GEMNEWS

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TUCSON '95

In what has become an eagerly awaited annual pilgrimage, Gem News editors traveled to Tucson, Arizona, again this February to attend the many overlapping trade shows in this Southwestern desert community. In doing so, they joined thousands of others—including gemologists, retail jewelers, gem and mineral dealers and collectors—in what is often referred to as the "Tucson experience."

This experience has something for anyone with an interest in minerals and the gem materials that are fashioned from them. The large gem shows, such as the American Gem Trade Association (AGTA) show at the Tucson Convention Center, draw many retailers from all over the world. When that show closes, the Tucson Gem and Mineral Society takes over the same venue for what was historically the main show, the nucleus around which the others have grown. This show draws mineral collectors and enthusiasts, as well as dealers. Then there are shows that cater primarily to fossil dealers and collectors, not to mention the "mom-and-pop" roadside shows where everything from the chic to the cheap is offered in an atmosphere more reminiscent of swap meets than sophisticated jewelry industry events. And, throughout the almost two-week experience, there are classes and lectures for those who wish to combine formal education with buying.

Helping the editors and regular contributors with this Gem News section were Dr. Sang-Ho Lee, Shane F. McClure, Thomas M. Moses, and Cheryl Wentzell, of the GIA Gem Trade Laboratory; and Dr. James E. Shigley, Dr. Ilene Reinitz, Sam Muhlmeister, and Yan Liu, of GIA Research. Because of the scope the 1995 Tucson shows, this report will continue in the Summer issue.

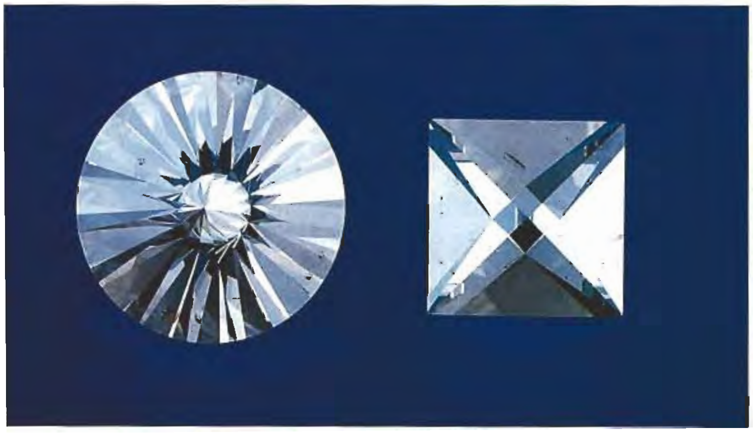

Figure 1. The 1.02-ct round modified brilliant diamond illustrates the new "Spirit Sun" cut; the 0.51-ct diamond is a "Context Cut," a type of square faceted octahedron. Courtesy of Figg Inc.; photo by Shane F. McClure.

DIAMONDS

New diamond cuts. Two new trademarked faceting styles for diamonds, produced in cooperation with world-famous gem designer Bernd Munsteiner, were debuted in Tucson by Figg Inc., of Fairfield, Iowa. Company president Guido Figdor loaned the editors one sample of each cut (figure 1) for examination.

The "Context Cut," a square faceted octahedron, has four crown and four pavilion facets and a faceted girdle; there is no culet and no table facet. Although not mentioned in their accompanying promotional brochure, this cut is reminiscent of the earliest fashioned diamond, the point cut, which was reportedly first produced before the 14th century. On the sample provided, pavilion angles were 40° and the crown angles were 23°, 25°, 27°, and 25°. The various crown angles cause the pavilion apex to be slightly misregistered from the crown apex, producing the appearance of a four-pointed star within the stone. According to the manufacturer, each "Context Cut" diamond comes with documentation detailing where the stone was cut and the weight, size, color, "purity," designer of the cut, manufacturer, jeweler, owner of the finished piece, etc. Reportedly, only octahedral rough is used.

The "Spirit Sun" cut is a round modified brilliant. Both crown and pavilion are cut with 16 equal main facets, again without culet or table facets. On our sample, the crown angles were 20°, and the pavilion

Figure 2. This 2.46-ct. cat's-eye emerald (7.38–7.89 × 5.61 mm) is from Santa Terezinha, Brazil. Courtesy of David Kaassamani; photo by Shane F. McClure.

angles were 42°, creating the illusion of a round disk, surrounded by bright rays, at the center of the stone. Michael Good Designs, of Rockport, Maine, has used these cuts in new jewelry designs, with a two- or three-point "Paragenesis" setting (similar to a tension setting).

