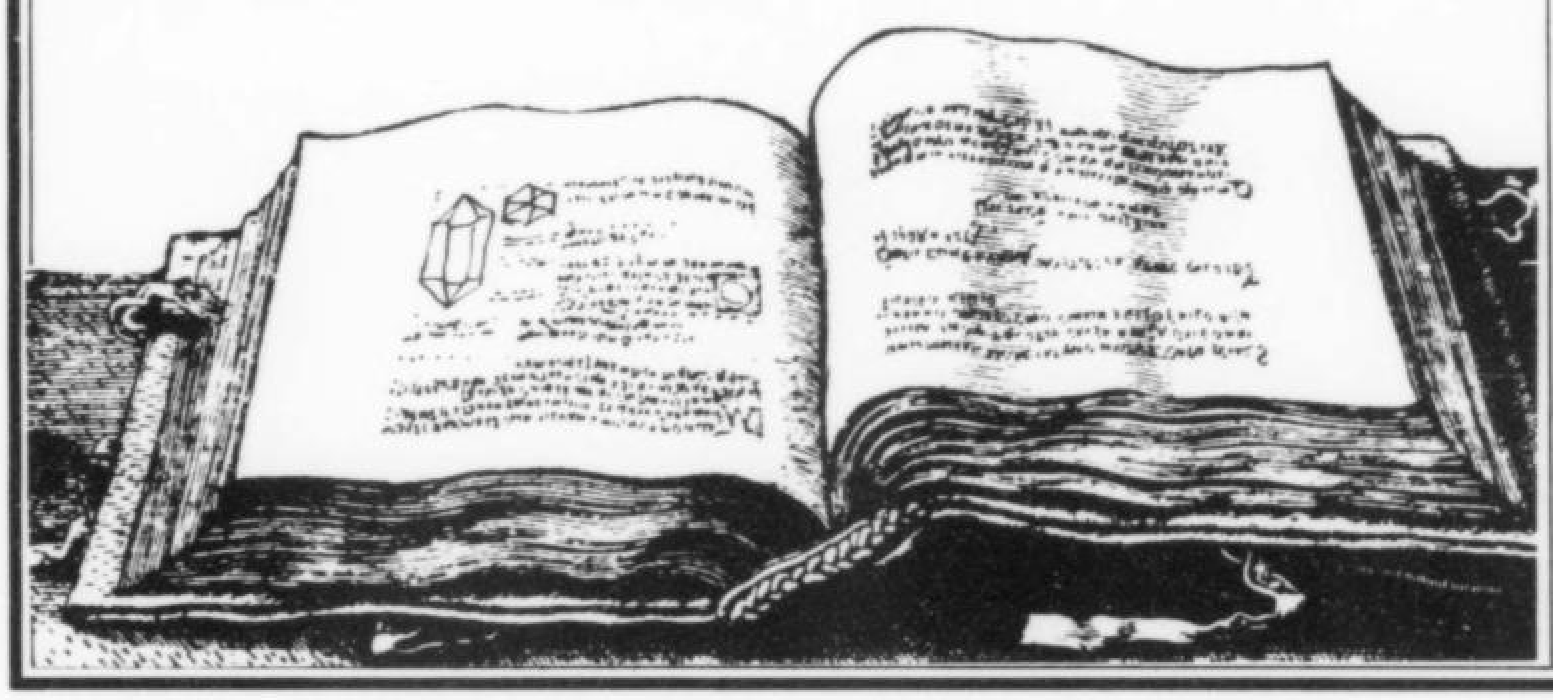
Book Reviews



Mineralien der Vulcan-Eifel

by Franz-Josef Emmerich. Published on CD (2000) by Franz-Josef Emmerich, D-50735 Köln, Germany. Email f.emmerich@freenet.de.

This CD is a simple one, yet encyclopedic within its field of concern: the extraordinarily diverse minerals of the Eifel volcanic field in Germany. The Eifel, a small region in the extreme western part of the central Rhineland, is beloved among German collectors, especially those who favor micromounts, for the 175 or so mineral species found there in excellent microcrystals. As the CD's introduction explains, the last several decades have seen extensive quarrying and roadbuilding in this forested, thinly inhabited region. The happy result (for mineralogists and collectors) of all this activity has been that amateurs have uncovered new species, professionals have described them, and the fame of the Eifel has grown in the mineral world. The microcrystals occur in tiny vugs in young (Tertiary and Quaternary) volcanic rocks, and such is the variety of crystal habits that specimens may look downright surreal under magnification. Franz-Josef Emmerich is careful to say in his text that the CD makes no claim to completeness, but 1,386 color photographs of 162 species from 17 different Eifel localities is, I would say, doing very well indeed.

The CD is easy to use, requiring no installation and claiming no space on hard disks, running on Windows '98 or higher. Little more than simple insertion in a PC brings up a leisurely paced "slide show" of photographs, and "allows an intuitive handling," as the introduction says. This phrase loses a bit in the translation from the German "Gestalt," meaning an easy, coherent, whole-feeling aesthetic experience, which is exactly how viewing the CD comes off.

First on the main menu is an Introduction, in your choice of German or English text. Then comes "Minerals," with a window for an alphabetical species list and links to "Properties," where there are brief physical descriptions and notes on crystal systems and habits for each species. Then comes the main event: the "slide show" of microphotographs by Jochen Tscheortner (with a few interspersed SEM photographs) of 162 species, afwillite through zirconolite. The 1,386 photo images are not of uniform quality, but foreground crystals are almost always in sharp focus, and the fantastic shapes of these crystals stand out all the more dramatically against the blurry backgrounds which seem unavoidable at such magnifications. The "slide show" runs automatically; each picture stays on the screen for four seconds (with a Stop option) before the next "slide" rolls in. There is no text except the bare names of the species and of the localities.

Among common and exotic species alike there are great aesthetic surprises: latticeworks of acicular, colorless, transparent apatite; fantastic skeletal shapes of hematite; analcime in pellucid dewdrops; perovskite in sharp, brown, translucent aggregates shaped exactly like Christmas trees. Species range from the very common (apophyllite, barite, calcite, corundum) to the semi-exotic (baddeleyite, haüynite, nosean, ettringite, jeremejevite) to the extremely rare (hannebachite, willhendersonite, the not-yet-published batiferrite), and all in selections liberal enough to show a full range of habits—I counted 25 pictures, each one different, of barytolamprophyllite alone.

Finally, a "Localities" section shows photographs of the collecting sites, with a map and species list for each site. The diggings are mostly small quarries in light basalt, scoria or pumice; the minerals line cavities formed by outgassing of the rapidly cooling lavas. These photographs give an accurate sense of the "sinter" that cuts up the feet of collectors not wearing stout enough boots. And Emmerich warns field collectors to wear hardhats and always to seek permission before collecting—virtually all of the sites are privately owned or under lease to commercial firms.

This CD is a fine armchair (or deskchair) visit to one of the great micromineral localities of the world, and is easy to recommend, without qualification, to micromounters and to everyone else who likes to look at beautiful and fascinating minerals.

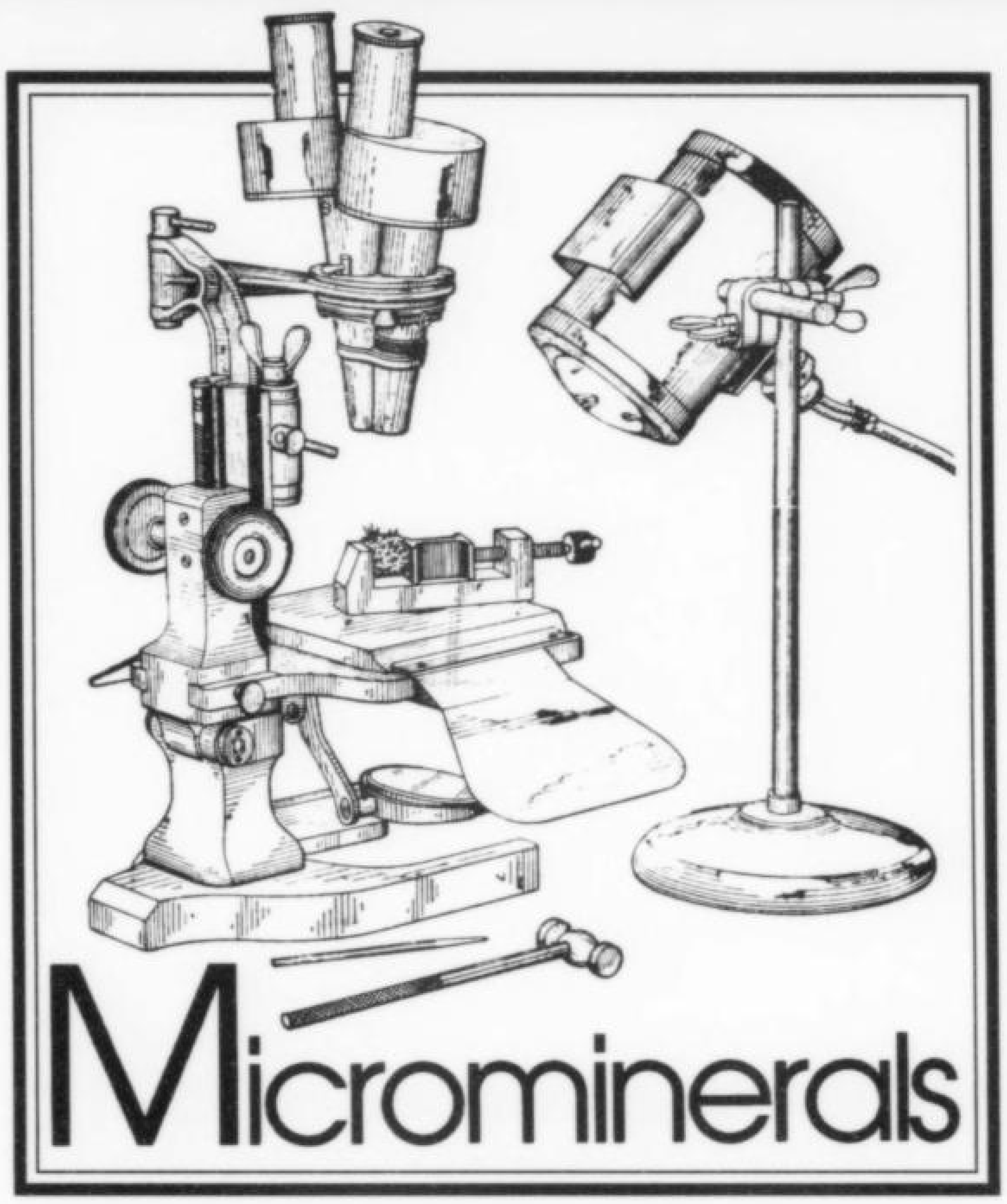
Thomas P. Moore

Les types d'espèces minerals et les collections de syntheses anciennes du Muséum National d'Histoire Naturelle

By H-J Schubnel. Illustrated in color. Published (1999) by Galerie de Minéralogie et de Géologie, 36 Rue Geoffroy Saint-Hilaire, 75005 Paris, France. Softcover, 21 x 29.5 cm, 28 pages, ISBN: 2-85653-259-4. Price 50 French francs.

French mineralogists, especially those of the 18th and 19th centuries, have played an important part in the establishment of an acceptable classification of mineral species. Using specimens from the collections of the Museum of Natural History in Paris, the author shows how Romé de l'Isle, De Bournon and Haüy, among others, arrived at conclusions by careful observation of features which could not, of course, be analytically tested. The book is a beautifully produced and illustrated short guide: for virtually all specimens pictured, dimensions and provenances are given, and there are accompanying notes referring the reader to seminal papers. A final section describes similar early work on the growth of crystals, and there is a short bibliography.

Michael O'Donoghue



by Quintin Wight

PHOTOGRAPHY

Publication of the first column in this series resulted in a number of requests to expand on the techniques for photography of micromounts or very small specimens in general. Some of that information is available at various Internet sites, as are many good photo galleries of minerals taken by other people. A good place to start is the site for the French micromounting association, *l'Association Française de Micromineralogie* (AFM). That site can be found at <http://www.cri.ensmp.fr/afm/>. It is available in both French and English.

There have also been requests for information on computer enhancement of photographs. That's a little trickier, for it presupposes both familiarity with computers and access to the appropriate software, but it may be worked in later.

In the meantime, I have been experimenting with the set-up I advocated for photography of loose tiny crystals in the first column. For those who find the ground granite hard to obtain, or that it gives too mottled a background, or even that the plastic film can inject too yellow a tinge, there is an alternative. It's the universal North American solution—duct tape. (We have to specify North American, because the universal solution in New Zealand is Blu-Tack and number 8 fencing wire.)

Go to the medicine cabinet and find a clear, colorless, plastic prescription container roughly the same size as a film can or slightly bigger. Use clear cement to stick that upright on a suitable piece of wood. (The earlier film container was rendered stable by the weight of the granite, but this has little weight so it needs extra stabilization.)

Take a piece of gray duct tape, and stick it to thin card stock. Cut a circle of this the exact size of the bottom of the container. Sand the tape surface very lightly with fine-grained sandpaper, just enough to dull the shine a little, and drop it to the bottom of the container.

Now set up the microscope slide and specimen, and take the photograph as before. The gray tape makes a very fine substitute for the Kodak 18% gray card (at a fraction of the cost). It is also a good background for blending with dust on the slide.

MOUNTING

Those who have read my previous words on mounting methods know that I am not a fan of using putty or modelling clay-like materials to hold specimens in their boxes. In concert with the late Neal Yedlin, I like a good, solid mount in which the specimen is well glued on a prepared pedestal affixed permanently in the box.

From time to time since the first publication of my mounting ideas in *Rocks & Minerals* in 1979, people have written to say that pedestal mounts were weak, and that the putty-like materials held better. I have always denied that, and shall continue to do so, particularly after an interesting accident that happened the other day.

I had made up two specimens perched on toothpick mounts using my double glue method (see below). They had not yet been placed in their boxes, but were stuck loosely in a block of Styrofoam waiting until I had the boxes prepared. In the process, I had spilled a quantity of rock dust at my working space, and without thinking of the consequences, I grabbed the vacuum cleaner to get rid of it. Unfortunately, we use a centrally installed vacuum system with a powerful motor. It got rid of the dust, but it also inhaled my two mounts!

It took a few seconds before I realized what had happened and shut down the vacuum cleaner. One of the mounts must have jammed sideways at the back of the nozzle, for it fell out to the floor when I gave the cleaner head a violent shake. The other was gone.

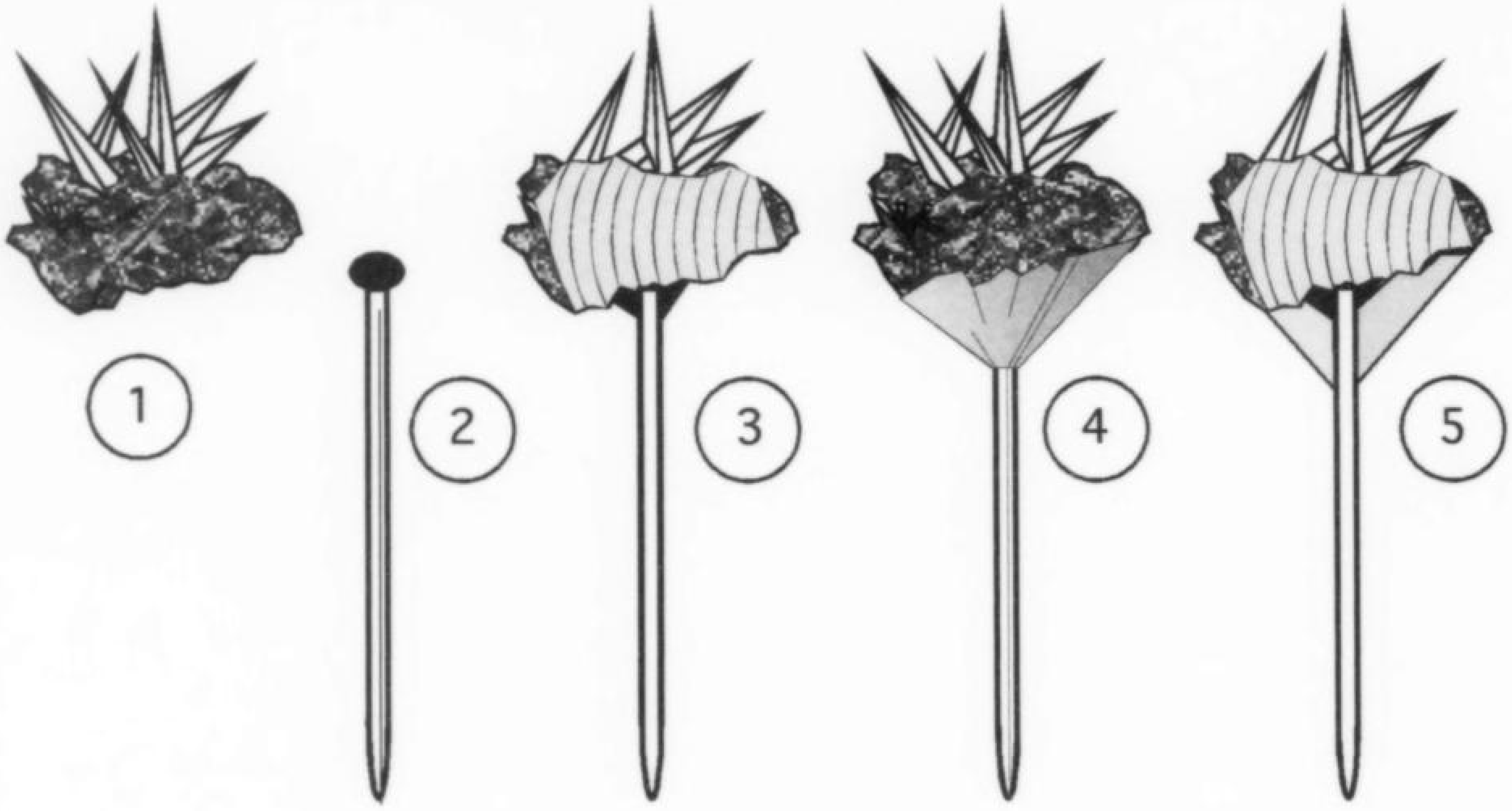
The next day, I put on my dust mask, went to the basement, and tackled the vacuum canister. Half an hour later, I found my second mount. It had gone past the cleaner head, through nine meters of corrugated hose (some of which was still coiled), into the wall, through another five and a half meters of rigid PVC tubing with four 90° corners and four 45° bends, and into the canister—and it was in great shape!

The whole trip took place without the protection of a box, so all of the impact and bending stresses were experienced directly by the specimen/pedestal bond. The toothpick section itself was still 3.2 cm (1.25 inches) in length, meaning that there was plenty of leverage against the glue as the specimen bounced around inside the tubing. Fortunately, the specimen itself was a tough one (a eudialyte crystal half embedded in matrix) and suffered no direct damage. My conclusion is that supportive glue bonds are very good indeed.

GLUES

I don't know why, but seven years after publication of my book on micromounting, I received several queries about my choice of glues, all in the space of a month or so. The question was always the same: where does one get acid-free PVA glue?

