GEM NEWS

John I. Koivula and Robert C. Kammerling, *Editors*

TUCSON '89

Every February the editors of Gems News, along with other gemologists, jewelers, gem collectors, and hobbyists, look forward to a trip to Tucson, Arizona, for the annual Gem and Mineral Show. The show—actually a series of several shows held throughout the city—is an excellent opportunity to see the new, unusual, and exceptional in the world of gems. This year was as interesting as ever.

"Angelite." A reportedly "new" gem material seen at Tucson and advertised prominently in lapidary magazines is called "Angelite." The material is semitranslucent, a medium light blue-gray (figure 1). Standard gemological testing, together with X-ray diffraction analysis, showed that the material is anhydrite.

Garnet. African rhodolites were seen in great profusion this year. Many of these stones, ranging from lighter pinks (sometimes called "rose garnets") to medium to dark reddish purples ("raspberry rhodolite"), reportedly came from the Kangala mine in northern Tanzania. A smaller number of exceptionally fine-colored rhodolites were said to have come from the Mwaki Jembe mine in Tanzania. Also seen were dark brownish to orangy red garnets from Mozambique.

In addition, several gem dealers were offering garnets from the Indian state of Orissa. Most were of a color

Figure 1. "Angelite," a medium light blue-gray semitranslucent form of anhydrite, was introduced at the 1989 Tucson show. This specimen is 6 cm in the longest dimension. Photo by Robert Weldon.

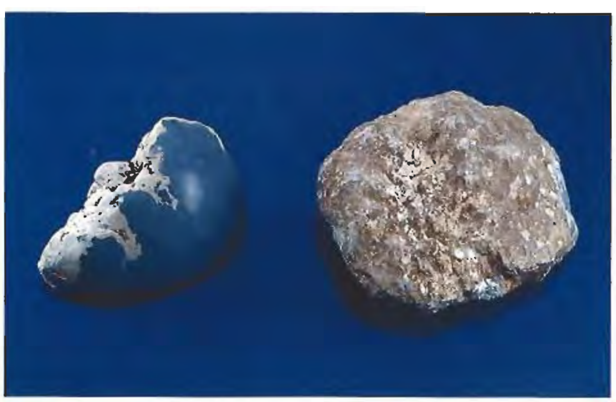

Figure 2. Almandine garnets from the state of Orissa, India, were plentiful at Tucson this year. This representative stone is 10 mm long. Photo by Robert Weldon.

typically associated with almandine. One such stone (figure 2) would be described using GIA's colored stone grading nomenclature as very dark, moderately strong reddish orange. Other garnets, also reportedly from Orissa, were reminiscent of the colors associated with darker rhodolite garnets from Sri Lanka.

Man-made "inclusion" specimens. Among the gemological novelties seen in Tucson this year were two materials with created inclusions. One was a translucent, flat cabochon of blue-green chalcedony with a large dendritic inclusion of the type that has been produced by soaking porous chalcedony in a copper solution, then

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Figure 3. Manufactured three-phase inclusions in quartz obtained at the Tucson show were found to consist of water, a gas bubble, and a small faceted red (as in this 3-cm-high crystal) or blue stone. Photo by Robert Weldon.

Figure 4. This 2.5-cm piece is one of several mother-of-pearl gambling chips, reportedly carved in China in the late 18th and early 19th centuries, that were sold both loose and mounted in jewelry at Tucson. Photo by Robert Weldon.

Figure 5. Remarkably good, one-piece plastic cameos, like these 4-cm-high samples, were among the imitations seen at Tucson this year. Photo by Robert Weldon.

applying an electric current to precipitate out a dendrite of elemental copper. The point at which the electric current apparently has been applied is revealed by a small area on the surface of the stone where the copper extends up from the otherwise internal mass.

The other "inclusion" specimens were colorless quartz crystals with man-made "three-phase" inclusions that were brought to our attention by Michael and Pat Gray. In each specimen, thin tubular columns had been drilled in from the base of the crystals. These had in turn been partially filled with a liquid. The final touch—"phase three"—was a minute faceted gem! In one such specimen the solid phase was a dark blue gem; in the other, a bright red one (figure 3). In both specimens, the bases were sealed with what appeared to be a mixture of small quartz fragments and epoxy.