COLORED STONES

Large apatites from Madagascar. For several years, highly saturated greenish blue to bluish green apatites from Madagascar have been available at the Tucson shows (see, e.g., Spring 1994 Gem News, pp. 50–51). Almost all the material the editors saw before this year's Tucson show had been fairly small, with cut stones typically no larger than about 2–3 ct.

This year, however, we saw some significantly larger faceted stones. For example, Neal Littman, of San Francisco, showed one of the editors a 40.25-ct. faceted bright greenish blue stone; Mark H. Smith, of Bangkok, Thailand, had a 47.62-ct stone; and the firm Jonte Berlon of Poway, California, had a few cat's-eye apatites in the 10-ct range, as well as three faceted stones in the 18–36 ct range and one of 153 ct. Thomas M. Schneider, of San Diego, California, explained that fairly large crystals have been mined for years from the deposit. However, as noted in the above-referenced item, this material was being heat treated as soon as it came out of the ground, on large circular steel plates placed over open fires. This treatment method caused the heat-sensitive apatite crystals to break into many fragments, the source of the many small stones. Some time in 1994, however, dealers began purchasing untreated crystals at the deposit and having them heated outside Madagascar under more controlled conditions. (See additional entry on Madagascar gems, below.)

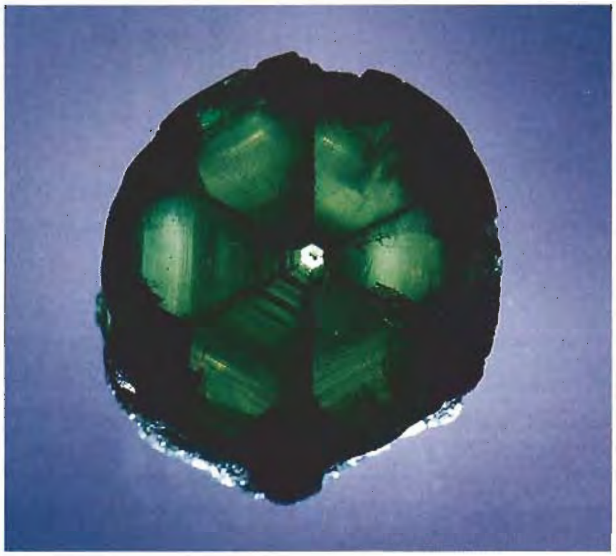

Figure 3. Note the distinct "spokes" in this 59.04-ct elongated trapiche emerald crystal from Colombia. Courtesy of Guillermo Ortiz; photo © GIA and Tino Hammid.

Diaspore from Turkey. A number of vendors featured the color-change diaspore from Turkey described in the Winter 1994 Gem News section (pp. 273–274). Mine Design, of Clarence, New York, had some 50 faceted stones, ranging from 1 to 8 ct. They also had a number of cabochons, the largest of which was a 22.72-ct flat, "bullet" shape. Two of the cabochons were chatoyant.

Stephen Kotlowski, of Golden Land Trading Company, Newburgh, New York, was marketing diaspore that he had fashioned. Stones ranged from 1.79 ct to over 20 ct; among the largest were a 26.06-ct "apex fan cut" and a 29.04-ct antique cushion cut. Commercially significant reserves of this material exist, according to Mr. Kotlowski.

Cat's-eye and trapiche emeralds. In both 1993 and 1994, we saw and subsequently reported on cat's-eye emeralds from the Santa Terezinha area of Brazil. This year, David Kaassamani, of South Lake Tahoe, California, had some attractive cat's-eye emeralds from this source (see, e.g., figure 2); the largest was a 9.47-ct stone from the Vienna mine. Also from that mine was a 5.93-ct emerald cabochon with a somewhat indistinct but complete six-rayed star. Colombian dealer Gonzalo Jara showed us a 3.23-ct light-toned emerald that also had weak chatoyancy, found in a parcel of nonphenomenal cabochons from Cosquez, Colombia.

Among the attractive trapiche emeralds seen were a matched pair of heart-shaped cabochons with a total weight of 24.71 ct, offered by Eminent Gems, of New York. We saw an exceptional 59.04-ct columnar trapiche emerald crystal (figure 3). It was interesting to note the great variation, along its length, in the concentrations of carbonaceous inclusions producing the "spokes."