My use of the term "acid-free" may have misled some people in their search. One looks for glues rated as "archival." The term "archival" covers acid-free as well as a few other desirable characteristics with respect to aging. Searching for "neutral pH" glues produces the same results. Two good sources for such glues are Talas (568 Broadway, New York, NY 10012), producers of the *Jade* series of PVA glues (*Jade 403* is standard; *Jade B* is removable with water) and University Products (517 Main Street, P.O. Box 101, Holyoke, MA 01041-0101), producers of the *Lineco* glues. Talas can also be reached at <http://talasonline.com>. University Products is at <www.universityproducts.com>. Eastern Canadian micromounters can write to University Products of



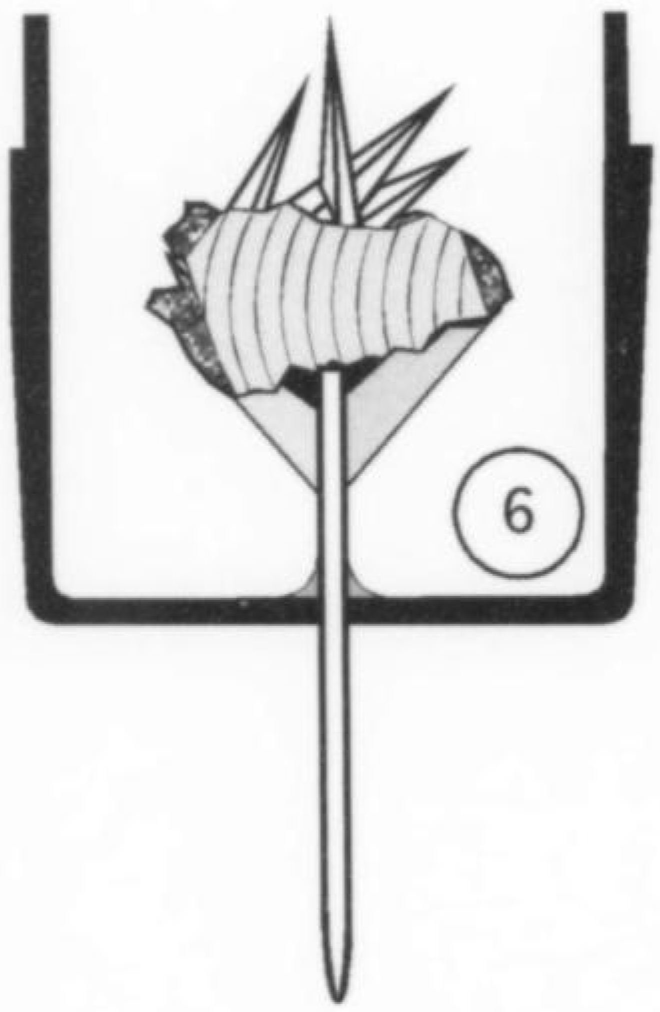


Figure 1. **Steps in the preparation of a glue-supported micromount. [1] Specimen trimmed to size. [2] Half toothpick with small drop of Super-glue. [3] Sectioned specimen and toothpick showing primary glue support. [4] Finished specimen on pedestal with final glue support applied. [5] Sectioned specimen showing support glue structure. [6] Section through specimen and box showing support for pedestal.**

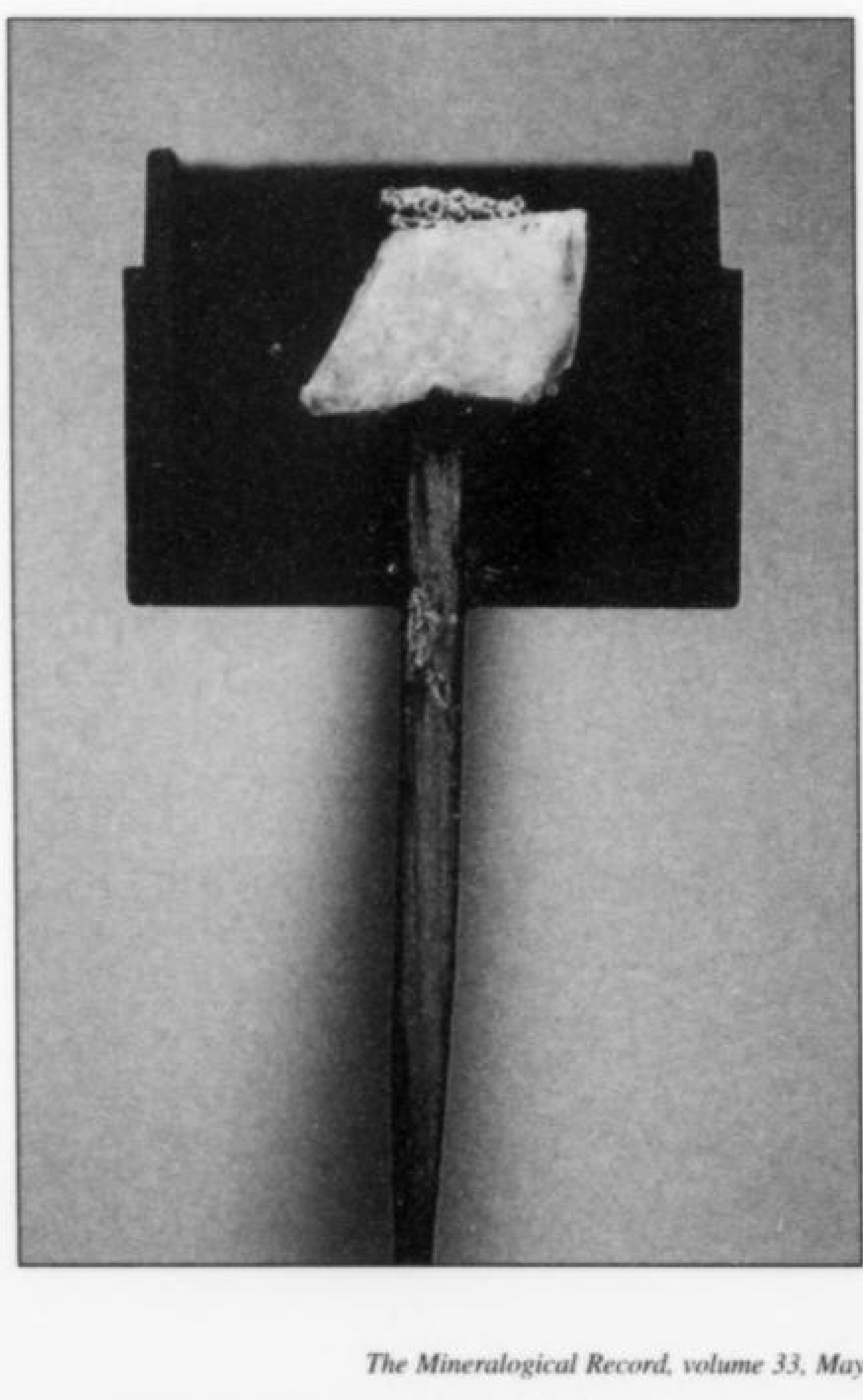


Figure 2. **Cutting a micromount in half requires a little care but it can be done. This example illustrates how the overlay of PVA glue acts as a brace to support the specimen. It also shows how the polystyrene glue builds up to hold the pedestal in the hole in the box.**

Canada (BFB Sales Limited, 6535 Millcreek Drive, Unit 8, Mississauga, ON L5N 2M2). Western Canadians can use R. Bury Media and Supplies Ltd. (#10 3771 North Fraser Way, Burnaby, BC V5J 5G5).

Although I hate to admit it, I occasionally change my mind. I have done so lately in the matter of cyanoacrylate glues (Super Glue and its relatives). I felt originally that they were, first, a bit of overkill, and second, rather dangerous for fiddly work such as micromounting because of their tendency to bond fingers together almost instantaneously. I have found, however, that they are excellent for my type of pedestal mount, not because of their strength, but because of their speed and rigidity. It is a simple matter to place a tiny amount of cyanoacrylate glue on the end of a toothpick, and touch it to the specimen for a few seconds. Within moments, one has a rigid, stable bond that is unaffected by subsequent application of the PVA support glue around it. In this case, the cyanoacrylate bond isn't particularly strong, but it certainly has strength enough to hold the mount until the PVA glue dries to form the supporting "bracket" effect that provides the strength.

Besides, micromounters ought to be dextrous enough to keep their fingers out of the glue in the first place.

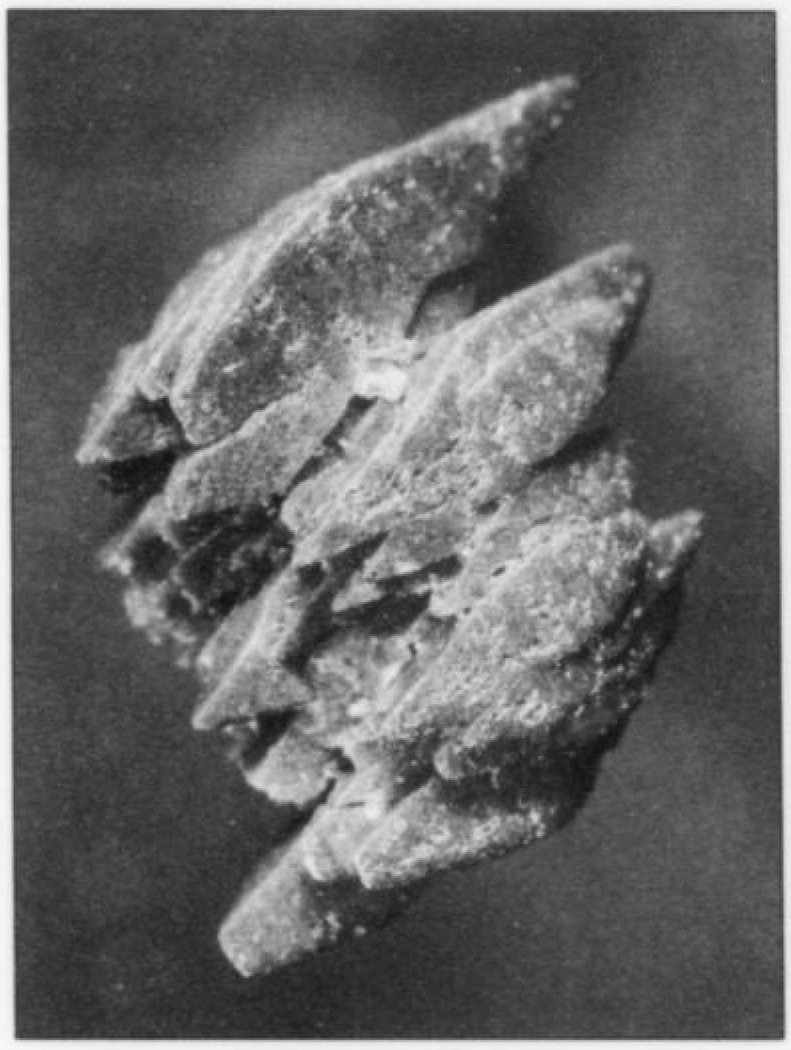


Figure 3. **Anatase crystals in parallel growth, 6 mm, from La Lauziere, France. (Photographed on a crushed granite background.)**

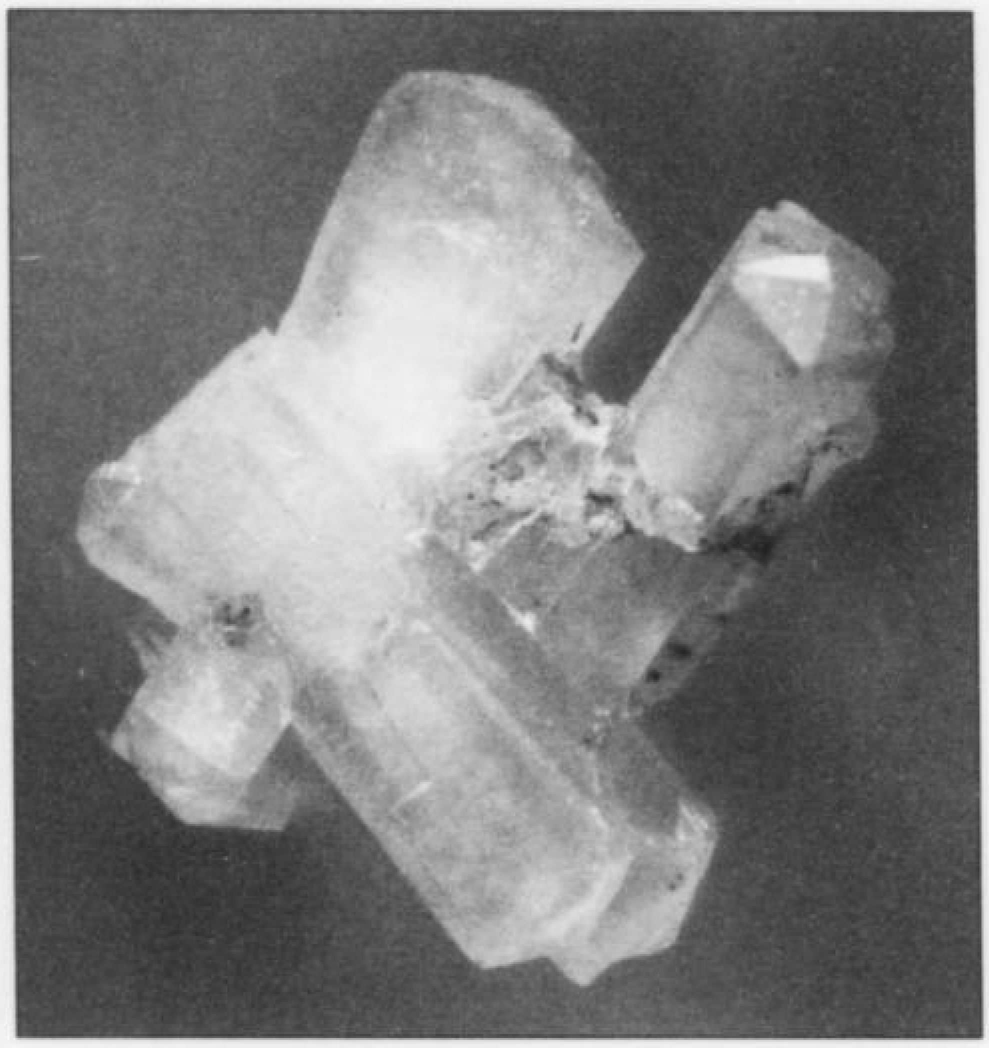


Figure 4. **Natrolite crystal cluster, 5 mm, from Mont Saint-Hilaire. (Photographed on a gray duct tape background.)**

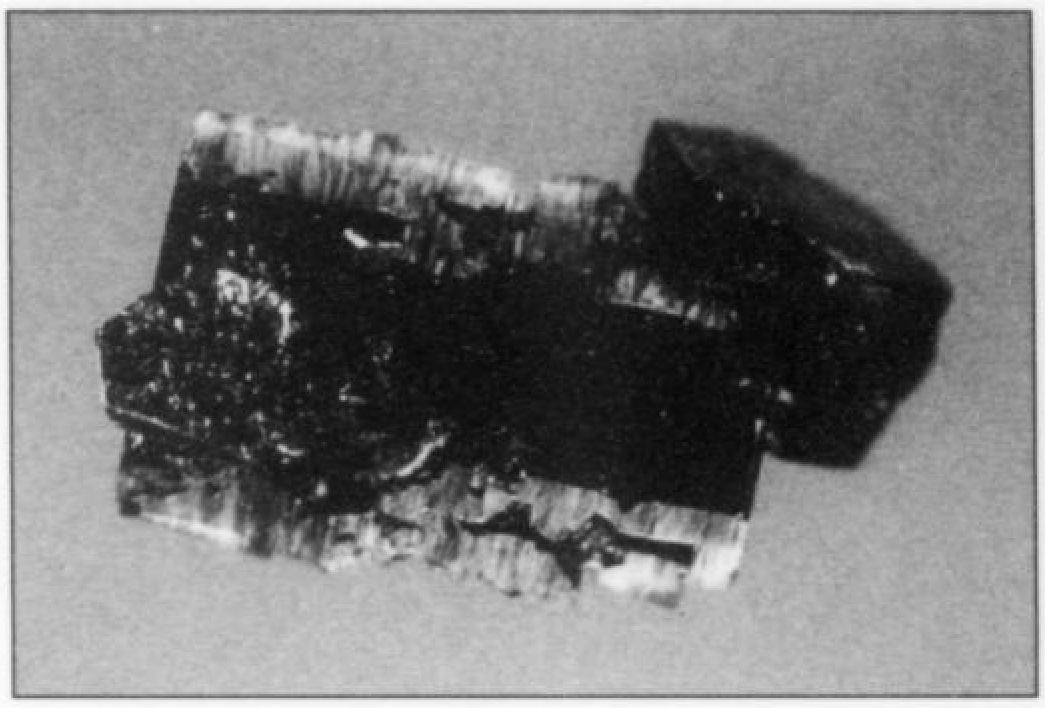


Figure 5. **Biotite crystal group, 3 mm, from Mont Saint-Hilaire; from an occurrence found in 1970 which is under study at the University of Ottawa. (Photographed on a gray duct tape background.)**

Figure 6. **Leucophanite crystal cluster, 6.5 mm, from Mont Saint-Hilaire. (Photographed on a nice black background for aesthetic purposes; the specimen is mounted inside a standard black micromount box.)**

VALUE

I've had a couple of queries recently about the "value" of micromounts. It has always been very clear that micromounts can have inestimable scientific value, but these people were asking about monetary value. They were relatively new to the hobby, and seemed to be of the opinion that there should be some sort of general catalog that states a micromount of calcite is worth $1.00, a micromount of quartz is worth $1.50, a micromount of hilairite is worth $10, and so on.

Well, there is no such catalog, and there never will be. The only thing of absolute value about a micromount is the basic box. In 2001, the box is worth somewhere around fifteen cents.

Value in micromounting is relative, in almost the same manner as value in books.

To value a book, we ask: Who is the author? When was it published? How many were published? Is it a first edition? Does it have a dust jacket? Is the binding sound? Are the pages foxed? Is it *ex libris*? Are the pages cut? Is it signed?

To value a micromount, we ask: What mineral is it? How rare is it? Is the identification good? Is the locality clear? Is it the type locality? Is there damage to the crystals? Can they be seen well under the microscope? Is the pedestal obtrusive? Is the label good? Who mounted it?

In both instances the question of value depends very much on association with people—the author for books, and the mounter for micromounts. In other words, a first edition of *Aristotle Detective* (1978) by Margaret Doody might sell for $5, but a first edition of *"A" is for Alibi* (1982) by Sue Grafton could set you back $1,000. Both are first editions and both are mysteries, but collectors know Grafton, and they don't know Doody. Similarly, a "generic" micromount of pyrite from Ohio, on a dealer's list might fetch $2, while a similar specimen mounted by Paul Desautels could bring in ten times as much. If the specimen were of a mineral mounted by the person after whom it was named, it could go higher than that.

All values are relative—except the price of the box.

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What's New in Minerals

Munich Show 2001 — by Bill Larson

[October 26–28]

I arrived in Munich along with American dealers Victor Yount and Carter Rich, fellow passengers on a slate-gray morning full of promise and excitement. We had come for the 38th annual Munich Show, which was not scheduled to open officially to the public until Friday, but set-ups were to start on Tuesday. The bus took us to the city center and a taxi then brought me to the charming Seibel Hotel to drop my luggage and clean up. Across the avenue disassembled tents littered the Theresienplatz like punctured dirigibles, testaments that Oktoberfest had just concluded.

Looking up the avenue one could see the old fairplex—the Messegelände—being torn down to make way for new highrises. I miss the charm and proximity of the original site of the Munich show. The new site, the Munich Trade Fair Center, is built on the grounds of the old Munich airport. It is an enormous complex of glass and steel, modern and convenient. An underground line easily whisks those of us who stay in downtown Munich to the show.

The Münchner Mineralientage ["Munich Mineral Days," www.mineralientage.de] is *big*: three halls of 25,000 square meters each, 740 dealers from 42 countries, 2.5 km of carpet, 3000 beer tables and special exhibit areas! Munich features minerals and fossils equally but of course my concern was with the minerals. I arrived at 10 a.m. on Tuesday Oct. 23 to spend the rest of the day searching out the new and exciting. Many people were setting up, so noise and confusion reigned everywhere.

I began in Hall B3, which was filled with dealers from producing countries like Morocco (24 of them were listed in the show catalog), China (16 listed), Russia and Peru (eight listed). These are mostly table setups without fancy booths, and with many dealers selling wholesale lots only. Several sellers there were offering tray after tray of **vanadinite**. The color has improved to a less brownish red since I described these Moroccan treasures in my St. Marie report. And fortunately the pieces had been wrapped carefully to avoid damage. Most are miniature or cabinet specimens with bright but small crystals up to 1 cm. Some fine examples were included and these sold rapidly, as there were already a dozen other American dealers floating about whom I recognized. Other Moroccan items of interest included **erythrite** miniatures with crystals up to 1 cm, some **skutterudite** specimens with crystals to 2 cm, **roselite** (or **wendwilsonite**?) crystal groups to 7 cm, small fine **azurite** roses, a few of the new golden **apatites**, and a scattering of **cerussite** and **anglesite** specimens. The best anglesites are bright yellow and undamaged; a miniature with a 4-cm main crystal was offered at $660. Sharp **scorodite** crystals to 2 cm on matrix were rare but available from the Aghbar mine, Bou Azzer, Morocco. The vanadinites were priced all over the place, from a few DM per piece to some costing many thousands. If one was willing to negotiate and buy a whole flat, a tremendous discount could be arranged.