Mother-of-pearl gambling chips. Among the more interesting materials being sold for use in jewelry were antique mother-of-pearl gambling counters (figure 4). According to the promotional literature that accompanied them, these hand-carved pieces were produced during the Ching Dynasty of China for the East India Trading Company and other European merchants. The majority were reportedly made during the reign of Ch'ien Lung (1736–1796). A heavy carved variety cut from relatively thicker mother-of-pearl was crafted during the rule of Chia Ch'ing, in the early 19th century.

Some pieces, custom made for British royalty and nobility, bear a family crest or initials on one side, while the reverse side portrays scenes from Chinese life. Other pieces depict animals, birds, fish, and insects. The counters were produced in various shapes, each denoting a different denomination.

Plastic cameo imitations. Among the interesting imitation gem materials seen were two types of plastic cameos (figure 5), one resembling a shell cameo and the other reminiscent of a Wedgwood piece. Magnification revealed no separation plane between either figure and its background, indicating that they were not assembled from separate components. Rather, it would appear that the cameos were molded in a two-step process, with the figure portion of the mold being filled first, followed by a pouring of the background material. Furthermore, a swirling of the two colors at the base of the shell imitation indicates that the background had been poured before the figure had "set." An examination of various details on both figures suggested that the two pieces could easily have been produced from the same mold.

Synthetic quartz. Hydrothermally grown synthetic amethyst, citrine, and rock crystal quartz were all easily available this year, although some pieces were being sold as natural. Several small rock crystal spheres, pyramids, and obelisks were seen that were flawless except for the seed plate. Interestingly, many of the faceted synthetics had a small portion of the seed plate directly under and exactly paralleling the table facet. This feature betrayed itself by a near-surface layer of so-called breadcrumb inclusions.

Tourmaline from Nigeria. A number of excellent bicolored tourmalines were seen, reportedly from a mine near Kaffi, Nigeria. Most notable were two emerald cuts weighing 20.71 ct and 58.08 ct. The two colors are best described as slightly purplish red and slightly yellowish green, and are of moderate to strong saturation.

COLORED STONES

A beautiful new form of orthoclase. A phenomenal Australian orthoclase feldspar that shows both a unique pattern of aventurescence (figure 6) as well as the traditional adularescence was recently brought to our attention by two separate gem dealers. Maxwell J. Faulkner, of Banora Point, New South Wales, Australia, first showed this attractive new material to us in fall 1988. He had obtained his samples from Lonny Mason, Alice Springs, Northern Territory, Australia. They had named this feldspar "Rainbow Lattice Sunstone" because of the spectrum of colors seen in reflected light and the lattice pattern of the inclusions.

Initial testing of Mr. Faulkner's samples showed that they were orthoclase feldspar containing crystallographically oriented exsolution inclusions of ilmenite and hematite, which are responsible for the colorful aventurescence.

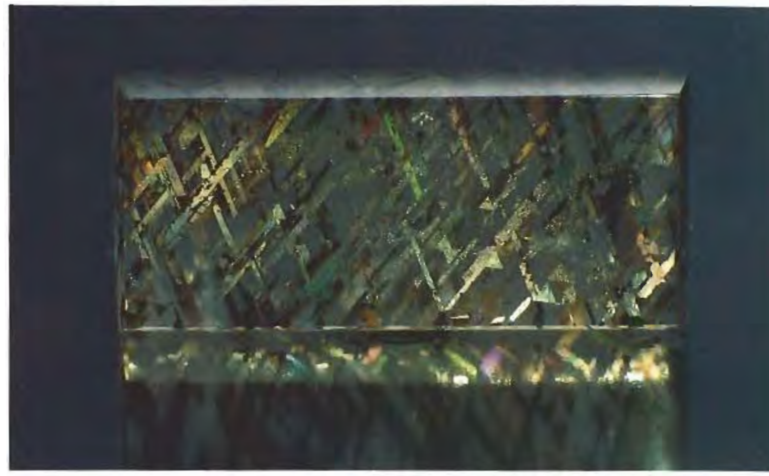


Figure 6. This attractive new Australian orthoclase feldspar, named "Rainbow Lattice Sunstone" by Max Faulkner, shows a unique aventurescence as well as adularescence. Stone courtesy of Bill Vance; photo by Robert Weldon.