Emerald necklaces fashioned in India. One of the more striking pieces of jewelry encountered was a necklace of 24 large emerald beads with a total weight of about 1,200 ct. Although the stones were somewhat light in tone, all were highly transparent and well cut. They were of Colombian origin and had been fashioned in India in 1994, according to a representative of Fine Emerald, New York. There was a smaller (294 ct total weight) rope-strung emerald necklace consisting of similar good-quality, well-made beads.

Garnets from Mali. The Winter 1994 Lab Notes section (pp. 265–266) contained an entry on a rough grossular-andradite garnet reportedly from the Republic of Mali in Western Africa. A number of dealers offered similar material at Tucson, also described as from Mali. Thomas M. Schneider had a dozen or so faceted stones that ranged from light greenish yellow to medium brown, and a 200-ct parcel of small "cobbed" rough that would produce finished stones of 1 ct or less. Mr. Schneider said that approximately 300 kg of these garnet crystals had just been received in Australia. Some 3 kg (15,000 ct) of very gemmy facet-grade material was quickly gleaned from this lot, and good cuttable material is still being recovered from the remaining lower-quality crystals. The firm Herman Lind II, of Idar-Oberstein, was also offering faceted material.

At various booths, we saw large, opaque, euhedral garnet crystals from this locality. One dealer, David Bunk Minerals, of Wheat Ridge, Colorado, also had a small collection of other mineral specimens from Mali: epidote, vesuvianite, and vesuvianite with prehnite; another, Azizaj Minerals of Ennepetal, Germany, had small quartz crystals (similar to "Herkimer diamonds") reportedly from a locality near the garnet deposit.

Fashioned natural glasses. Iridescent "rainbow" obsidian, which we first described in the Summer 1993 Gem News section (p. 133), was available from several dealers and in a variety of fashioned forms. Carvings included both geometric and representational shapes, an example of the latter being fish figurines sporting iridescent scales. Slightly domed tablets, free forms, and oval cabochons were among the pieces fashioned for jewelry. Some of the oval cabochons, offered by Gem Marketing International, of Rockville, Maryland, were fashioned to show the iridescence as a somewhat diffused chatoyant band. We also saw carvings in non-phenomenal black obsidian and carvings exhibiting a golden sheen. One vendor had models of tetragonal crystals fashioned from obsidian, approximately 12.5 cm (5 inches) long.

Other types of natural glasses were seen in both rough and fashioned form. These included moldavite, a grayish green material from what is now the Czech Republic; and Libyan Desert glass, a pale yellow material that is reportedly nearly pure silica (see, e.g., Webster and Read, *Gems*, 5th ed., Butterworth and Heinemann, London, 1994, p. 293). The desert glass reportedly was collected by the vendor in western Egypt's Libyan Desert.

Fashioned "rainbow" hematite. When the Fall 1993 Gem News entry on iridescent "rainbow" hematite from Brazil (pp. 209–210) was written, most of the material seen by the editors was in rough form. Not anymore.

Bill Heher, of Trumbull, Connecticut, was offering fashioned material that included individual free-form tablets and matched pairs (see, e.g., figure 4). As

Figure 4. Iridescent "rainbow" hematite is now being used in jewelry. These pieces were fashioned by Bill Heher; courtesy of Zoltan David. Photo © GIA and Tino Hammid.

Figure 5. This 1.33-ct iolite (7.63–7.77 × 5.11 mm) was fashioned from material mined at a new locality, Ambovombe, in the far south of Madagascar. Photo by Maha DeMaggio.

the phenomenon displayed by this material is confined to the surface, the fashioned pieces, which measured about 2 to 2.5 mm thick, were backed with a similar thickness of agate for additional strength. In this backed form, according to Mr. Heher, the material appeared to be quite durable and had presented no problems during setting.

Rainbow hematite has drawn the attention of some respected jewelry designers. Zoltan David, of Austin, Texas, indicated that he was designing a line of jewelry incorporating it.

Iolite and other gems from Madagascar. One gem we saw for the first time this year was iolite from Madagascar. The material was only discovered in 1994, at a locality called Ambovombe in the far south of the island nation, according to a representative of Le Mineral Brut, Saint-Jean-le-Vieux, France. Although many crystals have been found, he reports, they are typically very highly included, greatly reducing the yield of facet-grade material. Nevertheless, the firm was offering faceted stones up to 2–3 ct as well as some interesting small (about 1 cm) cubes, fashioned to display the material's strong pleochroism.