China was represented by several dealers, both familiar and new. Lots of **stibnite**, **fluorite**, **calcite**, **scheelite**, and **wolframite** were available from the usual localities in all size and price ranges. And, as usual, the quality had suffered from poor local packing in China. Amazingly, however, some pieces had arrived in perfect shape. One of the Chinese dealers showed me a dark gray, mirror-bright 2-cm tetrahedron attached near the base of a long, white, slender quartz crystal growing out of a group of similar quartz crystals. Luckily I passed his test; correctly identifying it as a **helvite** crystal. It is excellent, though awkward in aesthetics, and would be difficult to improve by trimming; considering the $1,100 being asked, I decided to move on. Marty Zinn found another perfectly formed helvite on a smaller quartz cluster, the best I saw at the show, and took home a great prize. The other mineral of interest from China was fine **inesite** showing great promise. Large pink clusters up to 14 cm across composed of small crystals made attractive specimens, and here the prices were down from those I saw in St. Marie.

The most interesting new mineral of the show first appeared here in Hall B3, with Muhammad F. Makki (*Matrix India*, matrixindiaminerals@yahoo.com), an Indian dealer on his first visit to Munich. He had a new find of green **fluorapophyllite** balls with an overgrowth of colorless apophyllite making for spectacular and beautiful specimens reminiscent of those mirrored spheres that used to hang from the ceiling in the discos of the 1970's! Alas, I arrived too late and saw only already-reserved pieces. The only thing to be done was to start the hunt for specimens which had already been sold, many of which were destined to be resold in other booths. Makki had only one large plate left unsold, a three-foot stilbite matrix with perhaps 25 5 to 6-cm apophyllite balls on it. He was asking what seemed like a hefty price, but after I declined it sold within a few hours to an American collector! Fortunately I found one of the dealers who had helped unpack this lot, and he sold me all of the 27 pieces he had for a fair price. Then the venerable K. C. Pandey (*Superb Minerals India,* superb@giasbm01.vsnl.net.in) showed up a little later and had some of the same. He explained that these are from a new area where fine minerals were formerly unknown. In the course of digging a well, this unique and rare pocket was encountered. He believed there would be only a few hundred total pieces, so I chased down what I could.

Most of the Russians had older specimens of the "usual suspects," including some nice new Dal'negorsk minerals, but the majority of their items were fossils, gemstones, jewelry and *objets d'art*. Fine minerals are now quite rare from Russia. One fine **sperrylite** was available for the advanced collector, a cluster with crystals to 1.3 cm.

Several Peruvian dealers (there were at least eight of them listed in the show catalog as having booths) had fine **wire silvers**, some quite large, up to 18 cm, but many of these larger wires had already been offered at the Denver show. I saw a few small but nice

Figure 1. **The Munich Show, Hall B2, at the Munich Trade Fair Center. Jeff Scovil photo.**

Figure 2. **Scorodite crystal pocket in matrix, 4.5 cm, from the Aghbar mine, Bou Azzer, Morocco. Ernesto Ossola specimen; Jeff Scovil photo.**

Peruvian **rhodochrosite** specimens, as well as Japan-law **quartz** twins, but most of these had been sold before the show to regular customer-dealers.

The minerals in Hall B3 were almost all newly dug specimens, or at least specimens not previously offered at any mineral show. In Tucson or Denver, American collectors are accustomed to seeing the same minerals recycled or left unsold at many shows. I myself have suffered the embarrassment of having a fine mineral go unsold for several shows and having a friendly competitor sing happy birthday to the specimen! But the minerals in Hall B3 had mostly disappeared through sales or trades before 5:00 p.m. Sunday and the close of the show.

Working my way into Hall B2, I saw many familiar European dealers. Excellent booths were going up and, of course, they contained boxes and boxes of specimens. This hall was similar to the Tucson Gem & Mineral Show at the Tucson Convention Center (the mineral side), with many individual unique specimens, both contemporary and classic. Many were recognizable from previous shows on both sides of the Atlantic. To bring Tucson into perspective, there was even a re-creation near the middle of this hall, of the "Old Desert Inn Bar" with lots of seats for meetings or drinks! Next to this area was the so-called "overseas section," which included many American dealers. Also here were Colombian, Brazilian, Namibian and Pakistani dealers; a great sign for international cooperation. Even though it had been just six weeks since the tragedy of September 11, four out of the six scheduled Pakistani dealers made it to the show.

In a middle row in Hall B2, about 50 shadow cases were being set up for special displays of unique collections. These private and museum displays are always one of the many highlights for visitors to the Munich Show, especially those from overseas. Here in Hall

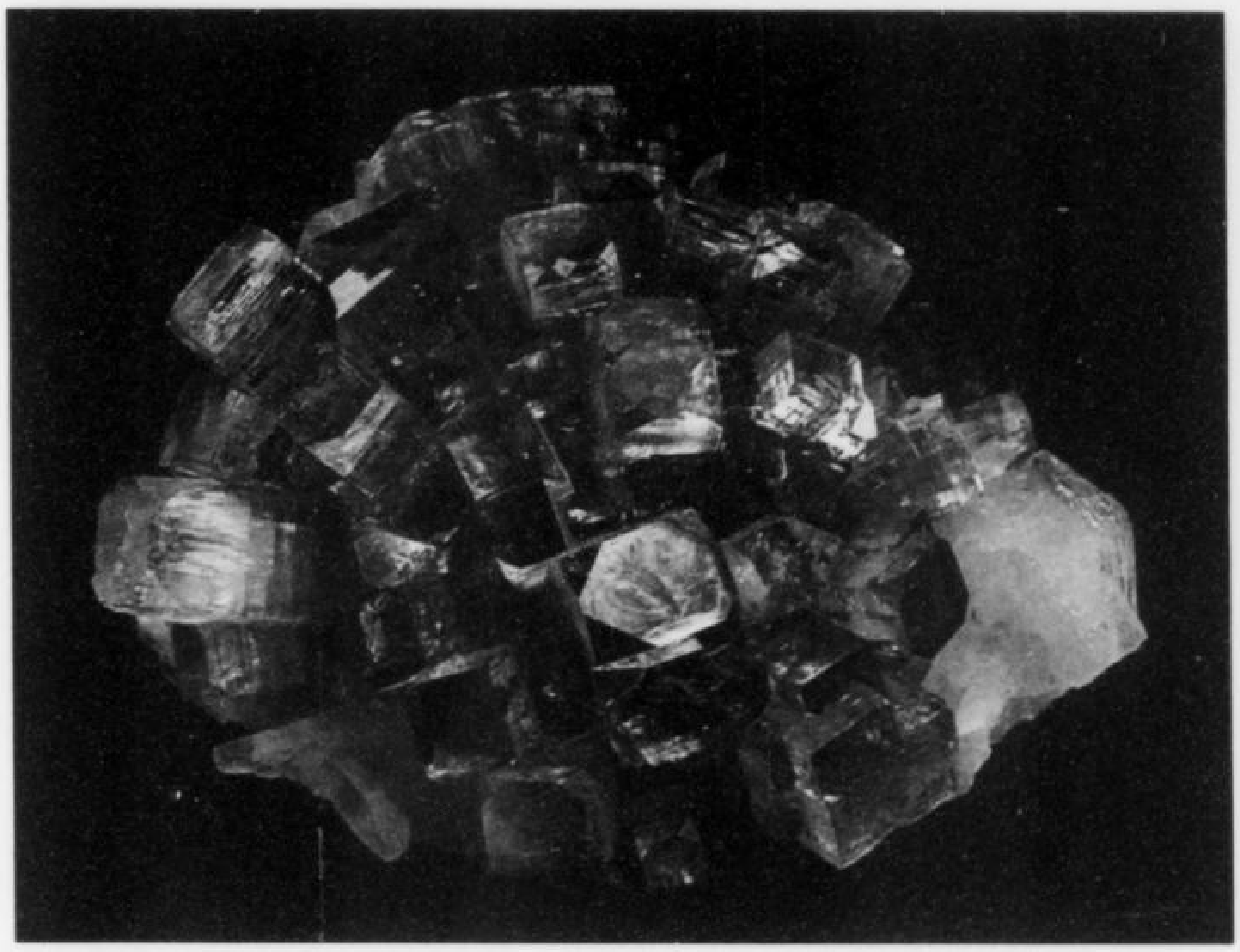


Figure 3. **Fluorapophyllite cluster on stilbite, 7.8 cm, from Momin Akhada, Maharashtra, India. John S. White specimen; Jeff Scovil photo.**

Figure 4. **Adelberto Giazotto standing beside one of the special exhibition cases featuring his superb collection. Jeff Scovil photo.**

B2, because of the larger, more complex booths and the fact that these very dealers were often out shopping in Hall B3, set-up was progressing more slowly, and very few of the booths were ready to do any business yet on Tuesday. Also these first days are dedicated to becoming organized (if possible), so many dealers are not happy to show their minerals until they are ready to open, which all of us can understand.

Leaving Hall B2, I entered Hall B1, where the emphasis was on jewelry, beads, cut stones and art objects. There were many minerals, too, so the mineral collector had to check here also. These were mostly larger, more elegant, three-walled booths, and consequently many were still under construction. The **special exhibits** were in a special section of B1. This year the theme was caves. Many wonderful features resonated around this theme. For the mineral enthusiast the display area featured some 60 pieces from Martin Zinn's extraordinary stalactite-stalagmite collection. He has a potpourri of types including a 25-cm malachite and a 12-cm pyromorphite that would grace the finest collection. Any museum curator worth his salt should be sweet talking "The

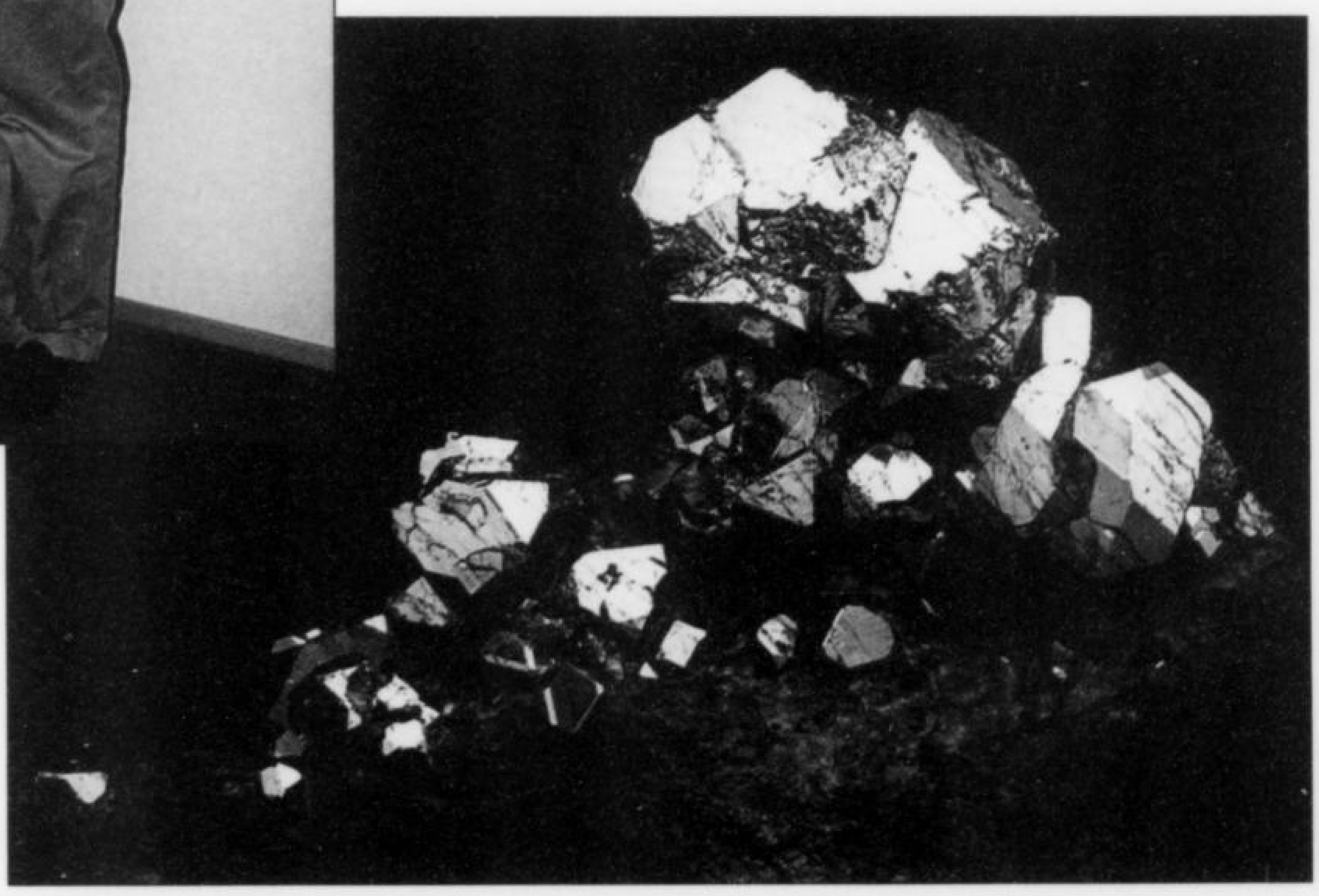


Figure 5. **Sperrylite crystals to 1.3 cm, from the October mine, Talnakh, Krasnoyarsk, Russia. KARP specimen; Jeff Scovil photo.**

Marty" to try to get this collection on permanent exhibition. What a great crowd pleaser!

Inside a smaller showcase at the entry to this area was one of this year's finest Munich mineral specimens: a complex, 30-cm cluster of **malachite** stalactites owned by the French dealers Brice and Christophe Gobin. This specimen was reserved, but was shown to me before it went on public display, compliments of the new owner.

Also featured was a marvelous selection of specimens from Adalberto Giazotto's Mineral Museum in Pisa, Italy. He collects large specimens. To transport everything to the show a total of 41 shipping boxes were constructed, holding up to four pieces each, and weighing in altogether at 4000 pounds! I remember my first visit to his collection, seeing aquamarines three feet across and still gemmy! An amazing tour de force!

In a specially created theater a 15-minute 3-D show featured the peaceful underground world. Of special interest was the "Forum Minerale," surrounded by exhibits from all the major museums in Munich, and from the Museums in Bochum, Freiberg, Regensberg, Germany, from Graz and Vienna in Austria, and from Alistrati, Greece!

That was enough for one day, so I headed for "home" via underground, and then went off to a small favorite haunt of mineral dealers to have dinner. There I learned from German dealer Helmut Brückner (*Brückner Exclusive Mineralien,* postfach 1342, D-79373 Müllheim) that he had received the rest of the famous Swethelm Collection. So over a meal of *Schweinshaxen*, I made an appointment to see him the next morning.

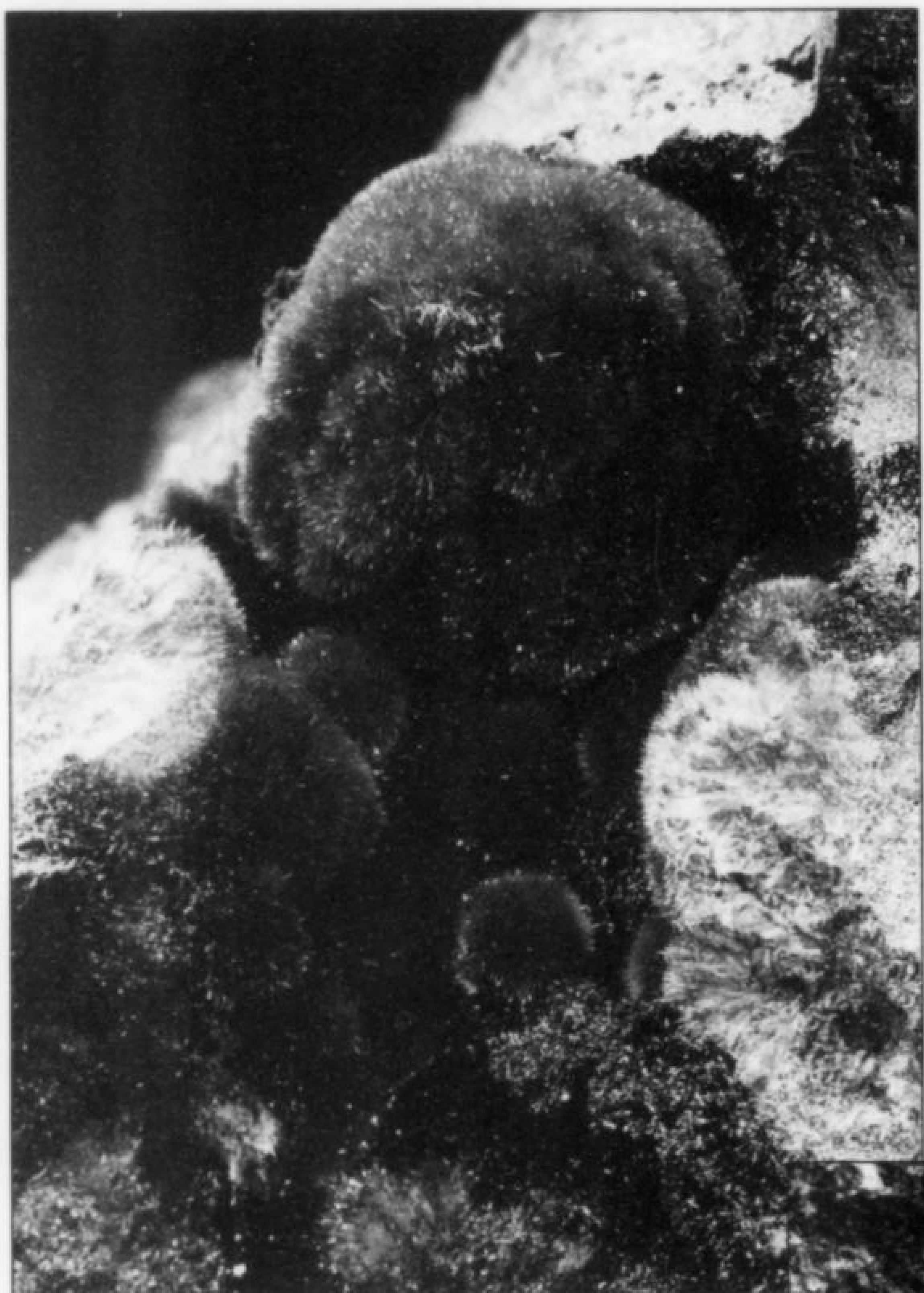


Figure 6. **Shattuckite in spherical sprays to 9 mm, from Mesopotamia, Namibia. Namibia Minerals specimen; Jeff Scovil photo.**

Figure 7. **Cuprosklodowskite with malachite, 3.5 cm across, from the Musonoi mine, Congo. Miner's Lunchbox specimen; Jeff Scovil photo.**