Our second exposure to this new aventurescent orthoclase feldspar came through Bill Vance of Hampton, Virginia, who had obtained his material from Darren Arthur of Melbourne, Australia. The feldspars from Mr. Faulkner and Mr. Vance were identical in every respect. According to information provided by Mr. Faulkner, moonstone comes from an area known as the Mud Tank Zircon Field, in the Harts Range area of Australia's Northern Territory, which may be the source of this new material.

New emerald deposit near Nova Era, Brazil. A new deposit of gem-quality emeralds has been found in the Nova Era area of Minas Gerais, Brazil, within several kilometers of the Belmont emerald mine at Itabira and the alexandrite deposit near Nova Era. Reports by David Epstein, Edward Swoboda, and Gerhard Becker, all of whom visited the deposit in late 1988 or early 1989, indicate that thousands of carats of attractive bluish green stones have been produced by this locality at Capoeirana, in the municipality of Nova Era, since concerted mining first began in October 1988. Several stones over 5 ct (see, e.g., figure 7) have been cut.

By January 1989, several hundred independent miners were active at this locality, digging pits and tunnels into the schist (figure 8). A comprehensive report on the deposit is scheduled for an upcoming issue of *Gems & Gemology*.

Record-size spessartine garnet. The existence of a 708-ct transparent, gem-quality, polished spessartine garnet (figure 9) has been reported to Gem News by its owner,

Figure 7. This 7.86-ct emerald is from the new deposit at Capoeirana, near Nova Era. Courtesy of Edward Swoboda; photo by Shane McClure.

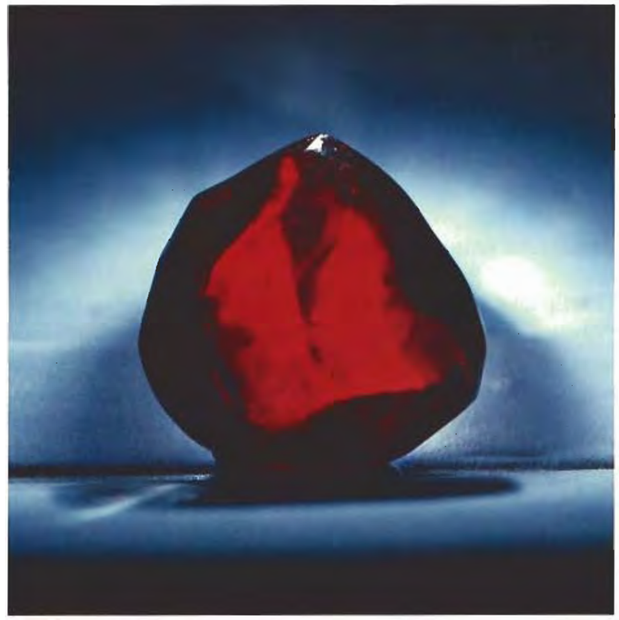
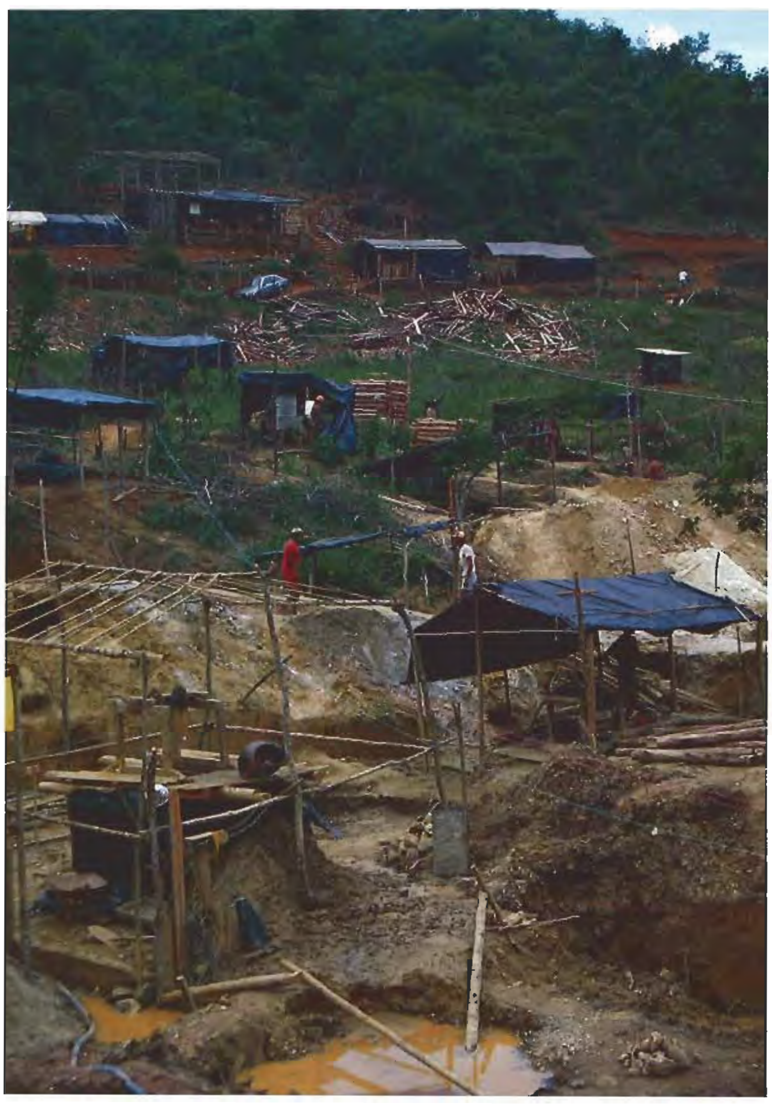