One round brilliant (figure 5) was purchased for gemological characterization. Properties determined were: R.I. = 1.536–1.548; birefringence = 0.012; S.G. (determined hydrostatically) = 2.59; strong trichroism in colorless, light bluish violet, and medium violet; inert to both long- and short-wave UV radiation; and a weak absorption spectrum typical of iolite (see, e.g., R. T. Liddicoat's *Handbook of Gem Identification*, 12th ed., 1990, p. 146). All these properties were consistent with those reported in the literature, although the birefringence was somewhat higher than the 0.008–0.009 that is typical for transparent iolite.

Another vendor, Saint-Roy Gems and Minerals, of Antananarivo, Madagascar, and Paris, France, was offering petrified wood from the Morondavo region. We also saw two feldspar gems—yellow orthoclase and phenomenal labradorite—as well as semitranslucent-to-opaque, well-formed hexagonal tabular crystals of ruby and transparent purple scapolite crystals.

Some blue sapphires of good color were available from Madagascar. A report on their gemological properties will appear in the Summer 1995 Gem News section.

Iolite and other Orissa gems. Last year's Tucson report mentioned at least eight gem materials from the Indian state of Orissa. Many of these were seen at the show again this year, including significant amounts of iolite, much of it calibre cut. We found that in the great majority of cases where the source of iolite was identified, that source was Orissa.

The Orissa area is actually producing an even greater variety of gems, according to Ashok Kaushik, president of Orissa Gems, Jaipur, India. Available at his booth were rubies, opaque blue sapphires, alexandrite (up to several carats, with a good color change), very nice cat's-eye chrysoberyl, aquamarine, small amounts of green and yellow beryl, emerald (including some crystals of good—but not exceptional—color), amethyst with good color, green tourmaline and indicolite, cat's-eye sillimanite, dark brown sphene, pink zircon, dark green apatite, and pink fluorite of very good color. Rhodolite and hessonite garnets were both available in large quantities. The hessonite was generally highly transparent, lacking the "roiled" appearance of Sri Lankan stones. Also seen was some irradiated blue topaz, the starting material for which reportedly came from Orissa.

Cat's-eye quartzes from Orissa were also available. According to Michael Randall, Gem Reflections of California, San Anselmo, his material came from an area that also produces the cat's-eye chrysoberyl. In general, cat's-eye chrysoberyl seen this year was of far better quality than that seen in past years. We also saw a few cat's-eye alexandrites, some with a fairly dark body color and prominent color change.

Temple Trading, of Encinitas, California, had cat's-eye diopsides from Orissa with a much purer and somewhat lighter color than what is typically seen. When illuminated from above, these stones exhibited a bright, medium-dark-green body color and a lighter, distinctly green chatoyant band. This material reminded the editors more of cat's-eye tourmaline with an atypically sharp eye than of the usual Indian cat's-eye diopside.

More meteorite products. In our 1993 Tucson report (pp. 55–56), we noted the availability of extraterrestrial materials. These included jewelry set with "Gibeon class" iron-nickel meteorite slices from Namibia and free-form "gems" fashioned from the large pallasitic meteor found in Esquel, Argentina. Both at the 1994 show and again this year, the editors saw these and several other meteorite materials being offered by the firm Robert Haag Meteorites, of Tucson. Among the specimens were pieces from the pallasitic meteorites that struck near Mount Vernon, Kentucky (in 1868), and near Brahin, Russia (discovered in 1810). Also offered were pieces of the nickel-iron meteorite that fell near Odessa, Texas, about 50,000 years ago; this material exhibits the same "Widmanstätten" lines that are seen in the Namibian material (see Summer 1992 Gem News, figure 6, p. 133). New "products" fashioned from nickel-iron meteorites include spheres, finger rings, guitar picks, and buttons.

This year, we also saw a material that superficially resembled pieces of a peridot-containing nickel-iron pallasitic meteorite. These specimens of peridot in basalt matrix from San Carlos, Arizona, had been coated with shellac. Although the purpose of the treatment was to keep the small, fragile peridot crystals from separating from the matrix, the coating gave the basalt a metallic appearance.

Miscellaneous notes on peridot. As is often the case, much of the larger high-quality peridot seen in Tucson was reportedly from Myanmar. Gem Tech, of New York City, showed off three attractive stones—weighing 45.87, 49.47, and 61.16 ct. Andrew Sarosi, of Los Angeles, had a nicely cut rectangular cushion weighing 57.82 ct. Direct Gems, of New York, had a 47.25-ct cushion cut and three other stones in the 20+-ct range.