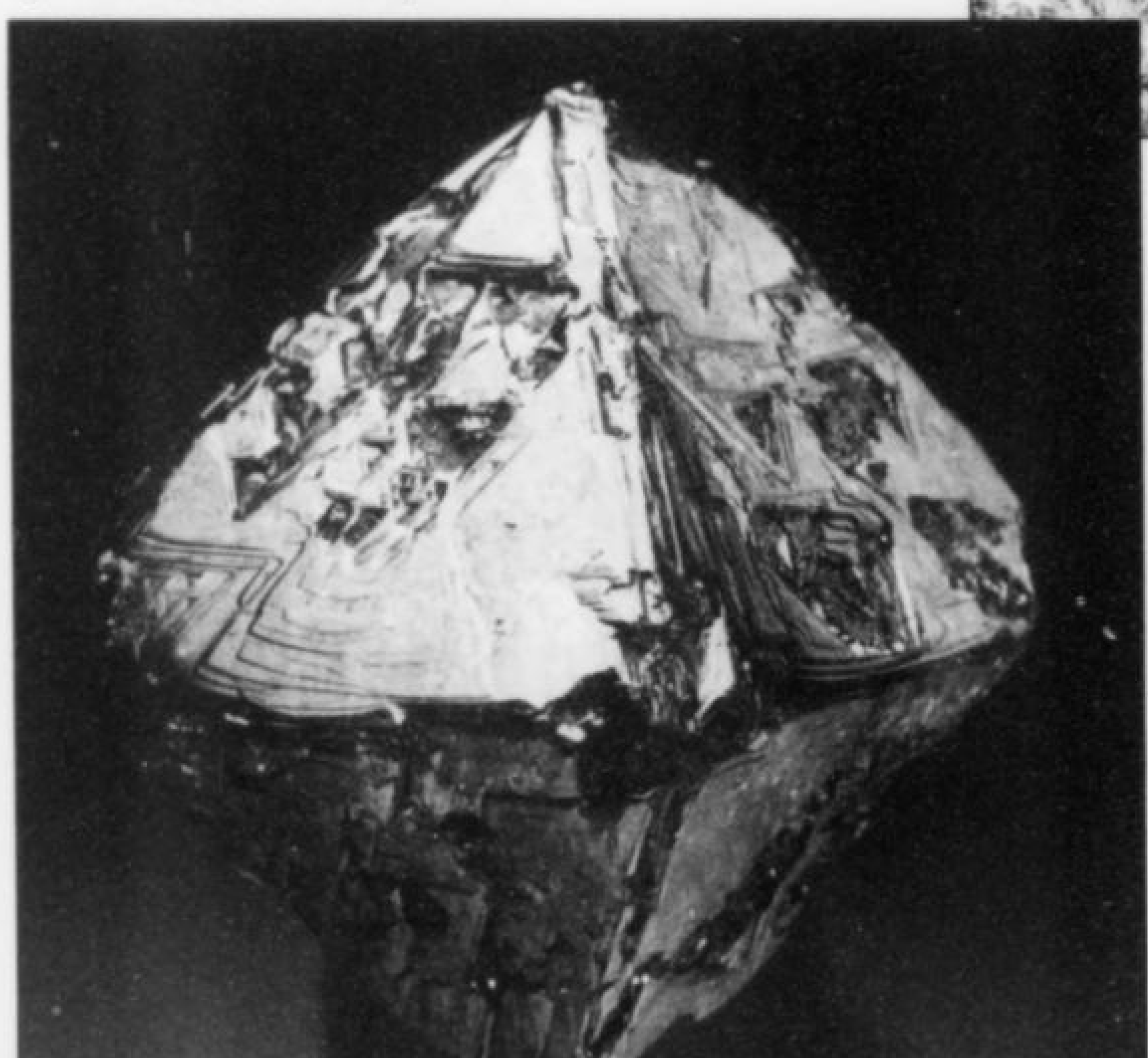
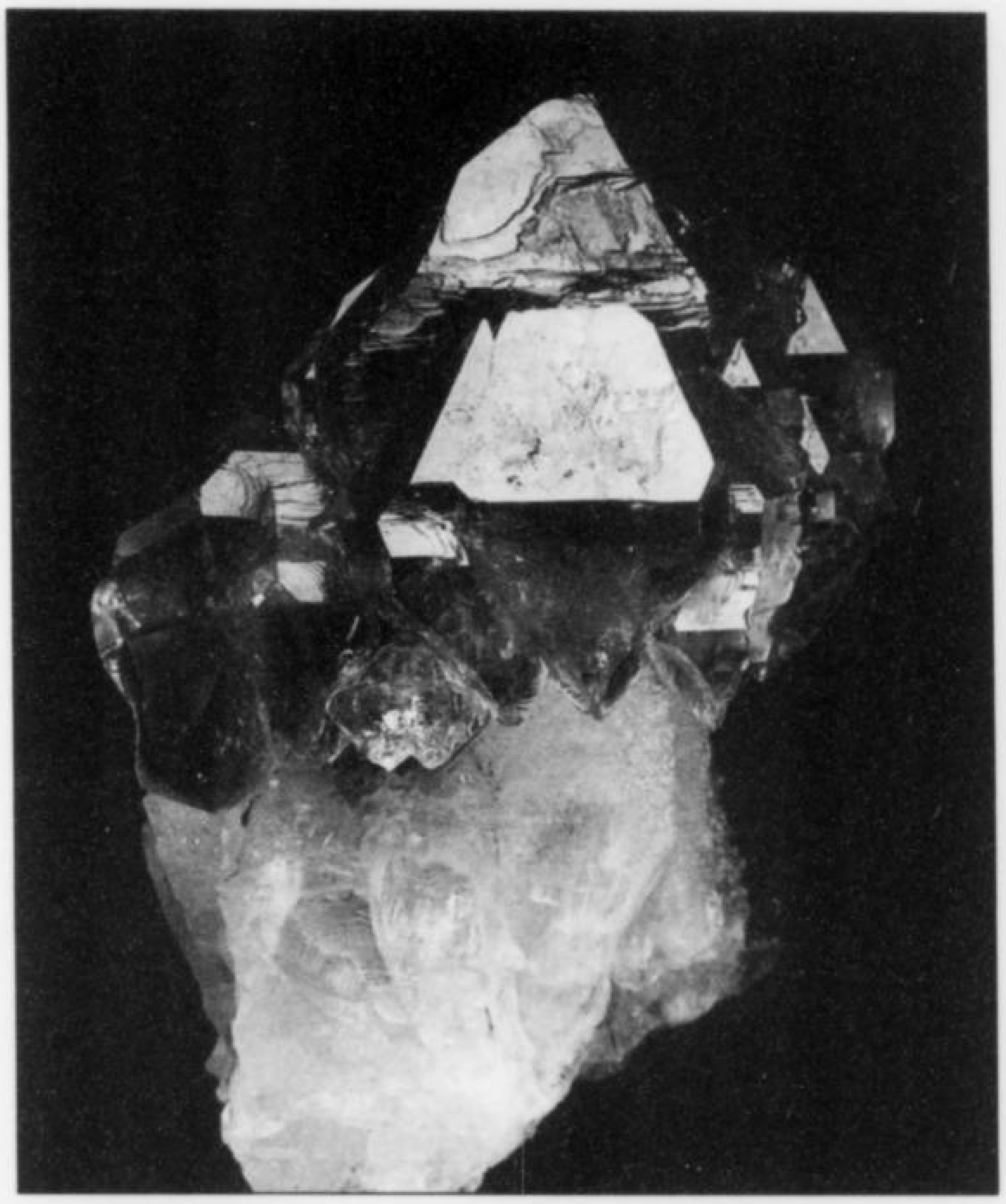


Figure 8. **Octahedral diamond crystal, 2.6 cm, from Mbuji-Mayi, Congo. Crystal Classics specimen; Jeff Scovil photo.**

Early the next day I arrived to a busy sight. Most of the 700-plus dealers were now in the process of setting up. Chaos continued to rule, and it was hard to know where to start first. But I decided on Hall B2 because quality pieces were most often found here. Remember that for this report I cannot cover even a small portion of the vast number of mineral dealers individually. Hopefully we can point to several fine new finds, and leave you wanting to visit the Show yourself. Here are a few specific highlights, inspired in part by Jeff Scovil's superb photo selections.

I kept my appointment with Helmut and obtained, among other things, a classic Austrian dolomite. The collection he had acquired contained many American, Canadian, and Mexican specimens from 20 years ago. Across the hall, *Namibia Minerals* (pha@mweb.com.na) had a new find of **shattuckite** from Namibia, some crystals reaching 9 mm. *The Miner's Lunch Box* had picked up a collection of new **cuprosklodowskite** from the Democratic Repub-

Figure 9. **Amethyst scepter, 7.4 cm, from Ambatondrazaka, Toamasina, Madagascar. Tropic Stone specimen; Jeff Scovil photo.**



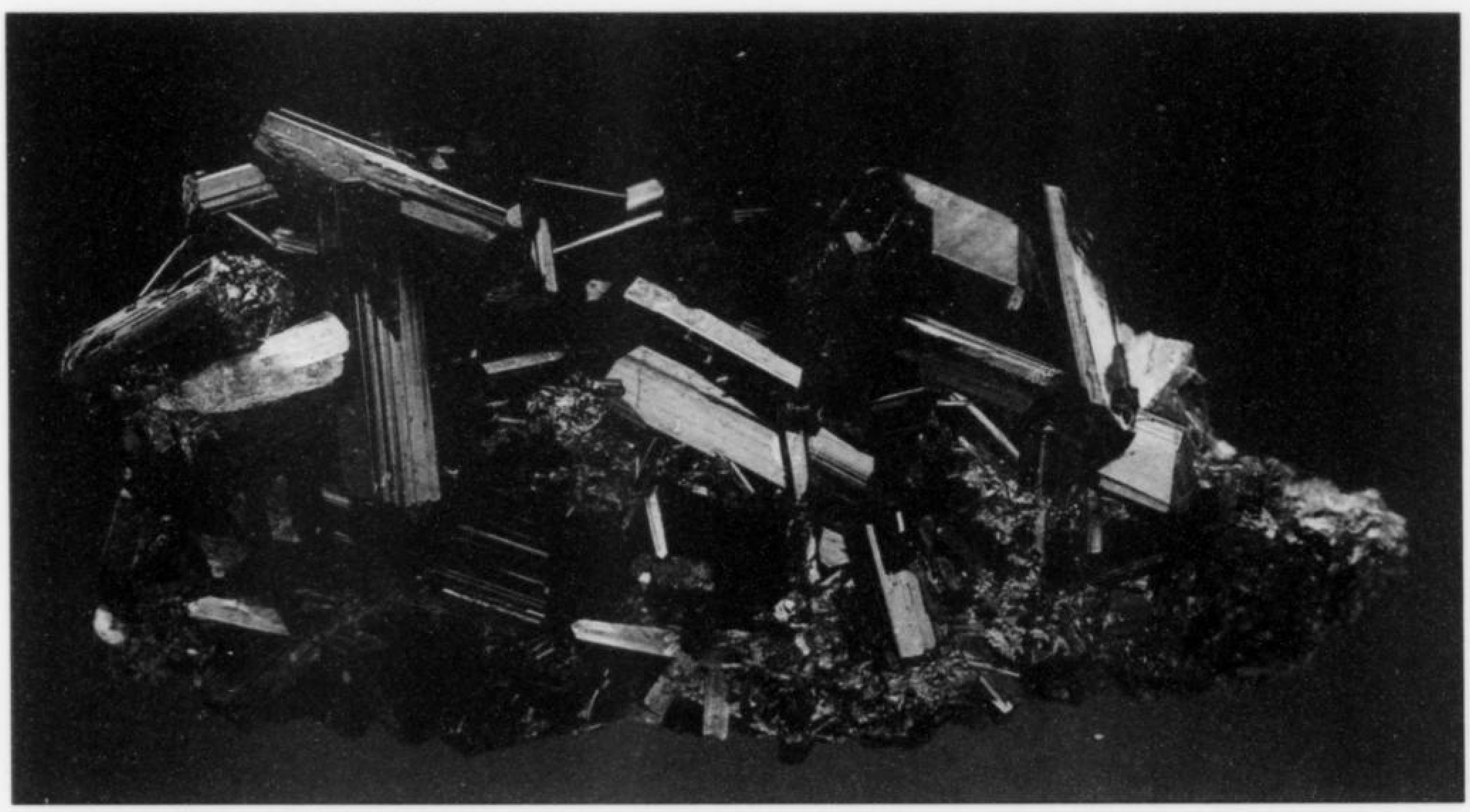
lic of the Congo. The largest needle-like crystals are 3.5 cm and bright yellow-green in color. Down the aisle I was struck by a blue glow. Ian Bruce's *Crystal Classics*' booth (ian@crystalclassics.co.uk) was filled in the back with **azurite** aggregates recently collected at Tsumeb. In addition, Ian had a 2.6-cm **diamond** octahedron from the Congo that would please anyone. From Sierra Gordo, Chile, he had new specimens of blue **penfieldite**. François Leitard (francois.lietard@wanadoo.fr) had several new items including twinned **calcites** up to 3.5 cm from Rio Grande do Sul. In high demand from him were translucent blue **afghanite** crystals in calcite, some 4 cm, from Sar-e-Sang, Afghanistan. He also had a few fine purple **sodalite** crystals up to 2 cm from the same area.

Several dealers in African minerals, including Erich Schmidt and Chris Johnston (chris@johnston.com.na), featured some of the finest **schorl** crystals ever produced, including singles to 20 cm and clusters to 50 cm, some mirror bright and undamaged, all from the Erongo Mountains, Namibia. A few new **aquamarines** were still available from this locality, as well as some fine, single, blue **jeremejevite** crystals up to 4 cm. Namibia has also produced some interesting scepter **quartz** from the Orange River.

Madagascar is well on its way to becoming an important mineral-specimen source once again. Several dealers were present, including Robert Olivier Andrianavalona of *Enterprise TDS* (tdsrobol@dts.mg), and *Tropic Stone*. An unusual **amethyst** scepter quartz from a new find in the Toamasina area is unique. Many fine Japan-law twinned **quartz**, **corundum**, **beryl**, **tourmaline**, and **feldspar** crystals were featured in both booths. Rare minerals, including the new species **londonite**, were also seen. There is great hope for more production.

Figure 10. **Pargasite crystal, 3.8 cm, from Mogok, Burma. Ennio Prato specimen; Jeff Scovil photo.**

Figure 11. **Epidote crystal group, 5.6 cm, from the Zagros Mountains, Iran. Marx-Mueller specimen; Jeff Scovil photo.**



Another African country about to surprise people is Mozambique. I visited there in 1971 and know the potential. *Mozambique Minerals* had etched morganite **beryls** to 12 cm, and some large and poorly-formed but gemmy greenish **herderites** to 10 cm. They also had a few of the famous large nodules of **lepidolite** from Alto Ligonha, along with various colored tourmalines from this famous district. Two perfect 3-cm **columbite** crystals from the Naipa pegmatite, and a 15-cm topaz also from Naipa were also on display. There is great hope for the future of Mozambique.

Various other new minerals got our attention. Ennio Prato (Via Aurelia 53, I-16031 Bogliasco (GE), Italy) had obtained a fine **pargasite** from Mogok, Burma. It is 3.8 cm and an excellent green, much better than any I have obtained or even seen, and I have been to Burma in conjunction with my gemstones business some 20 times. How does that happen? Easily! From Brazil, Marcus Budil (info@wohndesign.net) had some new green Pederneira mine **tourmalines**, many of which, while not large at 8 to 10 cm, were gem and unrepaired. Most of those produced have been heavily repaired according to his Brazilian partner. *Colombian Emeralds Corp*. had a nice selection of Muzo emerald specimens. The finest to my eye was a 3 x 4-cm cluster of emeralds asking $3000. They are direct from Colombia (they attend Tucson) and while they sell mostly cut emeralds, it is nice to see some good crystals being preserved from the cutting wheel.

Marx-Mueller featured some fine **epidote** crystals to 6 cm from the Zargos Mountains, in Iran . . . perhaps the next big surprise in the mineral community. From Europe there were several species of interest. **Milarite** from Austria in single crystals to 1 cm would make fine and rare thumbnail specimens. Christian Rewitzer (stadtapotheke.rewitzer@t-online.de) had many new and excellent Romanian **bournonites** from Baia Sprie. Rudabánya in Hungary also keeps us dreaming, with just a few more **malachite pseudomorphs after cuprite**; just enough to whet the apatite (sic).

After all this, my real appetite took me back to the culinary district of Munich to fortify myself for the next day when casual looking becomes impossible and elbows are the major experience, for Munich hosts more than 32,000 visitors! With this I bring the Munich report to a close. In the words of show organizer Johannes Keilmann: "This first Munich edition of the new century was, in a word, *breathtaking*! Sorry to everybody who was not able to attend!"

Pasadena Show 2001 — by Jeff Scovil

[December 8–9]

To say that things were a bit slow at the last Pasadena Show would be a gross understatement. It was no fault of the Mineralogical Society of Southern California, but a result of circumstances beyond their control. The events of September 11 must still have been having a lingering effect. And, making matters worse, the show had to be held two weeks later than usual, and any change in a show's date cuts attendance. The show in 2002 will be held on the same weekend [December 7–8] as in 2001, but its location will be changed to the L. A. County Museum (great idea!), since the Pasadena Center has given it the boot.

But now on to happier tidings. The **fluorapophyllite** balls from Rahuli, Maharashtra, India that showed up in Munich [*ed. note:* and in Tucson] made an appearance here at the booth of *The Arkenstone*: Rob Lavinsky had about two flats of the beautiful green hemispheres, most of them on a matrix covered by pale tan stilbite. The hemispheres are up to about 7.5 cm in diameter. Another goody at *The Arkenstone* was **tsavorite** garnet, in extremely gemmy, distorted green crystals.

Another first American showing was the new **cuprosklodowskite** lot from the Musonoi mine, Kolwezi, Katanga, Democratic Republic of Congo. *The Miner's Lunch Box* had a few of these specimens at the Munich Show, and even more at Pasadena. They show the classic vugs completely lined with brilliant green needles, and by good fortune were collected from some large boulders discovered on the dumps of the mine.

Nevada is holding on to its "king of **barite**" reputation with yet another new locality—Anglo Gold's SSX mine near Elko, Elko County, Nevada. Casey and Jane Jones of *Geoprime*, who are handling the material, told me that the new mine is about 24 miles

Figure 12. **Barite crystals to 4.5 cm, from Anglo Gold's SSX mine, Elko, Elko County, Nevada. Geoprime specimen, now in the M. and A. Mizutani collection; Jeff Scovil photo.**

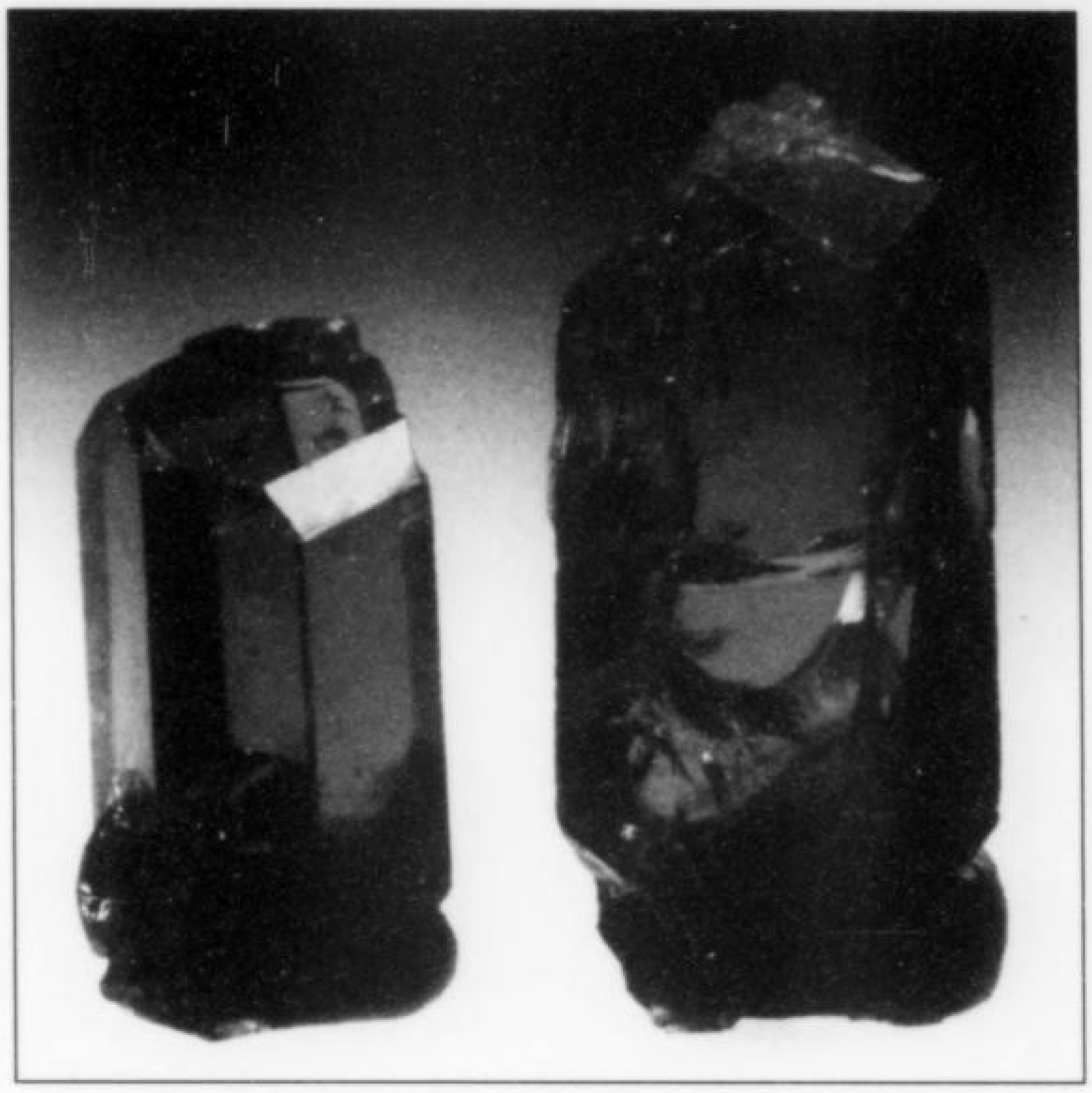


Figure 13. **Tsavorite garnet crystals, 1.5 and 2 cm, from Arusha, Tanzania.** ***The Arkenstone*** **specimens; Wendell Wilson photo.**

from the now famous Meikle mine. The barites from this new source, occurring as tabular, diamond-shaped yellow crystals, are quite similar to those of the Meikle mine.