Figure 9. This 708-ct transparent, gem-quality, polished spessartine garnet crystal is thought to be from Brazil. Courtesy of Harrison L. Saunders.

Figure 8. Hundreds of small operations have been set up to search for emeralds at Capoeirana. This January 1989 photo is © Bryan Swoboda.



Harrison L. Saunders of Austin, Texas. According to Mr. Saunders, the rough crystal was acquired from a Brazilian by an American dealer about 16 years ago. When Mr. Saunders purchased the rough garnet he agreed not to facet it, but only to polish the surface.

The polished crystal was subsequently studied by Ed Jonas at The University of Texas at Austin. Dr. Jonas determined the specific gravity to be 4.194; chemical analysis showed that this spessartine contained 16% manganese, 14.2% iron, and a trace of calcium. Our research indicates that this may be the largest polished transparent red gem crystal in the world.

Star almandine garnet from Idaho. The east fork of Emerald Creek in the Idaho Panhandle National Forest near Clarkia, Idaho, is one of two places in the world where star garnets are found with any regularity (the other is India). Every spring since 1974, the stream has been diverted into a metal pipe at the top of the digging area and returned to the streambed at the lower end.

In 1987, 1,027 diggers took out 675 lbs. (305 kg) of garnet, including some very large crystals. In a recent season, five half-pound stones, one a solid dodecahedron, were removed. A group of four permit holders weighed out 16.5 lbs. of garnet from the West Fork in one day.

The Emerald Creek Garnet Area opens for its 16th season on May 27, 1989 (the season ends in September). A $5 permit will allow the removal of up to 5 lbs. of garnet each day, with digging limited to six days, or 30 lbs. of garnet per person each year.

Star rhodolite garnet. While examining some low-quality, facet-grade rhodolite garnet from the Kangala

Figure 10. The Kangala mine in Tanzania is believed to be the source of this unusual 15.60-ct star rhodolite garnet. Courtesy of Barton Curren.

mine in Tanzania, Bart Curren, of Glyptic Illusions in Topanga, California, noticed that some of the material contained oriented long, thin needles of what looked like rutile. The needles appeared to be sufficiently dense that if the rough were properly oriented and cut *en cabochon* asterism might result.

Although star almandine garnets are known from both the United States and India, an East African star rhodolite had not yet been reported, so Mr. Curren cut a sample of the garnet containing the necessary rutile needles *en cabochon*. The 15.60-ct finished stone shows not only pleasing color and a high degree of transparency, but also a very fine four-rayed star (figure 10). Thus far we do not know how much of this material is available.

Wollastonite for carving. White to light greenish gray massive wollastonite (figure 11) is being mined at the White Caps wollastonite deposit in the Viola mining district, 50 miles east of Caliente, Lincoln County, Nevada. According to Gorman Boen, of Gorman Boen Enterprises in Las Vegas, Nevada, the area was first prospected for precious metals before the turn of the century.

The wollastonite, which is marketed as carving material, occurs in the contact zones between altered limestones and volcanics. The wollastonite outcrops for several hundred feet along these contacts, and is compacted into a very tough and fine-grained form nearest the contact borders. Other minerals such as diopside, idocrase, hydrogrossular garnet, and nephrite have been identified with, and sometimes in, the wollastonite. With a good toughness and a hardness of $5^1/_2$ to 6, wollastonite is an excellent carving material.