Peridot from a new source, Pakistan (Fall and Winter 1994 Gem News, pp. 196 and 275, respectively), was seen for the first time at the Tucson shows this year. Dealers included John Bachman, of Boulder, Colorado, who had two well-cut 27-ct stones; Jonte Berlon Gems, which had about a dozen stones in the 3–8 ct range; and Shades of the Earth, of Phoenix, Arizona, which provided information for the previously cited Gem News entries and had a large selection of this material. Pala International, of Fallbrook, California, had a nice selection of about 50 stones. The largest weighed 74.5 ct. "Peridot from Pakistan," a report in the January 1995 *Gem Spectrum*, the firm's newsletter, said that the material is similar to peridot from Myanmar and Egypt (Zabargad Island) because it forms in pockets in high-temperature veins. This mode of formation explains why the new Pakistani material often occurs in large, transparent, euhedral crystals—in contrast to peridot from localities such as San Carlos, Arizona, where the material forms as xenocrysts in basalts. The largest faceted peridot we have seen to date from this locality was offered at Tucson by the firm Gebr. Henn, of Idar-Oberstein, Germany. This exceptional cushion-cut Pakistani gem weighed 309.90 ct. Gebr. Henn also had another cushion cut of 108.37 ct and a 125.25-ct round brilliant cut.


Figure 6. Russia is the source of this polished 58.22-ct "strawberry" quartz crystal. Courtesy of Judith Whitehead; photo © GIA and Tino Hammid.

Many crystal specimens of Pakistani peridot were available at the mineral show. We noted that some had very large, acicular inclusions (see, e.g., Winter 1994 *Gems & Gemology*, p. 275).

"Strawberry" quartz and other Russian gems. Natural and synthetic gem materials are coming from Russia and other republics of the former Soviet Union at what appears to be an ever-increasing rate (see also entries elsewhere this section). This trend was again evident at Tucson. The drusy uvarovite garnet described in our Tucson '94 report (Spring 1994 *Gems & Gemology*, pp. 53–54) was available in both rough and tablet form (including matched pairs for use in earrings) from several dealers. Interestingly, some dealers were marketing this material by the square centimeter.

One Russian gem seen at Tucson for the first time was "strawberry" quartz. Short crystals with polished faces (figure 6) were offered by Judith Whitehead, of San Francisco. The color-causing inclusions in this material seemed to be a lighter and more saturated color than that seen in similar material from Mexico. With magnification, however, the inclusions appeared to be goethite and lepidocrocite, the same minerals found in the Mexican material.

Also encountered was Russian amazonite, as large tumbled pieces and steep-angled pyramids (fig

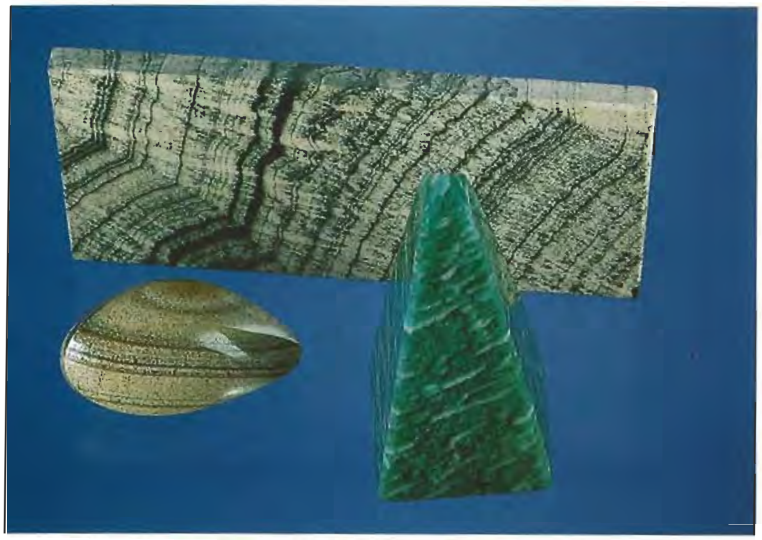

Figure 7. This amazonite pyramid is from an unspecified locality in Russia; the skarn cabochon and slab (10.3 × 5.0 × 0.5 cm) are from the Primorye region of Siberia. Photo by Maha DeMaggio.

ure 7). This rough material appeared to have a stronger "pure" green component than most amazonite, which is typically green-blue to bluish green. According to the vendor, Marco Schreier of Renningen, Germany, the material will be marketed as cabochons.