Last but not least, there was a case put in by the Gochenour family displaying a wonderful new find from southern California: **elbaite on quartz** from the family-owned Cryo-Genie claim, San Diego County, California. After a great deal of work during the summer, they hit several pockets that produced gorgeous pink elbaite crystals having a distinctive parallel, slightly divergent habit of tourmaline aggregate growths. The largest crystal is 16.3 cm long, doubly terminated, with one end green. Also found was a specimen with a pair of elbaite crystals perched on top of a **tantalite** crystal.

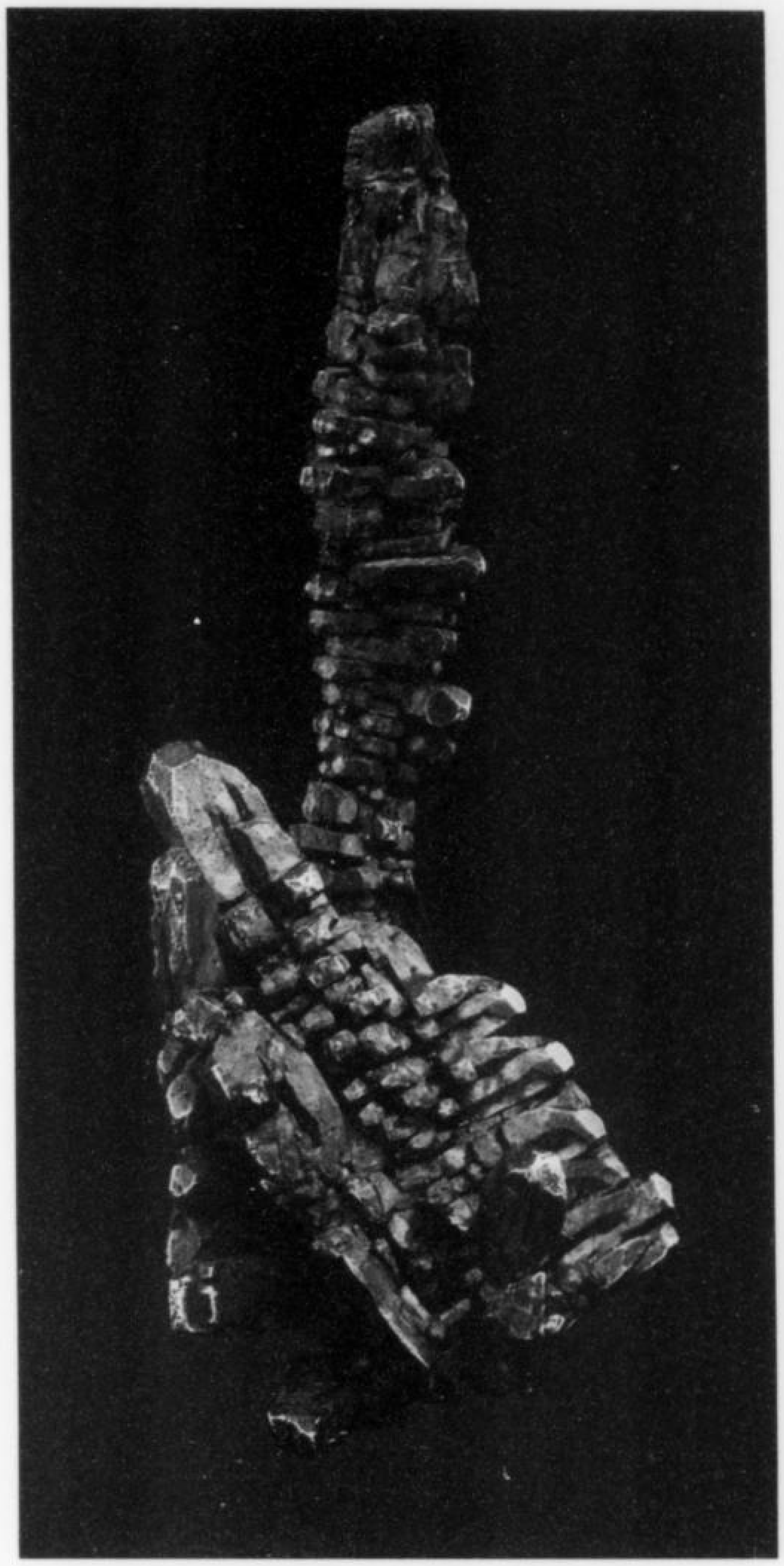


Figure 14. **Copper, 8.7 cm, from the Chino pit, Grant County, New Mexico. Galena Rock Shop specimen (from Mike New); Jeff Scovil photo.**

Tucson Show 2002 by Tom Moore

[February 1–17]

Being a resident of Tucson now proved a significant advantage in fulfilling my duties as show reporter. For example, I could prowl among the early-arriving hotel dealers for more than a week before the "official" opening dates of the hotel shows, and I got hopelessly in their way as they tried to unpack, but they dealt with me graciously for very long periods *before* thinking of reaching for the nearest blunt instrument. By such means I managed to see more fine minerals than ever before. The downside of starting early, of course, is that the more you see and the sooner you see it, the faster your budget withers—but that's a "problem" every collector welcomes.

The Tucson Experience always smiles with familiar constants: good weather, predictably friendly faces and voices, fantastic specimens aspired to like the Holy Grail, huddles in hotel rooms, otherworldly displays at the Main Show, and cars in the parking lots whose plates says things like "Rocks 4U." This year also saw the debut of an experimental new hotel show, the *Tucson Westward Look Show*, wherein eight dealers were offering top-end specimens primarily for elite collectors at the Westward Look Resort on the north fringe of town. Business there was extremely brisk at opening time, making it successful enough not only to survive but to expand somewhat next year.

Now on to the minerals:

Last fall George Godas and John Callahan hit a new **wulfenite** pocket on the 4th level of the famous 79 mine, Gila County, Arizona, and extracted about 15 flats of new material, including four flats of very good, mostly miniature-sized wulfenite specimens. There are two crystal habits: extremely thin, perfectly transparent yellow-orange, square-tabular "windows," and thicker, darker orange tablets. In either case these wulfenite crystals are remarkably free of chips and dings: real miracles of the field collector's art. Crystals of both types reach 2.5 cm on edge, and they perch at high angles on drusy coatings of black mottramite microcrystals and tiny quartz crystals over rock. A handful of the best specimens were to be found in the Executive Inn room of *Arizona Minerals* dealers Dick Morris and Mark Hay (smhay@ srpnet.com).

A major New Mexico item had everyone at the Main Show buzzing. One day last summer, Stan Esbenshade was running a metal detector over some dumps at the Chino open-pit copper mine, Grant County, New Mexico (Stan and two others have a specimen-collecting contract there with Phelps Dodge Chino Mine, Inc.), and suddenly the detector went berserk over one particular boulder. The boulder proved to be almost pure **native copper**, and *what* copper! About 50 specimens were produced, from thumbnail-size up to around 22 cm, composed entirely of well-formed copper crystals including euhedral dodecahedrons to 3 cm, hoppered cubes to about the same size, and distorted spinel twins even larger. The parallel aggregates are so interestingly complex that the term "herringbone" only hints at their intricacy. The uniform color is that of pure, clean copper, with a good though not brilliant luster; the specimens have been cleaned ("conserved" as they say in numismatic circles) but not overcleaned. Mike Bergmann got about 10 of the largest clusters, and Dave Bunk offered the rest at his Main Show booth.

Several major mining projects are currently being undertaken by Bryan Lees' *Collector's Edge Minerals* company. One result: some fine new specimens of **benitoite** and **neptunite** from the famous Benitoite Gem mine, San Benito County, California. The Collector's Edge crew started working the mine in March 2001; they are washing alluvial gravels and mine tailings, then hand-sorting for specimens, and they are also mining *in situ* the greenstone formation which hosts the benitoite-bearing natrolite veins. In short, they are using their customary innovative mining techniques to exploit geological features, and this revitalization of the locality, plus careful lab work, has already produced many hundreds of fine specimens of benitoite, with deep blue crystals to 2 cm perched at varying angles all over plates of matrix. Although fewer than 1% of the benitoite crystals formed in open pockets, a number of those liberated from enclosing natrolite are quite smooth-faced, lustrous, and gemmy; Collector's Edge even had some gorgeous faceted blue benitoite gemstones to show off. Work at the mine is scheduled to resume in March and continue through June.

The old Commodore mine, near Creede, in Mineral County, Colorado (see p. 297 of vol. 7, no. 6—the elusive "Colorado I" issue) is widely regarded as the source of the state's best **sphalerite** specimens. In the InnSuites room of the Collector's Edge dealership, and later at their stand at the Main Show, visitors found a couple of hundred "combination" specimens of sphalerite, chal-

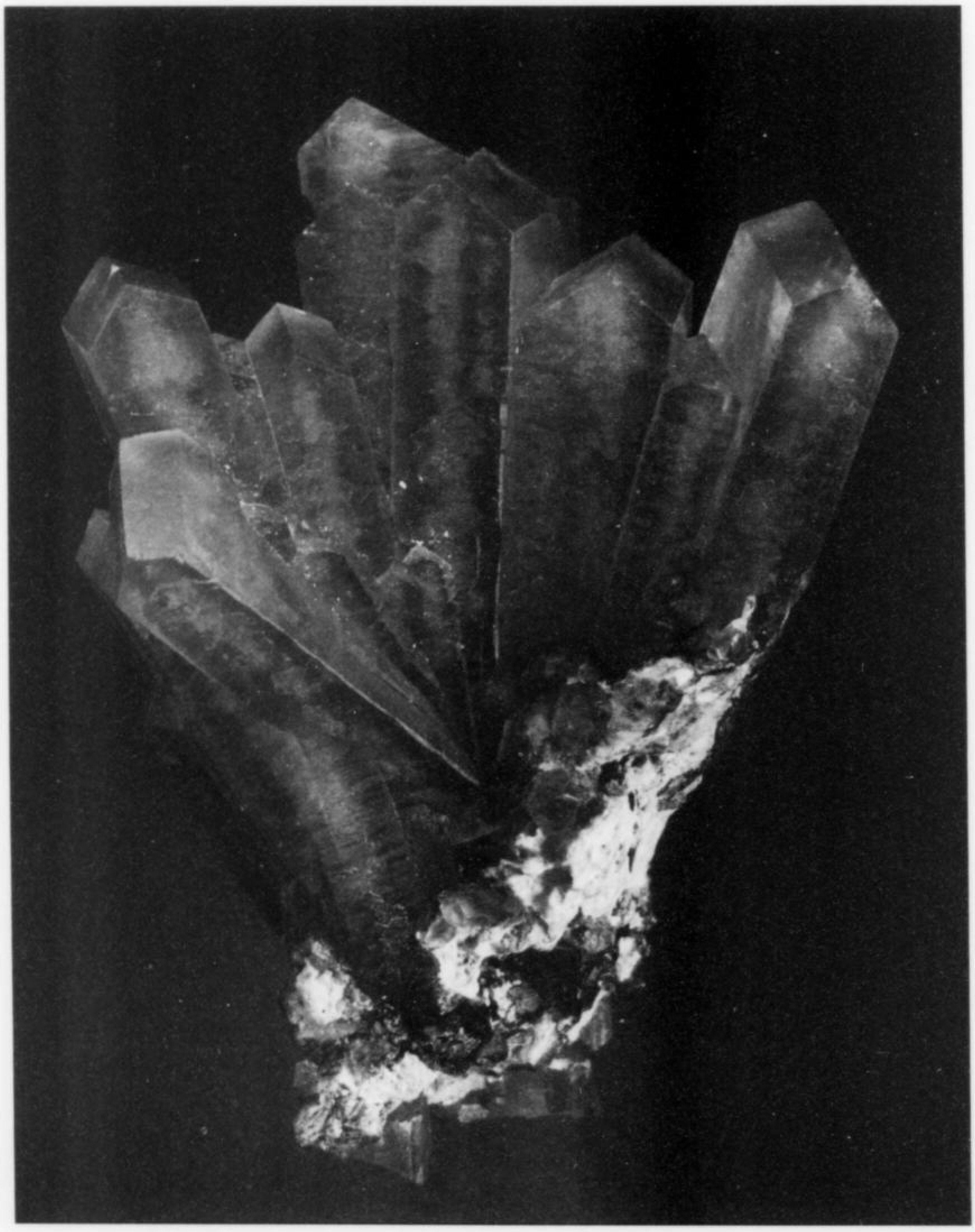


Figure 15. **Celestine crystal cluster, 6.4 cm, from Monroe County, Michigan. Joe Kielbase specimen; Jeff Scovil photo.**

copyrite, and galena, dug during the 1960's in the Commodore mine and only now coming to market. The flattish matrix specimens range in size from a few small miniatures up to one 20 x 25-cm plate. On all of them there is dense coverage of sharp, lustrous, gemmy-transparent brownish orange sphalerite crystals (dramatic when backlit) to 2 cm; in most specimens there are equally sharp (but less brilliant) sphenoidal crystals of **chalcopyrite** to 1.5 cm; in some there are sharp-edged but dull-lustered gray **galena** cubes, a few slightly hoppered, to 1 cm. The three types of crystals are tightly intergrown in rich, sparkling coatings—but not too tightly; each species speaks clearly for itself.

A quarry somewhere in Monroe County, Michigan (reportedly a "sneak-in" quarry whose name is undisclosed) gave up some 200 major **celestine** specimens from a vuggy zone late last summer. Sharp, fairly lustrous, translucent, pale to medium-blue celestine crystals individually reach 10 cm; they are long orthorhombic prisms with wedge-shaped terminations, arrayed either in jumbled groups or in neat parallel picket-fence formations, making handsome specimens from 5 to 30 cm across. Some of the celestine crystals have brownish yellow calcite scalenohedrons to 1 cm lying flat on their faces. A large glass wall case full of these pieces adorned the Executive Inn room of Joe and Susan Kielbaso's *Gemini Minerals* (P.O. Box 70062, San Diego, CA 92167).

North Carolinians Terry and Jean Ledford of *Mountain Gems & Minerals* (P.O. Box 239, Little Switzerland, NC 28749) still have some gemmy green **spodumene** variety hiddenite crystals from that old stash described in my Denver report . . . but for those with less robust budgets, the Ledfords this time also had some fine loose single crystals and miniature-sized crystal groups of transparent **quartz**, much of it pale smoky to pale citrine-orange, which Terry dug recently at the old hiddenite/emerald locality on the Adams (or Warren) Farm, Hiddenite, Alexander County. Some of the quartz crystals have inclusions of hematite and/or external attachments of sharp, thin plates of green muscovite. Terry managed also to dig a few **emerald** crystals: sharp hexagonal prisms to 5 cm long, not gemmy, of course (being infused with mica from the surrounding schist), but of a good medium-green color.

Tyson's Minerals (relocating this year from the hotel to the Main Show) offered about 30 cabinet specimens of the very rare hydrous calcium silicate **suolunite**, found four years ago at the (active) Black Lake asbestos mine in Quebec. Many zillions of suolonite microcrystals are packed into thick, deep purplish blue to pale lilac mammillary crusts with glittering surfaces, mostly without matrix. But radically more attractive are the Tysons' three flats or so of variously sized **fluorite** specimens from the Rogers mine, Madoc, Ontario. These came from an old hoard just now being marketed—the Rogers mine closed in 1961 (see vol. 13, no. 2). Before doing so it had operated for decades as a source of fluorite for flux and for optical uses; the Tysons are now working two pits for specimens, so perhaps this important old fluorite locality is coming to life again. The lustrous, transparent crystals are uniformly cuboctahedral in habit and reach about 5 cm across. They are pale green in fluorescent light or sunlight, and gray-green in incandescent light. They perch singly or in clusters on massive pinkish white limestone, sometimes with spheroids of tiny white barite blades.

Executive Inn show visitors crossing the wooden plank "bridge" from the south to the north buildings should not neglect the steel trailer they'll see on their right, wherein they might very well find some pleasant surprises brought in from Mexico by Dan Belsher of *Blue Sky Mining Company.* (8890 North Federal Blvd #52-D, Denver, CO 80260). This year the surprise was about 30 specimens, miniature through cabinet-size, of beautiful pink **apophyllite** found about six months ago in the La Noria mine, San Pantheon de la Noria, San Martin de Sombrerete, Zacatecas, Mexico. The sharp, highly lustrous, translucent to transparent [fluor?]apophyllite crystals reach 3 cm and are pale to medium pink; they form generous coverage on massive calcite/fluorite matrix, with microcrystals of stilbite and heulandite. Some specimens show flat-lying, doubly terminated tetragonal prisms (with pyramid faces) of apophyllite to 1 cm.

At the Main Show, Dave Bunk presented (as he did last year) a shelf full of brilliant, small specimens of Mexican silver minerals, mostly from Fresnillo, Zacatecas, including manically high-lustered groups of sharp crystals of **acanthite, stephanite, polybasite** and **pyrargyrite** from various levels of the Proana mine, recovered at different times within the last year. They are mostly thumbnails and small miniatures.

With Rock Currier's article about his 1993 visit to the mines at Tasna, Bolivia (Vol. 26, No. 3), there is a photo of a cluster of strikingly large, thick **bismuthinite** crystals from Tasna, unfortunately rendered moldy-looking by solid coatings of "pyrite." The pictured specimen looks just like some bismuthinite crystal clusters that Jaroslav Hyršl (Heverova 222, 280 00 Kolin, Czech Republic) had on hand in Tucson this year, although Jaroslav says the moldy coating is marcasite. A pocket found in December 2000 at Tasna yielded a handful of jackstraw crystal groups, to 10 cm across, with sharp bismuthinite prisms to 7 cm long. Surely this is the best crystal development of bismuthinite yet to be unearthed anywhere. The crystals on the new specimens are still solidly covered with greenish pyrite or marcasite mold ("moss" is maybe a better metaphor), but the groups are still impressive; and Jaroslav showed me some single, loose bismuthinite crystals with a satisfyingly steel-black, stibnite-like appearance, as he had laboriously chipped away the coatings on these. Jaroslav is now trying to discover a chemical process whereby the ugly iron sulfide might be removed without damaging the bismuth sulfide below. If he can succeed, the results should be spectacular!

Brian Kosnar of *Mineral Classics* (P.O. Box 2, Black Hawk, CO 80422) also knows a thing or two about Bolivian minerals. At the Main Show he had some miniature specimens of the new **bournonite** from the Viboras section of the Machacamarca mine, Potosi, which I mentioned from Denver: sharp, metallic gray platy crystals to 5 cm standing upright on a matrix of drusy quartz and pyrite. Brian also had about 25 thumbnails and miniatures of massive gray galena matrix on which perch sharp, silky white, wedge-shaped crystals of **valentinite** to 1.5 cm, found a year ago at the Colavi mine, Potosi. And about six months ago, at Cerro Huañaquino, Potosi, Bolivia, there was a major find of **magnetite** in black octahedrons so sharp as to suggest old Swiss magnetites; these crystals reach 2 cm on edge, and huddle together on flat plates of gray-brown granitic rock. Brian had about 20 fine miniatures and a few cabinet specimens of this snappy material.

Last August, at the Baxao mine, Taquaral, Minas Gerais, Brazil, yet another new find of Brazilian **elbaite** was unearthed. The loose, lightly etched, gemmy, more often than not doubly terminated, pristine little elbaite crystals from 1.5 to 5 cm long are sharply color-zoned, with each crystal one-third pink, one-third a surprisingly strong yellow, and one-third root-beer-brown. Several flats of these floater gem crystals were to be found at the Main Show stand of *Hawthorneden*, and proprietor Frank Melanson says that about 200 crystals were found in all, the longest measuring 15 cm.