Figure 11. Wollastonite, a good carving material, is being mined in Lincoln County, Nevada. The largest slab shown here is 10.5 cm long. Photo by Robert Weldon.

INSTRUMENTATION

New developments in spectroscopy. A recent advance in gemological spectroscopy is the Digital Scanning Diffraction Grating spectroscope (figure 12). The DISCAN spectroscope is the result of a cooperative research and development effort between optical engineer Nicholas

Figure 12. The new DISCAN spectroscope has a crosshair scanner coupled with a liquid crystal display so that an absorption feature can be lined up precisely and its exact numeric position (in nm) read in the digital display window.

Michailidis and GIA GEM Instruments. This desk-model spectroscope unit features a magnified spectral field and a crosshair scanner coupled to a liquid crystal display that allows the user to precisely line up on any absorption feature and read its exact numeric position (in nanometers) in the digital display window. The base of the DISCAN spectroscope allows the use of either direct transmitted or oblique reflected light.

During the search to develop a new-generation visible-light spectroscope, GIA's research-and-development team examined a number of interesting approaches. One of these, shown by its developer, Harold A. Oates of Glen Ellyn, Illinois, uses a small fixed-slit, fixed-focus diffraction grating spectroscope attached to a GIA GEM Instruments VideoMaster camera-monitor system, creating a video spectroscope. William Hanneman, of Castro Valley, CA, is now marketing a version of this instrument.

SYNTHETICS AND SIMULANTS

Recent advances in gem diamond synthesis. At an August 1988 conference on diamond optics held in San Diego, California, Dr. S. Yazu, of Sumitomo Electric Industries, reported that Sumitomo has dramatically increased the size of their cuttable-quality synthetic yellow diamonds beyond the 2-ct weight previously reported in *Gems & Gemology* (Winter 1986, p. 192). According to Dr. Yazu, Sumitomo's high-pressure diamond synthesis facility can now routinely grow cuttable-quality synthetic yellow diamond crystals in the 5-ct range.

Synthetic diamonds by detonation. Scientists engaged in a study of the chemistry of carbon in high explosives at Los Alamos National Laboratory have discovered the formation of synthetic diamonds in the course of a high-explosive detonation. Specifically, the detonation of common TNT (carbon, oxygen, nitrogen, and hydrogen) apparently caused carbon clusters to convert to diamond under 250,000 times normal atmospheric pressure at more than 5,000°F (2,760°C). The primary research was done by Los Alamos scientist Roy Greiner while on sabbatical at West Germany's Fraunhofer Institute for Propellants and Explosives. He returned to Los Alamos with the carbon soot residue caused by the chemical reactions of detonation, and had it analyzed with an electron microscope by David Phillips. Twenty percent of the carbon was found to have turned into diamond, a result that was repeated in a number of follow-up experiments. This is the first report of the formation of diamonds caused by the reactions in an explosion. The project is administered by the Los Alamos Advanced Munitions Office.

Synthetic diamond vs. cubic zirconia. Dr. Russell Seitz, of the Harvard Center for International Affairs, has informed GIA that the announcement by the Soviet Union of the successful synthesis of a 2-*kilogram* (not carat) "synthetic diamond" (Gem News, Winter 1983, p. 243) is really about a very large piece of high-optical-quality cubic zirconia.

The original press release came from a Soviet Institute specializing in radio frequency–heated crystal growth. Dr. Seitz saw a photograph of the 2-kg crystal, which had the typical appearance of a rough crystalline chunk of skull melt–grown cubic zirconia. The confusion, apparently unintentional, arose from the fact that there is no clear distinction in the Russian language between the words *simulant* and *synthetic*.

Emerald imitation from quartz. Dr. Henry A. Hänni of the Swiss Foundation for the Research of Gemstones, Zurich, Switzerland, reports that two quartz imitations of rough emeralds were recently identified as fakes in their Zurich laboratory. The two imitation emeralds weighed 228.4 and 94.6 grams, respectively. As can be seen from the photograph of the larger sample (figure 13), they are somewhat convincing to the unaided eye. Careful examination of the two crystals showed that they had been broken and glued back together with a green substance. X-ray powder diffraction was used to identify the material itself as quartz, while the green binder was identified as an epoxy resin by means of infrared spectroscopy. A film of glue over the outside surfaces of the two repaired fakes had been used to create a layer of mica flakes and other bits of crushed matrix in an effort to give the pieces a more natural look and hide the evidence of assembly. According to Dr. Hänni, the purchaser who bought these two fake emeralds in "southern Africa" took a serious financial loss.

In a separate communication, Bill Vance of Hampton, Virginia, reported seeing similar emerald imitations—formed by gluing broken quartz crystals together with a green substance—on a recent trip from Namibia through South Africa. Mr. Vance reported that acetone (fingernail polish remover) easily revealed the dye, and that the stones did not "feel right" when held.

Heat-treated lepidolite? Massive specimens of lepidolite mica, fashioned to have the morphology of single-crystal materials, have been seen at various gem and mineral shows for several years now, perhaps in response to the "crystal consciousness" movement. This year, however, a new twist may have been added. Kenneth Scarratt, managing director of the Gem Testing Laboratory of Great Britain, gave GIA one of these "fashioned" lepidolites that was uncharacteristically dark in color, somewhat resembling massive sugilite. Some vendors of this material state that a color alteration had been effected through heat treatment. As time permits, experiments will be carried out to determine if and how the material is altered.

Imitations from Africa. Bill Vance also reported that in Swakopmund, Namibia, fake diamond octahedra made of synthetic cubic zirconia had been sold to unsuspect-

Figure 13. This 228.4-gram (1142-ct) quartz imitation of emerald proved to be a costly mistake for the person who purchased it in southern Africa. Photo courtesy of Dr. Henry A. Hänni.

ing diamond buyers for as much as US$4,000–$5,000. Also noted was green bottle glass, cut to imitate rough tsavorite grossular garnet, being offered as tsavorite by street peddlers.

"Reconstructed" azurite-malachite. Blaise Harper of Pahrump, Nevada, has kindly shared with Gem News the process used to make "stabilized azurite-malachite block," a new form of compressed and plastic-impregnated azurite and malachite that is just now entering the market. First, chalky-looking porous azurite and malachite nodules are placed in a steel die-set type of mold. Then a hydraulic ram powered by a 600-ton press compresses the nodules into a dense block that is stabilized using the same pore-filling treatment techniques commonly used to stabilize turquoise. The compressed block that results from this process, together with samples of the rough starting material, are shown in figure 14.

The resulting product shows good color, polishes well, and has a toughness that allows it to be readily cut into cabochons. The rough azurite and malachite used in this stabilization process come from Arizona's Prescott-Jerome mining district. Enough material is available to allow several thousand pounds of the compressed azurite-malachite block to enter the market each year.

Figure 14. A block of compressed azurite-malachite, approximately 6 cm in its longest dimension, is shown here with rough azurite and malachite similar to that used to make it. Photo by Robert Weldon.

Synthetic amethyst alert. The International Colored Gemstone Association reports that 20,000 ct of synthetic amethyst are now arriving in New York from Korea every month. Potential buyers should be wary of amethyst being offered for sale at 10% or 20% below current market value. This situation occurred previously with some purportedly "Uruguayan" amethyst that was also offered at bargain prices and was subsequently identified as synthetic.

Mr. Francisco Muller Bastos should have been included in the list of people who received a perfect score on the 1988 *Gems & Gemology* Challenge. We regret the error and congratulate him on his achievement.

IN MEMORIAM: IRWIN MOED, 1918–1988

Irwin Moed, of Theodore and Irwin Moed Inc., died in a tragic automobile accident on October 9, 1988. The Moed firm was one of the first diamond dealers in New York to undertake production and distribution of irradiated diamonds. The open manner in which Irwin and his father presented irradiated stones was an inspiration to anyone who has dealt with the firm, and is always welcome in a highly competitive trade.

Irwin Moed was instrumental in GIA's acquisition of its first Geiger counter, and he and his father donated one of the first treated "raspberry red" diamonds to GIA for study. The absorption spectrum of this stone appears in all GIA illustrations of hand-spectroscope spectra. Additionally, the firm has made available suites of stones that continue to be used in every GIA residence gemology classroom. GIA's Research Department owes a debt of gratitude for study stones loaned and donated.

The business of Theodore and Irwin Moed Inc. will be continued by Irwin Moed's wife and son.