From Diamantina, Minas Gerais, Brazil, supplies of the brilliant, loose elbow-twins and V-twins of deep red **rutile** seem to be ongoing (Luis Menezes had a particularly fine selection), but just this past January a new pocket at Diamantina yielded about 50 small-miniature-sized specimens of another habit: extremely delicate, loose reticulated groups of deep brownish red (gemmy red at

Figure 16. **Gold crystals, 3 mm, from Morro Velho, Minas Gerais, Brazil. Carlos Barbosa specimen; Wendell Wilson photo.**

the tips) acicular rutile, individual crystals of which reach 4 cm long. The general aspect recalls the spidery rutile on matrix from old localities in Switzerland and North Carolina. The new find included only a couple of matrix pieces, with rutile girderworks on and in transparent colorless prisms of quartz. Andy Seibel (P.O. Box 2091, Tehachapi, CA 93581) brought these exceedingly delicate specimens to the Main Show.

From Denver last time I noted John Attard's two very peculiar-looking specimens of "magnetite," or more likely **hematite pseudomorphs after magnetite**, from a vague locality in Argentina (see the photo in vol. 33, no. 1, p. 84). Argentinian dealer Jorge Dascal of *Ocean (Herkimer) Quartz Crystal Diamonds* (oceanherkimer@hotmail.com) brought what looked like thousands of these specimens to a room in the Executive Inn, where visitors could pick The One from a dense litter of thumbnail through small-cabinet-sized pieces strewn over the surfaces of three large tables. All are loose, cinder-black crystal groups; some feature simple sharp octahedrons, some have deeply hoppered and elongated forms, some are coated on surfaces with bright black druses of microcrystals, and some are frosty lustered while others are smooth to sparkling. Some are magnetic and some not, and some have varying magnetism from one end to the other (incomplete replacement of magnetite by hematite presumably being responsible). John Attard (www.attminerals.com) was again selling some extra-fine large specimens, and Rob Lavinsky offered some on his website, but the real fun was in poking about the vast spread in Dascal's room, where prices for specimens ranged primarily between about $20 and $100. A locality called "Chubut" in "Patagonia" was being given reluctantly by Jorge, but the specimens are identical to earlier examples from the remote Payun Matru volcano, Malargue department in the state of Mendoza (confirmed by another Argentinian collector, and apparently first mentioned in the *Record* by George Robinson in 1991, vol. 22, no. 5, p. 387).

We shall begin our survey of European minerals in Sweden, with the dealership called *Nordic Mineral* (Raket G.11, 41320 Gothenberg, Sweden), run by the brothers Peter and Anders Lyckberg. At the famous iron mine at Malmberget, in northern Sweden, a few excellent **stilbite** specimens have been collected over the past several years, and now the little hoard was on sale: about 20 specimens, thumbnail to small-cabinet size. The stilbite crystals are sharply individualized rectangular prisms with slightly flaring, square tops; they range from 5 mm to 1 cm, in attractive radial sprays and in sprinklings over matrix. The luster is bright, and the color ranges from creamy white to pale yellow to medium orange. Especially impressive are hand-sized matrix specimens with sparkling, perky and sharp, yellow-orange stilbite crystals strewn all about.

The magnesite quarries at Oberndorf an der Laming, Steiermark, Austria are world-class localities for **strontianite**. The quarries are now inactive, and the strontianite crystal specimens have never been plentiful on the U.S. market (and never too plentiful in Europe either). Thus it was pleasant to find Stefan Stolte of *Mineralien & Fossilien* Galerie (Fahrgasse 88, 60311 Frankfurt/Main, Germany) offering about a dozen fine Oberndorf strontianite specimens, dug in 1967. They are spherical clusters of tightly packed but sharp, cream-colored pseudohexagonal prisms, in clusters ranging from 4 to 12 cm across. Nearly all are tinted pale to medium orange, but at their bases a few very sharp, lustrous white, well individualized single 1-cm strontianite crystals stick out.

Another classic locality in central Europe, the coal mines at Kladno, Bohemia, Czech Republic, last year yielded a brand-new surprise: the world's largest crystals of the very rare species **cryptohalite**, in about 40 specimens found last November on the mine dumps. Cryptohalite—$(NH_4)_2SiF_6$—is an alteration product of coal, and, sure enough, the colorless to pale yellow, transparent crystals have grown on dull black carbonaceous matrix. These crystals are sharp, wedge-shaped, lustrous, and reach up to 7 mm

Figure 17. **Rose quartz crystals on quartz, 2.5 cm across, from Paroon, Afghanistan. Jack Lowell specimen; Wendell Wilson photo.**

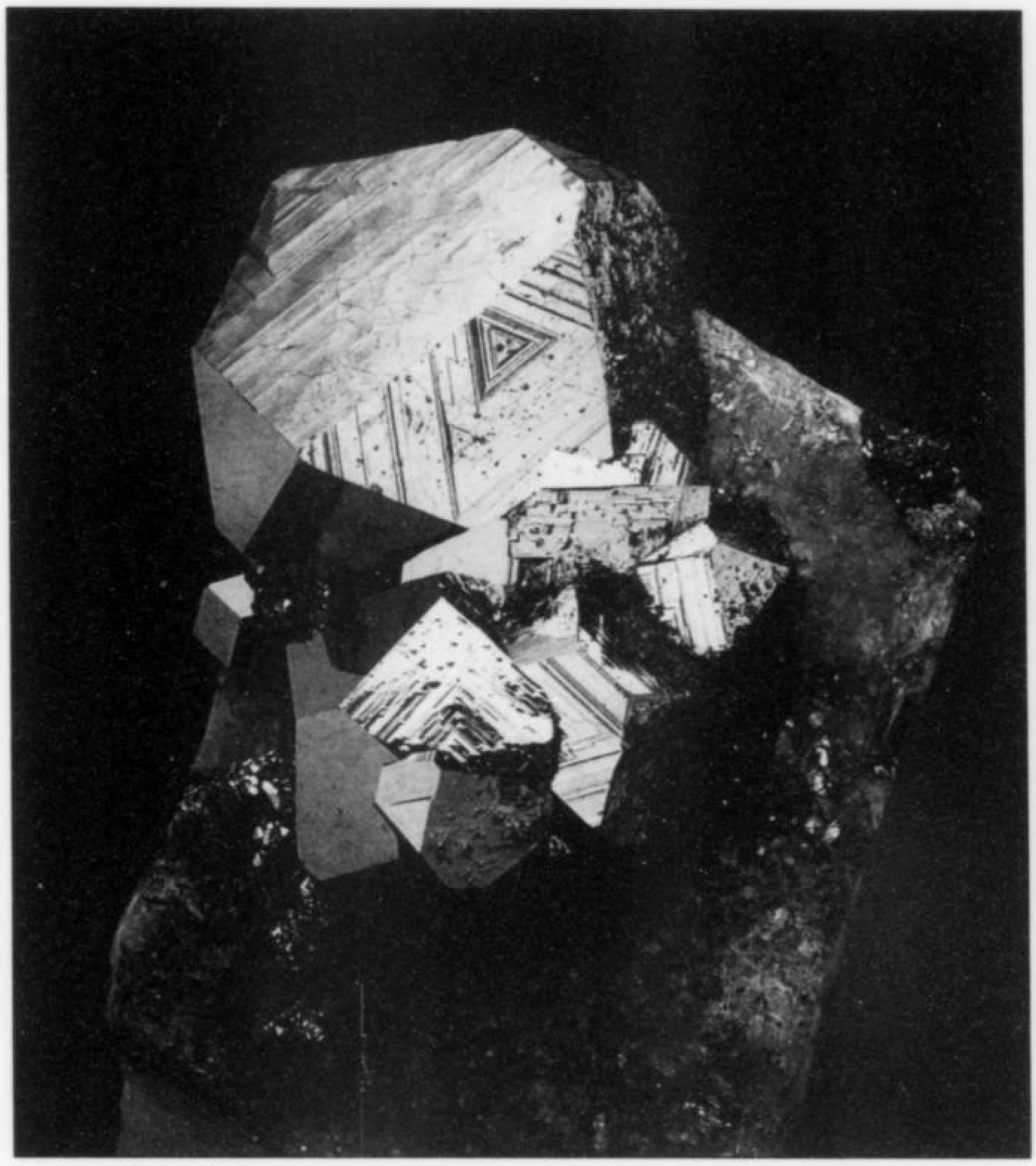


Figure 18. **Carrollite crystals on calcite, 8 cm tall, from the Kamoya II mine, Kambove, Katanga, Congo. Stuart Wilensky and Irv Brown specimen; Jeff Scovil photo.**

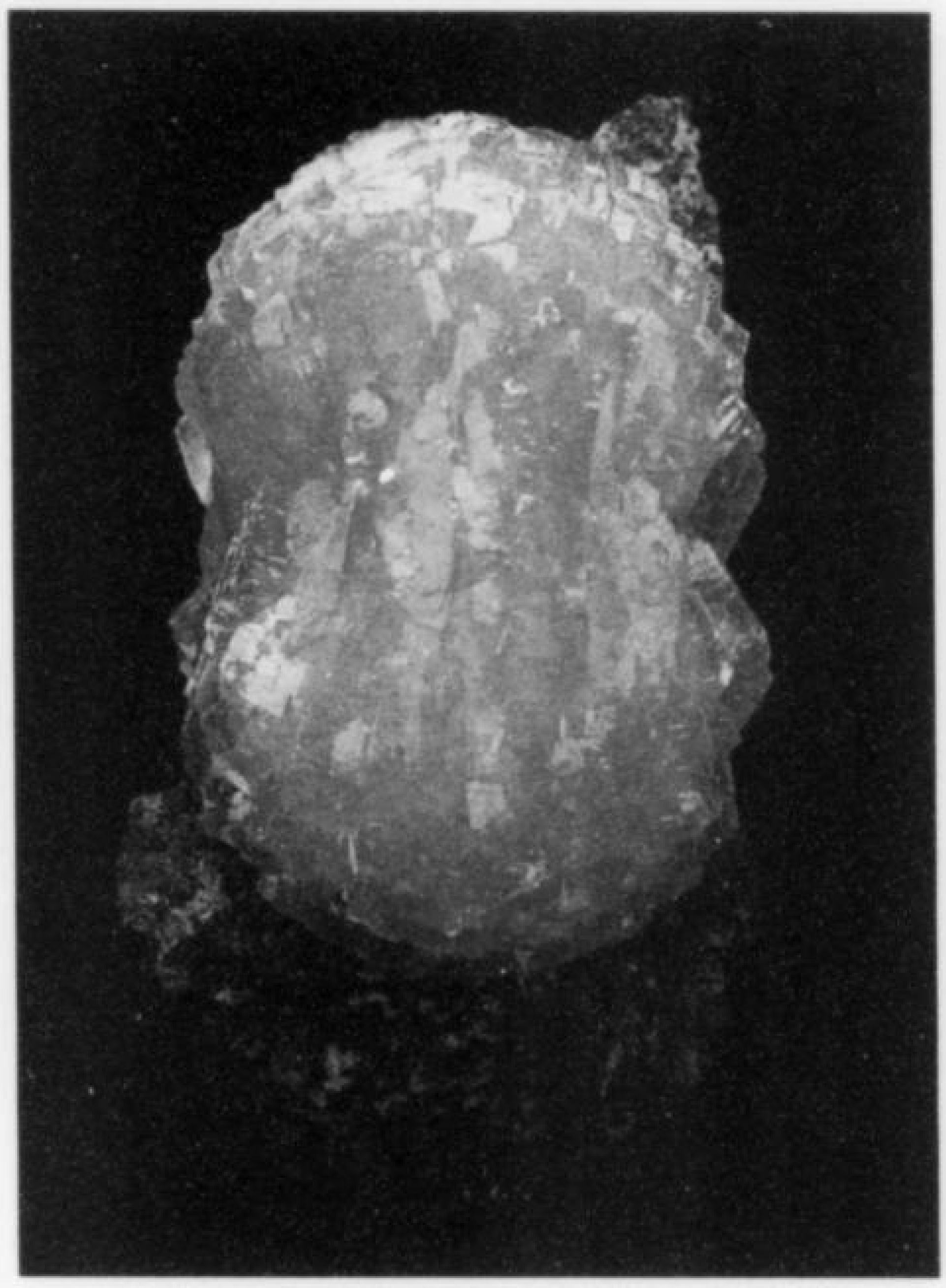


Figure 19. **Poldervaartite, 2.7 cm, from the N'Chwaning II mine, Kalahari Manganese Field, Cape Province, South Africa. Jordi Fabre specimen; Jeff Scovil photo.**

Figure 20. **Pollucite crystal, 2.7 cm, from Apaligun, Baltistan, Northern Areas, Pakistan.** ***Mountain Minerals International*** **specimen, now in the John Taylor collection; Jeff Scovil photo.**

individually; they form sparkling crusts on matrix which reach 8 cm across. These very unusual specimens were to be found in the Executive Inn room of Jaroslav Hyršl (see above under bismuthinite).

Coincident with the "African Minerals" theme at the Main Show, there were many interesting African what's-new items on the market this year. To begin in the north and safari southwards:

Superb **vanadinite** from Morocco, quite common on the market today and taken somewhat for granted by collectors, will some day be looked back upon as one of the great specimen opportunities of our time. Availability, however, tends to be rather sporadic, and there have been significant if subtle color and habit variations from different finds in the Mibladen area (where all of the mines have been abandoned by mining companies and are now worked only for specimens by local free-lance diggers). Last October there was a new find of about 200 specimens from the Coud'a shaft, only 500 meters or so from the well-known ACF shaft, and Jordi Fabre brought a few flats of these new specimens to Tucson. The bright red hexagonal plates of vanadinite are deeply hoppered and brightly lustrous on their narrow prism faces, but in all but a few, early-collected crystals the wide basal pinacoid faces are much less lustrous. Loose single crystals reach up to 5 cm; more common are stacks of parallel crystals, making fine miniatures up to 5 cm high. Other dealers at the Executive Inn, especially Horst Burkhart, and François Lietard (*Minerive*) at the Executive Inn and the Main Show, had fabulous miniatures and big cabinet specimens of the more typical ACF-mine specimens produced by recent digging.

François Lietard also came up with about 20 very fine specimens, large-thumbnail through small-cabinet size, of **wendwilsonite** from the Aghbar (or Arhbar) mine, Bou Azzer, Morocco. François says that the species has been verified by testing as wendwilsonite, not roselite; hereby hangs an interesting tale, however. New mining in rich cobalt ore horizons in the mine between late 1999 and July 2000 encountered some spectacular crystal pockets in dolomite

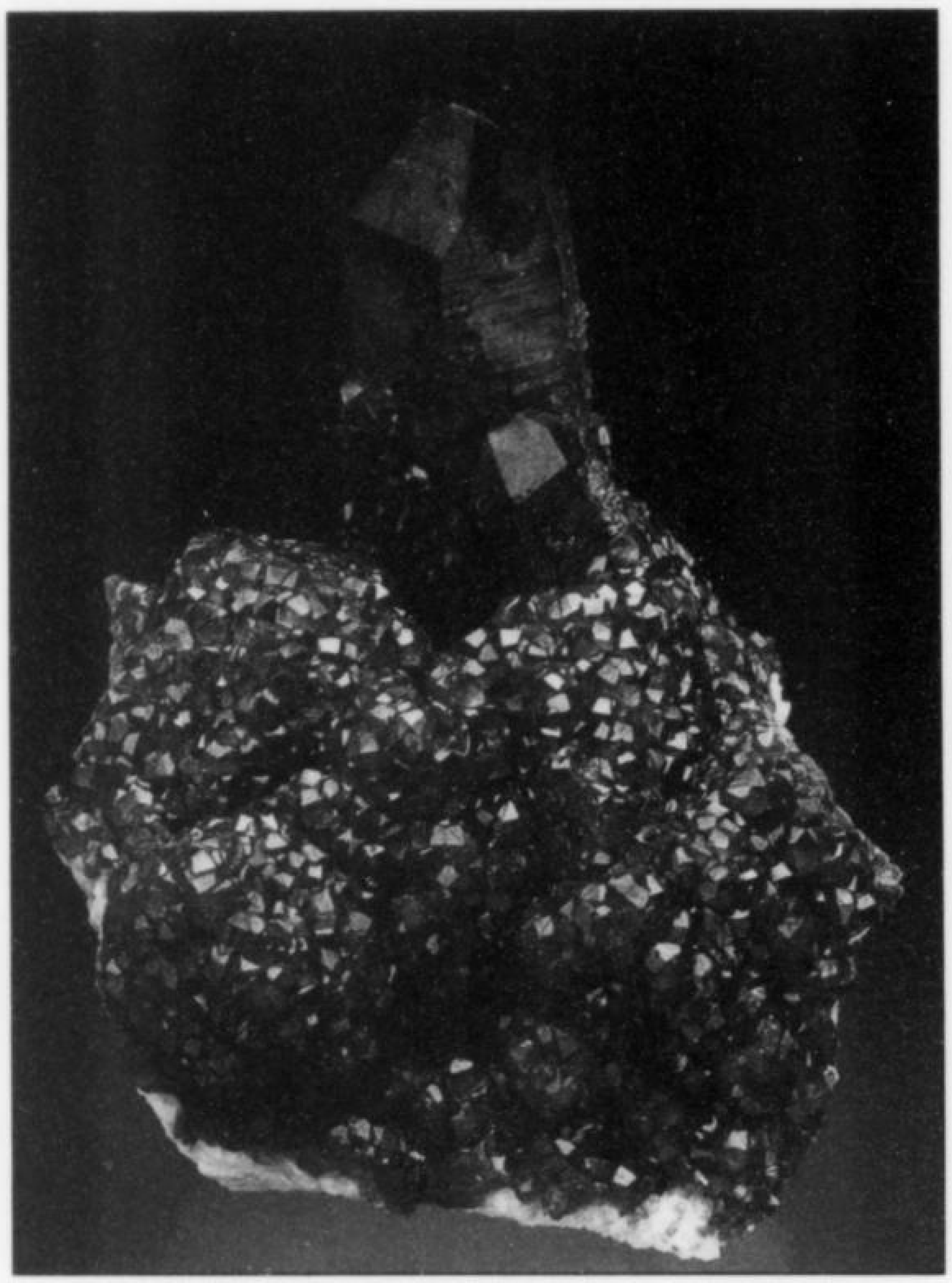


Figure 21. **Drusy spessartine garnet with smoky quartz, 8.5 cm, from the Tongbei area, Yunxiao County, Jujan, China.** ***Collector's Edge Minerals*** **specimen; Jeff Scovil photo.**

gangue in serpentinite country rock. The pockets contained beautiful, transparent and lustrous, rose-red to violet-red crystals to nearly 1 cm forming in druses and isolated sprays against the white carbonate matrix. Recent German work on the crystal chemistry of this material reveals that the crystals, in fact, are intimate mixtures of monoclinic roselite and wendwilsonite and triclinic talmessite and roselite-beta; moreover, individual crystals may be zoned, with very thin, alternating layers of the different species, as magnesium, cobalt, and (in much lesser amounts) zinc substitute for each other in different proportions during crystal growth. In general, the crystals with more of a muddy-brown hue are primarily **cobaltian talmessite,** in some cases intergrown with lesser amounts of **beta-roselite**, while redder, more attractively colored crystals are wendwilsonite, sometimes with roselite intergrowths. The German study concluded that the majority of the crystals from this recent find are, for the most part, wendwilsonite, and can safely be labeled that way. At Tucson, François Lietard had many small and several large specimens of wendwilsonite from this find, clearly the world's best so far for the species, with open seams to 6 cm across sprinkled generously with the glowingly lustrous magenta clusters and individual crystals to 7 mm. Some specimens showing predominantly talmessite were brought in by Ernesto Ossola (Ossola Minéraux, R.N. 86, 30210 Pouzilhac, France) and his new bride Rachida.

A few years ago we were pleased to see fairly large quantities of excellent specimens of **carrollite** coming out of the Kamoto Fond mine, Katanga, Congo [Zaire]; and one year ago we were quite delighted to see even *better* carrollite specimens—mirror-faced, razor-sharp, lustrous metallic white crystals hiding in crannies in coarsely cleavable white calcite—from a locality given as the Kamfundwa mine, Katanga. Well, this year, carrollites of the newer type are both more plentiful and of an even higher quality, indeed virtually off the charts for crystal size, sharpness and luster, although old Congo hand Gilbert Gauthier has a locality correction: the source, he says, is not the Kamfundwa mine but a surface prospect called the Kamoya II, or South Kamoya, mine. The crystals are usually simple octahedrons or, more commonly,

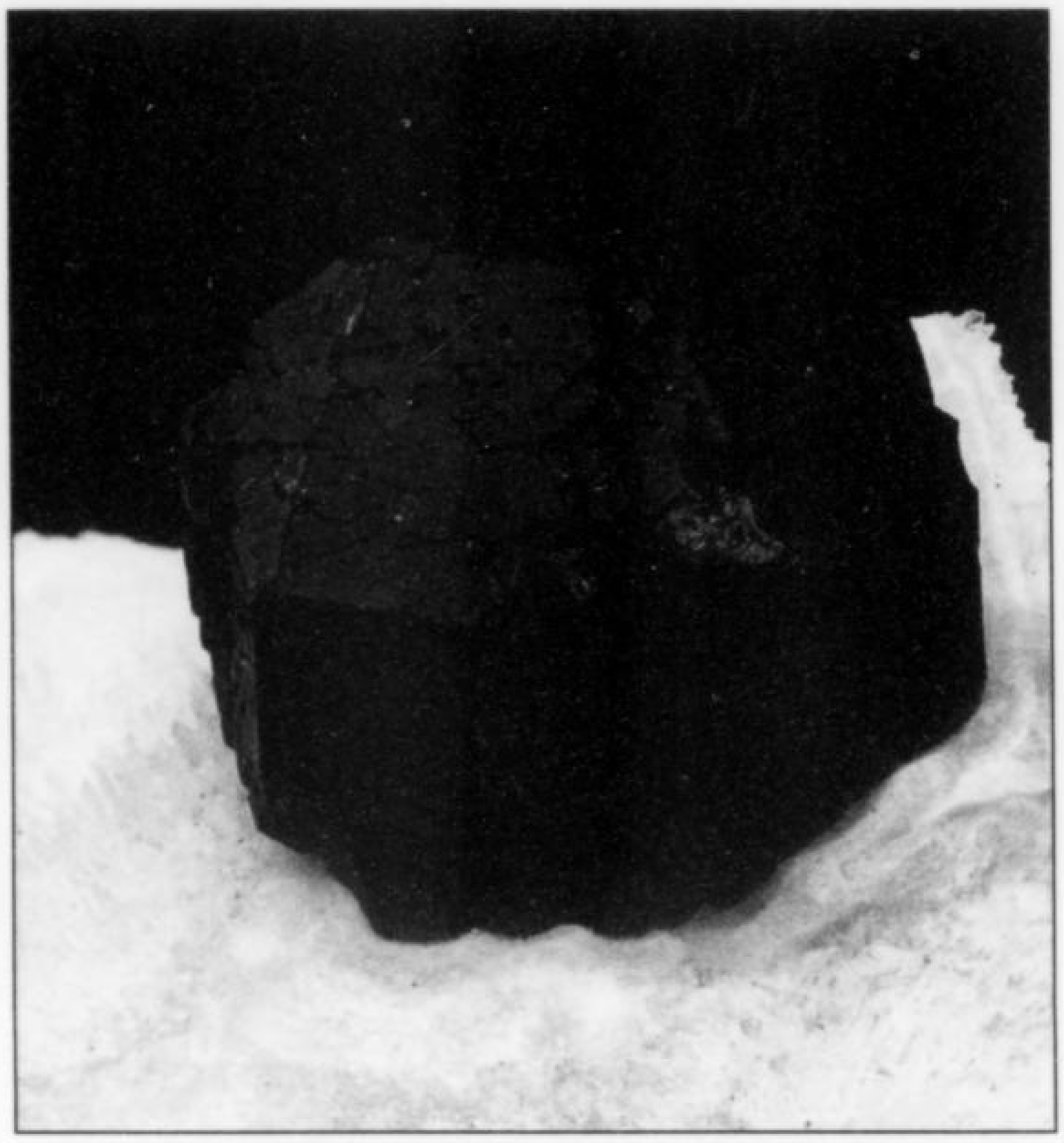


Figure 22. **Fluorite crystal, 3.3 cm, from Yiwu, Zhejiang, China.** ***Collector's Edge Minerals*** **specimen; Jeff Scovil photo.**

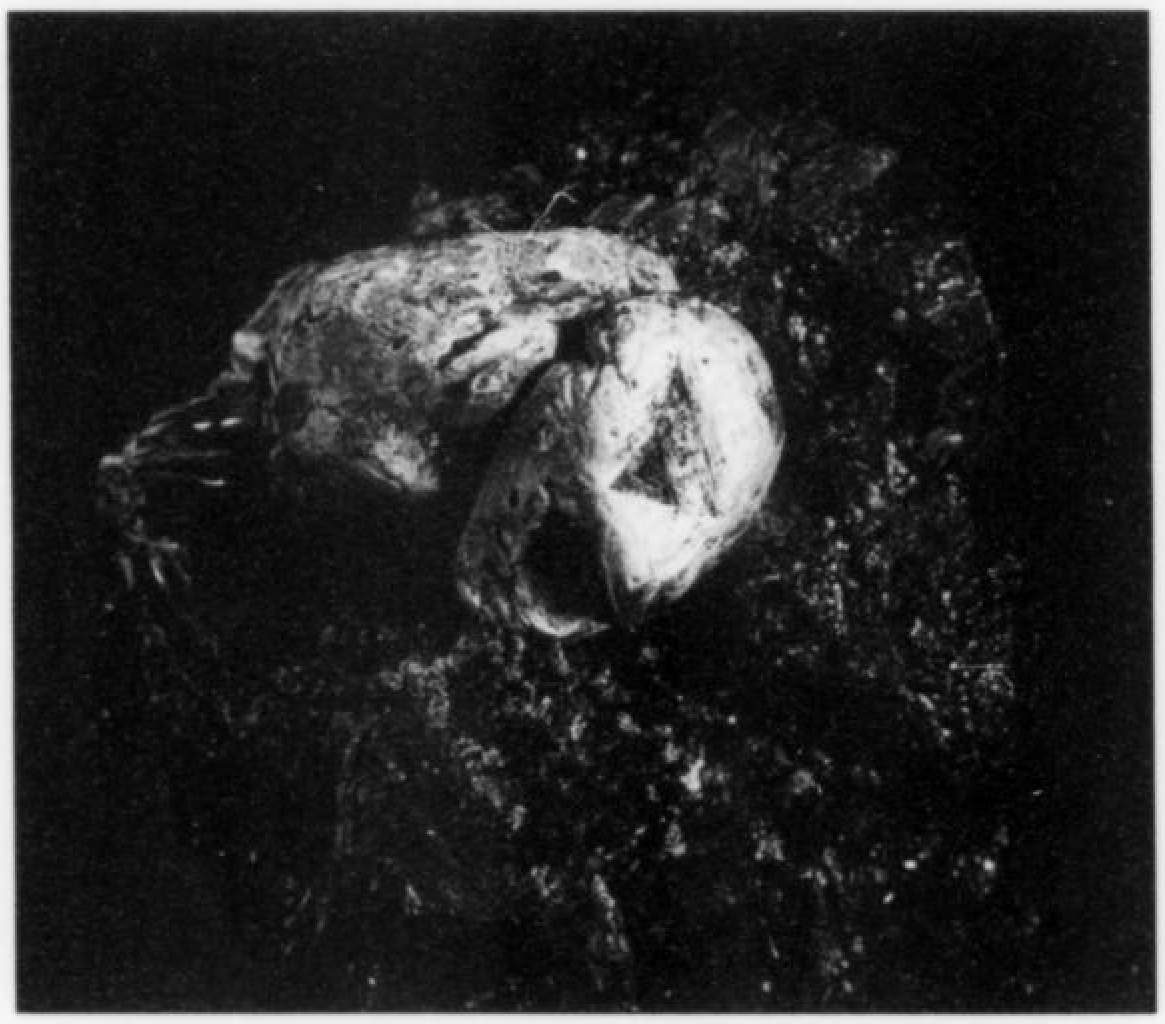


Figure 23. **Pandaite crystals on cassiterite, 3.2 cm, from Ping Wu, Xue Bao Dian, Sichuan, China.** ***The Arkenstone*** **specimen; Jeff Scovil photo.**

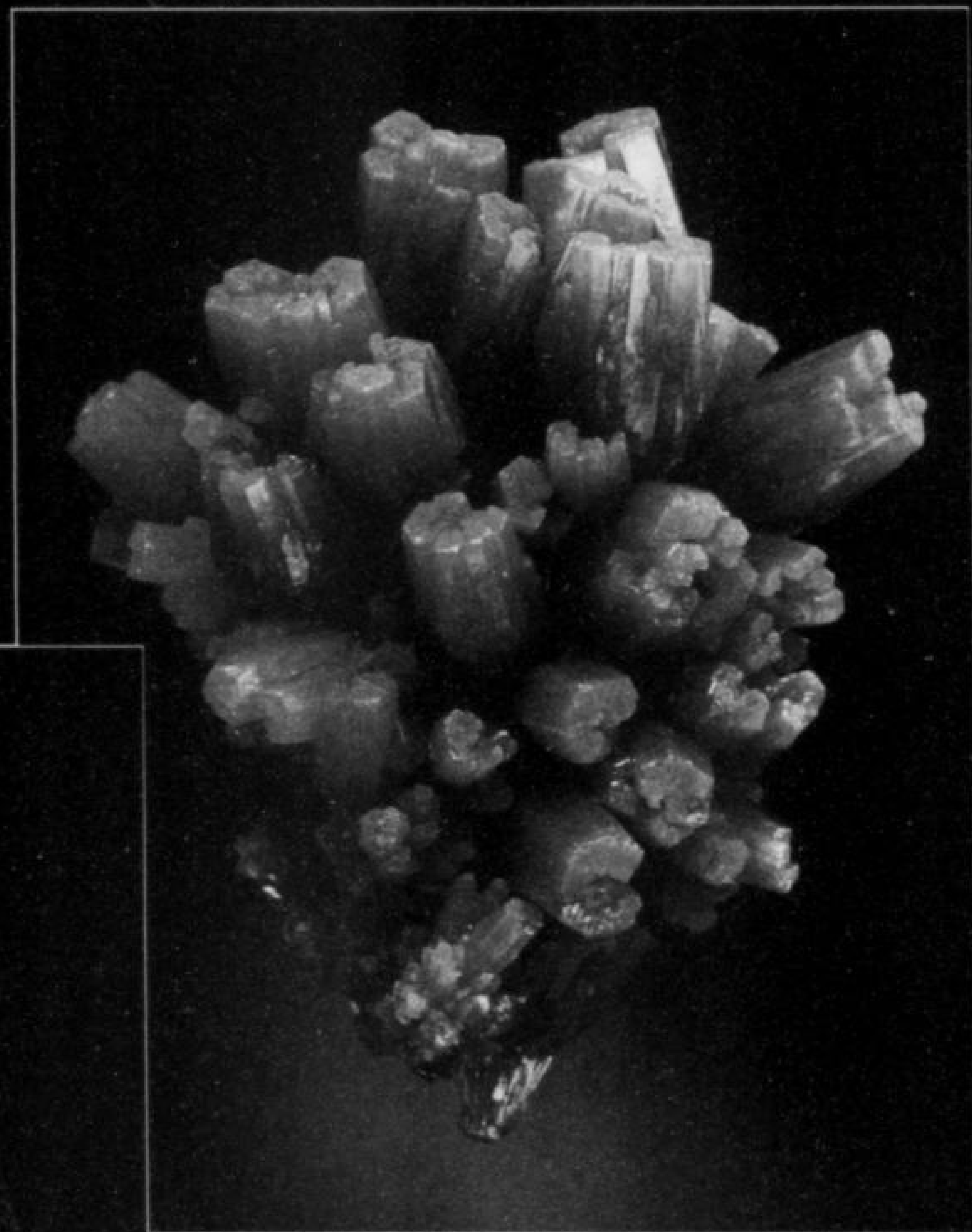
(continued on p. 273)

Jeff Scovil Photo

William Severance Collection

Malachite, 11 cm

Ekaterinburg, Ural Mountains
Russia
Ex William S. Vaux (1811–1882) collection



Pyromorphite, Daoping Lead-Zinc Mine, China, 4 cm

JEFF SCOVIL

Fluorite on Quartz, China, Crystal Size, 3.3 cm

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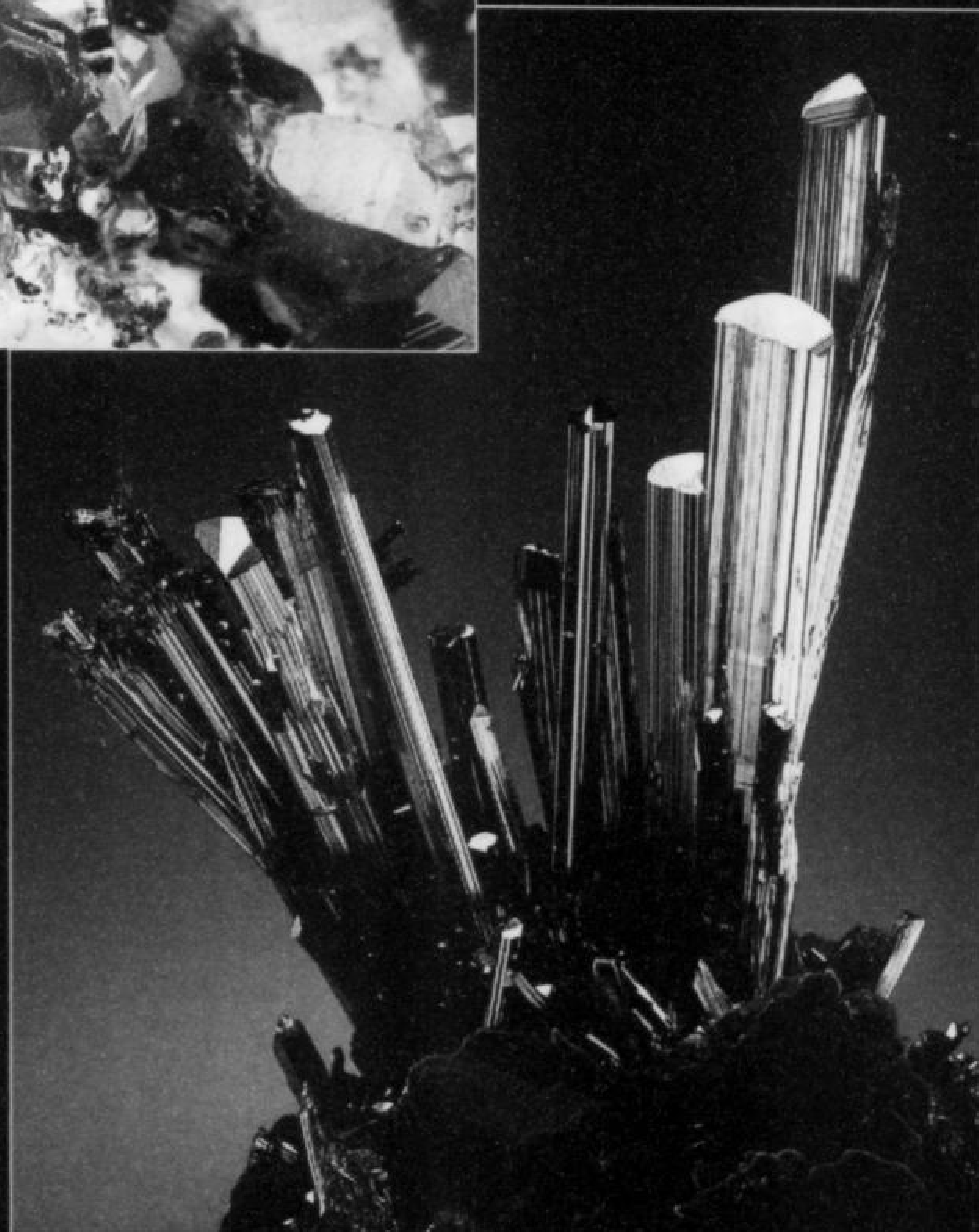
JEFF SCOVIL

Spessartine, Tongbei area, China, Crystal Size 1.5 cm



JEFF SCOVIL

Stibnite on Quartz, Wuling Antimony Mine, China, 20 cm

THE CARNEGIE
MINERALOGICAL AWARD

cuboctahedrons but many are modified by other isometric forms, and though averaging around 1.5 cm they can be nearly the size of baseballs while still being wonderfully sharp and lustrous. The crystals appear to have grown in the interstices between very large (20 to 30 cm?), white, closely intergrown calcite crystals. In most specimens the crystals occur singly or in small clusters, not very firmly attached to the calcite, so that many singles and clusters have become detached in the course of collecting. There is usually a bit of chipping on edges and some contact roughness on some of the sides of the crystals. Many dealers had at least a few specimens, but the Mother Lode was in the InnSuites room of Brice Gobin (Port Inland – 701, Av. Gaston de Fontmichel, 06210 Mandelieu, France). Brice says this is probably the last of the find, since mining has now progressed through and past the productive zone.

Here and there around the show, but particularly in the Executive Inn room of Paul Botha (Southern African Minerals, P.O. Box 12027, Vorna Valley, 1686 Republic of South Africa), one saw nice, newly mined examples of the loose, cyclic-twinned alexandrite **chrysoberyl** crystals which have long been found intermittently in prospects around Fort Victoria (British colonial-era name), now Misvingo, in Zimbabwe. The sharp, equant twin groups occur individually or as clusters, from small to "full" thumbnail-sized; they are modest-looking and somewhat rough-surfaced, but most of them are translucent enough to turn from dark grayish green to strong purple when backlit. Paul had about 25 specimens: quite an impressive lot for this very elusive material.

In the alien territory of the gem/lapidary half of the Main Show floor, Wendell Wilson spotted an exciting hoard of some 300 blue **jeremeyevite** crystals found in two pockets (last April and last October) at the Ameib Farm, Erongo Mountain, Namibia; the occurrence is a pegmatite in the same general area which has lately been turning out so many fine aquamarine and "schorl" (foitite) specimens. The gemmy loose crystals, together with some lovely faceted jeremeyevite gems, were being sold by Charles R. Cecil (P.O. Box 6752, High Point, NC 27262). All of the crystals are sharp, lustrous thin prisms, and many are well terminated on one end (none are doubly terminated). They range from less than 2 cm to more than 5 cm long, and from totally colorless through deep (even faintly lavender) blue; many are color-zoned, colorless to deep blue. They are all more or less facetable and are priced for their gemstone potential, which is significant. This is an exceedingly rare species, very attractive and seductive, and who knows whether we'll ever again get to ogle so many jeremeyevite crystals in one place at one time? An article will appear shortly on the occurrence.

The folks at the Portuguese dealership of Geofil (geofil@geofil.com) had renewed supplies of specimens of the new species **fluornatromicrolite** from Alto Ligonha, Mozambique—see last year's Tucson Show report, vol. 32, no. 3, p. 252. Very sharp, lustrous deep green octahedrons to 2 cm, and less sharp ones to 3 cm, occur partially embedded in albite/ lepidolite matrix in 10 or so major pieces from 2 x 3 to 10 x 10 cm; on a few specimens there are also sharp brown 1-cm crystals of the rare mineral **hafnon** ($HfSiO_4$). These best-yet specimens of fluornatromicrolite were found last October.

Once in a while, a species assumed to be very rare appears in a tiny handful of well-crystallized specimens. Then there is a pause while the mischievous mineral gods prepare their surprise. And then specimens of the same thing come out by the thousands (one thinks of Indian cavansite); collectors are momentarily disoriented but finally as pleased as kids in a candy store, or in this case a South African **poldervaartite** store. This show was awash in specimens of two distinct habits of poldervaartite from the N'Chwaning mine, Kuruman, South Africa, from a series of pockets first hit last October. Dealers carrying this material included Paul Botha (see under alexandrite), Clive Queit (Box 1014, Fourways 2055 Sandton, Johannesburg, South Africa), and Rocko Rosenblatt (438 Southside Spur, Margaretville, NY 12455). In the more common habit, opaque, tan to medium brown, short-prismatic poldervaartite crystals to 1 cm form clusters, spheres and wheat-sheaf aggregates to several centimeters across on reddish black hematite matrix. In the rarer and radically prettier habit, microcrystals of poldervaartite form glistening, glowing translucent spheres of a beautiful orange-pink color, the spheres reaching up to golfball-sized, on the same dark matrix. In a few examples being offered by Rob Lavinsky (*The Arkenstone*), the spheres had resolved themselves into blocky individual crystals up to 2 cm with frosty to fairly lustrous faces and that same luscious, dark orange-pink translucency. Both habits look very different from the stilbite-like crystal groups of a few years ago, which in any case are from the Wessels mine.

Madagascar is prominent in the news this time. First, Maurice Eyraud of *Minerama S.A.* (49, Rue de la République, 42800 Rive de Gier, France) had about 100 thumbnails of sharp, loose, part-gemmy yellow-green twinned crystals of **chrysoberyl** from Ambatondrazaka, most of them V-twins with shallow re-entrant angles on top, or none, and with sharp patterns of chevroned V's down the front. These were taken from two pockets around the turn of the year. Also at this dealership in the Executive Inn there were about a dozen very nice, deep yellow-orange, gemmy, lightly etched crystals of **heliodor beryl** from Fitampito near Fianarantsoa; the hexagonal prisms, to 5 cm high, are singly terminated.

Laurent Thomas of *Tropic Stone* (BP 7688 – Antananarivo 101, Madagascar) had some amazingly sharp, lustrous, lushly colored short-hexagonal prisms of **corundum** newly mined at an undisclosed locality in southern Madagascar. All that's lacking is the transparency that would qualify these as gem-grade sapphires, but the floater crystals, to 3 cm, make excellent corundum specimens, anyway, with their mirror-smooth sides and rich purple-blue color (moreover, some are color-zoned, from blue to raspberry-red). A couple of miniature-sized matrix specimens show the host rock to be a dark silvery gray micaceous schist. Laurent also had a few sharp **euclase** crystals, part of a lot of about 100 found 14 months ago in a pegmatite near Soavinandriana, north of Tananarive. The loose, lustrous, bladed crystals, ranging from 1.5 to 6 cm, are colorless and transparent, with small blue interior spots.

And then there are the extraordinary new **quartz** specimens from two pockets uncovered late last year at Audilamena, Tanatave. The specimens show Japan-law twinned crystals, but these in turn are sceptered or reverse-sceptered, and irregularly amethystine, and some have inclusions of rutile needles; there is uneven color-zoning, and there are odd wormlike twists and meanderings of the shapes, and sometimes areas of a very rich, deep purple color. Bill Larson (of Palagems) had some of the best and the oddest specimens at his stand at the Main Show (some of them reaching 7 cm across or so), while Laurent Thomas had some very cute (if strange-looking) thumbnails, and Rob Lavinsky had some fine examples also.

Trekking on into Asia now, it should be remarked that there's an increasing supply on the market of sharp, lustrous, *very* dark green (uvarovite-green and darker) loose dodecahedral crystals of **"demantoid" grossular** garnet from Soghan, near Jiroft, Kerman Province, Iran. Dudley Blauwet, who had about a dozen small specimens (including sparkling groups of tiny crystals), says that vast quantities of this material are consumed as gem rough for every sharp crystal saved for the likes of us. François Lietard had an extraordinary, spectacularly dark green, complete dodecahedron 3 cm across.

Victor Ponomarenko of *"Axinite PM" Ltd.* (22 A, Rogova str., Moscow, Russia, 123479) had beautiful photos of an unbeautiful landscape, a low hill in a desert near Akdzhalau, Kazakhstan, where an underground mine in a pegmatite has for the last few years been producing nice specimens of gemmy pink **apatite.** The sharp, glassy, simple hexagonal prisms are a pleasingly transparent pink, though the color fades when exposed to sunlight. Most of the crystals, to 4.5 cm, are floaters, but one 2.75-cm specimen has two crossed crystals, one of them doubly terminated, on smoky quartz/sericite matrix.

The Elbrusskiy mine on the Kuban River, 35 km northwest of Mt. Elbrus, North Caucasus, Russia, has for a while now produced brilliant red-orange microcrystal crusts of orpiment. But in April 2000 a pocket in the old lead/arsenic mine was entered, and magnificent crystals of **barite** to 10 cm long fell off the walls, landing at the feet of the surprised miners. The barite crystals are tabular, lustrous, and honey-brown to yellow-brown; the larger crystals are somewhat crazed internally and only partly gemmy, but some 4 and 5-cm crystals are totally gemmy and a bit twisted, so that they vaguely suggest smoky quartz gwindels. A few of the orpiment plates harbor 1-cm barite crystals of this type, as I saw when Nikolai Kouznetsov of *Stone Flower Company* (155 Via de Casa, Fallbrook, CA 92028) pointed them out to me; it was Nikolai who brought these serendipitous barites to Tucson.

An unnamed pocket in the Nikolay mine at Dalnegorsk, Primorskiy Kraj, Russia has just this past autumn produced what are surely among the world's sharpest, snazziest-looking **pyrrhotite** crystals to date. Several hundred specimens of all sizes were taken out, and when Ivo Szegény of the *KARP* dealership (P.O. Box 54, 272 80 Kladno, Czech Republic) brought most of them to Tucson, he won himself a place in show-stopper annals. The pyrrhotite crystals, which reach 10 cm across individually, are extremely lustrous, mirror-faced, sharp bronze-brown hexagonal tablets, associated with equally bright spinel-twinned galena crystals to 3 cm, plus needle quartz, on sulfide matrix. Dazzling little thumbnails may feature either single, upstanding razor-sharp pyrrhotite crystals, or bulging, slightly offset, parallel dinner-plate stacks of crystals; and very little is lost in the way of sharpness or luster even when specimens reach cabinet size. These are simply knockout pyrrhotites, even for Dalnegorsk, which has already been so prolific in supplying this (and many other) species in knockout manifestations.

Collectors who stay in touch with the market between shows may already have seen (at least in pictures on dealers' websites) the new green **fluorapophyllite** specimens found by the thousands last August in a well excavation in the Indian Deccan Plateau. The locality is in the village of Momin Akhada, 5 km west of the town of Rahuri and 50 km north of Ahmednagar in Maharashtra state. While the classic green apophyllite crystals from the Poona/Pashan Hills region have prominent, steeply sloping pyramid faces, such that the crystals rise to a point, these new crystals are simple tetragonal prisms, long or short, terminated by a basal pinacoid face. These crystals are arranged radially in hemispherical clusters on white stilbite, so that you look through square windows all over the cluster surface and down the *c* axis toward zones of deepening green at the base. There may be several discrete hemispheres, each reaching several centimeters across, on matrix plates reaching a foot and a half across. At Tucson, at least 20 Indian and western dealers had miniature to giant-sized specimens of this head-turning stuff. Some of the most dramatic specimens (plus a pamphlet for the Gargoti Mineral Museum, located 120 km from the find) were available from K. C. Pandey of *Superb Minerals India Pvt. Ltd.* (Shyam Castle, Brahmgiri Society, Nasik Road, Nasik – 422 101 India).

National Minerals (209/1673, Motilal Nagar No. 1, Road No. 4, Goregaon (West), Mumbai – 400 104, India) had about 25 large (15 to 30 cm across) **okenite** "geodes" collected in December at the Pathanwadi quarry near Bombay (by the way, Bombay is now officially called/spelled "Mumbai"). The hollow pieces of gray basalt expertly trimmed into ovoid shapes have openings into interiors lined with drusy quartz or milky white stalactitic **prehnite**, on which sit okenite puffballs averaging 2 cm; pearly white spheres of **gyrolite** accompany the puffballs on a few specimens. Since these puffballs occur only in the spilitic basalts around Bombay, and since the Pathanwadi is the last major quarry still working in the metropolitan area, this may be the last significant new find of okenite that we will see.

A last item from India: quarries around Sakur (or Shakur), about 90 km southeast of Nasik, have lately produced another large batch of **heulandite** crystal specimens tinted pale apple-green to dark green by fine-grained inclusions of **celadonite**. *National Minerals* (see paragraph above) had about 50 beautiful cabinet-sized specimens, with individual heulandite crystals to 5 cm, curved and shiny, standing up well on matrix; some crystals also have dustings of dull brownish black microcrystals of **julgoldite**.

Dudley Blauwet, François Lietard and Andreas Weerth are the three most prominent western dealers who have specialized for years in penetrating the wild mountains of Pakistan and Afghanistan to bring out exotic, terrific minerals. In Tucson this year it was a great relief to learn that all three had returned from the war zones with heads still attached to bodies, and it was heartening to see that they'd brought fresh supplies of interesting specimens out. Dudley, in particular, had his best buying trip ever, though it was somewhat harrowing. Here is a quick survey: François Lietard had some brand-new specimens (miniature to cabinet-size) of sharp black **spinel** octahedrons and spinel-law twins in sizes to 4 cm on edge embedded in white marble, with sharp red-brown opaque **chondrodite** crystals to 1.5 cm, from somewhere in Badakhshan, Afghanistan. All three dealers (and Herb Obodda too) had sharp, opaque blue, barrel-shaped terminated prisms of **afghanite** to 4 cm, a few of them gemmy in small areas, in white marble, from Mine #1, Kokcha Valley, Afghanistan. Dudley Blauwet offered loose, partial crystals of milky white to icy-transparent and colorless **petalite** to 15 cm across, from Paprock, Kunar Province, Afghanistan. The photosensitive and intensely fluorescent **sodalite** (generally labeled with the varietal name "*hackmanite*") crystals from Badakhshan which all three dealers had are palest blue-purple to vivid purplish pink. These specimens are at their best when sharply formed, especially the pale lilac-colored translucent ones; a remarkable specimen in the "Giant Crystals" case at the Main Show (see later) proved that sodalite crystals can be up to 10 cm across and still show some mirror-smooth faces.

Jack Lowell (*Colorado Gem & Mineral Company*, Tempe, AZ) was showing around some interesting new specimens of deeply colored **rose quartz**, 3 to 9 cm, from Paroon, Afghanistan, brought out by Haleem Khan of *Hindu Kush Minerals*, Peshawar, Pakistan. The crystal sizes are small but the flowing encrustations of dark pink rose quartz on white quartz are quite attractive.

Most intriguing of all, I think, are the sharp brown crystals of **bastnäsite** which now are more numerous and of *much* higher average quality than previously. Again, all three western dealers, plus some Pakistanis in the Executive Inn, offered these fine crystals, usually loose but occasionally on matrix. Tiny 1-cm hexagonal-tabular floater crystals of bastnäsite are sometimes of a rich orange or yellow color, and totally gemmy; at the other end of the size scale are stout hexagonal prisms with complex low-angle pyramidal terminations to 6 cm. The large crystals are thought to be epitaxial overgrowths of parisite on bastnäsite, and, sure enough, backlighting reveals distinctly lighter brown outer zones over dark brown cores.

A new Chinese occurrence of beautiful transparent green **fluorite** begs notice: the specimens come from a huge pocket hit last October in the Ti mine, near the town of Shan Hua Ling in Hunan Province. Sharp, very lustrous, medium-pale green cubes to 5 cm on edge rest on massive calcite matrix covered by drusy white quartz crystals, and so transparent is the fluorite that one can clearly see the matrix through the "sea of green"; some of these matrix specimens are two feet across, although sizes range down to about 6 cm. Several dealers had these specimens, including some of the Chinese dealers, but Andrew Pagliero of *Nature & Art Company Ltd.* (Steinhwiete 11, 20459 Hamburg, Germany) probably had the most: many flats of smaller pieces, and a huge glass wall case loaded with giants.

Spessartine from China has been prominent on the market lately, and now the *Collector's Edge* dealership has acquired a large supply of very beautiful specimens—together with, at last, reliable and detailed locality data. The specimens come from scattered pegmatite prospects over a large region called the Tongbei area, Yunxiao County, Fujian Province (*not* Guang Dong Province, as some earlier labels said). In their InnSuites room, Steve Behling and Sandor Fuss of *Collector's Edge* had laid out about 10 flats of matrix-plate specimens measuring from around 4 x 4 to 20 x 20 cm, with thick coverages of brilliant cinnamon-colored spessartine trapezohedrons, often with smoky quartz crystals to 4 cm, chalky white feldspar crystals to 1 cm, and tiny-but-sharp greenish hexagonal books of clinochlore, all these over a gray-white pegmatitic rock. The spessartine crystals at their best are extremely sharp, lustrous, well-individualized and gemmy, and can reach 2 cm across; some intergrown crusts of smaller garnet crystals rise from the matrix in blocky forms, being casts after feldspar crystals.

Finally, from near Luc Yen, Yen Bai Province, Vietnam, come some fine, loose, gemmy, trigonally terminated **elbaite** crystals from 2 to 4 cm long, of an unusual brownish green color (kind of an epidote green), with hints of red: about 10 of these crystals were to be found with the *KARP* dealership in the Executive Inn. And from the same Vietnamese locality, *KARP* was offering dark pink, somewhat crude ruby **corundum** crystals to 5 cm embedded in white marble, and a few thumbnail groups of sharp, translucent red **spinel** octahedrons individually to 1 cm, looking very much like the familiar specimens from Burma.

EXHIBITS

Now for the usual all-too-brief listing of some of the terrific exhibit cases at the Main Show. The theme of "African Minerals" inspired exhibits from all of the great museums. Other fine and fun African cases were put in by (in no particular order) Roz and Gene Meieran, Christopher Johnston, Palagems, Ed Huskinson, Wayne and Dona Leicht, the Mineralogical Association of Dallas, Alain Carion (North African meteorites!), Catherine Woest, the Fallbrook Gem & Mineral Society, Steve and Clara Smale, Bill and Anne Cook (all-Madagascar), Bill and Diana Dameron (Mali garnets), Mary M. Murphy (all *pink* African specimens), and Jack and Kaye Thompson.

Three African cases *must* be remarked upon individually. Brice and Christophe Gobin filled a small, simple case with eight unbelievably large and sharp examples of the new carrollite crystals from the South Kamoya mine, Katanga, Congo. The Smithsonian displayed the great 253.7-carat Oppenheimer diamond, a gemmy, lustrous, yellow curved-faced octahedron hailing from (of course) South Africa. And the American Museum of Natural History's case included the enormous and famous Tsumeb azurite specimen called the "Newmont" or "Bird's Nest." In New York I have often marveled at this piece; the card in the case said that it is, for some people at least, the greatest mineral specimen in the world, and staring at it for a while tempts one to concur.

Of the African-themed cases it was "Nature's Art: Tsumeb" by Marshall Sussman that had to be the most beautiful and creative. Each fantastic *large* Tsumeb specimen sat on top of a paint can; each one of five wooden painter's palettes held 12 also-fantastic *small* specimens of a single Tsumeb species; and around the floor of the case were scattered oil-paint tubes and artists' brushes. The total effect was playful and serious at once (and one of the azurites was just about the most *serious* thumbnail I saw at this show).

A spotty listing of some of the more dazzling/intriguing/educational cases on other themes: Ste.-Hilaire minerals, by the Royal Ontario Museum; a "Centennial" case, all in antique brown, and with "antique" specimens, in honor of the 100th anniversary of the A. E. Seaman Museum, Michigan Technological University; specimens from the Arthur Montgomery collection in the Smithsonian; lush, large, rich specimens of gold from the Red Ledge mine, California; "Giant Crystals," by Stuart and Donna Wilensky and Irv Brown; a case of giant gem aquamarines, by Gene Meieran; huge pink elbaites from the Cryo-Genie mine in Southern California self-collected by the people at *Gochenours Minerals*; a calcite case by Rob Lavinsky (awarded the Best Master Case trophy); a case of mind-blowing specimens-from-everywhere which won Danny Trinchillo the Desautels Trophy. Oh yes, and *Collector's Edge* put in a case with two enormous Pederneira mine, Brazil elbaite specimens: the beautiful stalklike gem crystals stuck up and out at all angles from the matrix, but this case was called "Boom," and its text explained that *all* such potential specimens get smithereened by blasting around the pockets, and what gets shipped out is merely cartons of fragments, and that's where the 3-dimensional jigsaw wizards of the Collector's Edge lab take over. I could see no repair sutures on any of the crystals: amazing.

SATURDAY NIGHT

At the Saturday night awards ceremony, John Schneider was presented with the Lidstrom Trophy for best specimen in a competitive case. Danny Trinchillo, as mentioned, won the Desautels Trophy. Marco Marchesini and Renato Pagano won the Friends of Mineralogy Award for the best article in the *Mineralogical Record* for the past year—"The Val Graveglia Manganese District, Liguria, Italy;" Renato (he and his wife Adriana, are our Italian subscription agents) was present to accept. And before all this awarding got under way there was a tribute, with slide show, to mineral collector par excellence Jim Minette of Boron, California, who died of cancer in January. Les Presmyk, Bill Moller and Rock Currier did a fine job, without excess of solemnity, of reminding everyone who had known Jim about why they'd liked him so much, and how devoted to minerals he had been.

The most prestigious award of the year, of course, is the Carnegie Mineralogical Award, given for a person's or institution's general and long-term contributions to mineralogy, mineral collecting, mining, publishing, or education. The *Mineralogical Record* itself, and thereby all of its many contributors over the years, received the Carnegie Award in 1994. It is most fitting that now, on the 25th anniversary year of his editorship, Dr. Wendell Wilson has received it as well. Although Wendell is both my friend and my boss, my objectivity cannot be challenged when I say that this award is extremely well-deserved. To see Wendell receive it made a dynamite finish to a dynamite Tucson Show.

But finish I must: happy spring mineraling to all!

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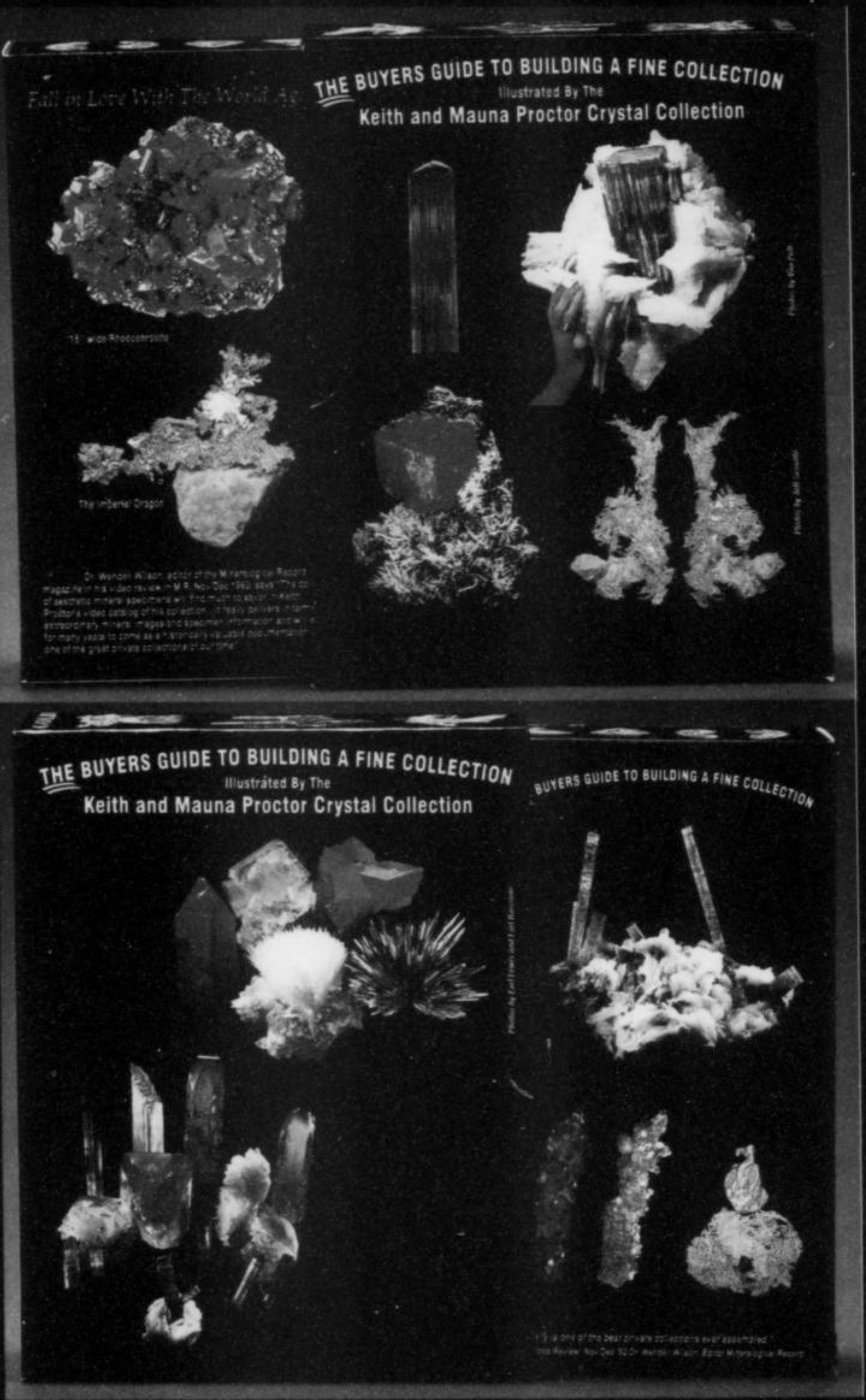

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