Yet another ornamental material being sold this year was skarn from the Primorye region of Irkutsk in Siberia. This opaque material has a light tan background with gray to green markings. Depending on the orientation in cutting, these markings appear either as concentric circles or as stripes (again, see figure 7). According to promotional material provided by the vendor—White Nights Company of Anchorage, Alaska—the skarn is formed by metasomatic action on limestone and contains the minerals wollastonite, apatite, and hedenbergite as major constituents.

Another new material from Russia, marketed by the Russian Colored Stone Company, of Golden, Colorado, was aventurescent aquamarine from a locality near Krasnoyarsk, Lake Baikal, Siberia. This beryl contained iridescent "rain-like" inclusions. It is cut either as tablets, to emphasize the aventurescent effect, or as chatoyant cabochons.

Other Russian gem materials seen this year include moss agate, jasper, Siberian nephrite, some calcite-rich lapis lazuli, small quantities of jadeite, yellowish green serpentine, and charoite. We were also shown a few cabochons cut from Uralian emeralds in their feldspar matrix. These appeared to be very similar to emerald-in-matrix cabochons from North Carolina (Summer 1993 *Gems & Gemology*, p. 132; emerald-in-matrix from Brazil, fashioned as carvings and spheres, was also available). Faceted Russian gem materials included small quantities of demantoid garnet, alexandrite, and emerald.

Miscellaneous notes on sapphires. Malhotra Corp., of New York City, had an interesting 1.38-ct emerald-cut bicolored sapphire that was about two-thirds blue and one-third light yellowish brown. The border between the two colors was distinct. The House of Williams, Loveland, Colorado, had a small quantity of blue sapphire rough containing yellow cores. This rough material reportedly came from Burundi about three years ago. Apparently, the unsettled political climate (especially in neighboring Rwanda) is limiting development of the deposit.

Both ruby and sapphire from gem gravels in Sierra Leone, West Africa, were being marketed by Tideswell Dale Rock Shop, of Derbyshire, United Kingdom. The material was translucent to nearly opaque and probably best suited for cutting cabochons and beads. According to Don Edwards, of Tideswell Dale, a significant percentage of the material yields asteriated stones (several of the samples displayed the characteristic sheen when viewed perpendicular to the basal plane). Mr. Edwards said that this alluvial material from Sierra Leone was first marketed some 10–12 years ago.

NCE Enterprises, of Chicago, Illinois, had about 60 faceted sapphires from Cambodia that exhibited a color change: areas that were blue and yellow in (incandescent) halogen light appeared greenish blue in diffused daylight. Because all the stones were quite color zoned, however, it was somewhat difficult to see the color change under "field" conditions.

Sapphires from Tanzania. Sapphires in a range of colors were available from a new deposit in the far southwest of Tanzania. The source is in the Mbinga District of the Ruvuma Region, according to Abe Suleman, of Tuckman International, Bellevue, Washington. The closest village to the deposit is Amanimakoro.

The editors saw a wide range of pastel-colored sapphires from the region, including light pink, purple, and blue. Mr. Suleman reported that dark green, "magenta," and dark red sapphires, seen at the show, are also found in the region. Michael Couch, of Cumming, Iowa, offered a few dozen very dark purple-red stones that were reportedly from this new area. They did not appear to be quite in the ruby color range; he described them as a "wine" or "burgundy" color.

A small percentage of stones from this region exhibit a color change, ranging from weak to distinct. In general, the change was from grayish bluish green to reddish brown. This is more reminiscent of the color change displayed by vanadium-doped synthetic

Figure 8. These five sapphires, ranging from 1.32 to 2.14 ct, show different colors in incandescent (left) and fluorescent (right) light. They are all reportedly from a new deposit in southern Tanzania. Courtesy of DW Enterprises; photo © GIA and Tino Hammid.

color-change sapphires and some alexandrites, rather than the violet-to-purple effect shown by some sapphires from other sources—Sri Lanka and Montana, for example.

Bill Marcue, of DW Enterprises, Boulder, Colorado, subsequently loaned the editors 11 sapphires (1.06–2.16 ct) from southern Tanzania. The stones all showed some color change between incandescent and daylight-equivalent fluorescent light (see, e.g., figure 8). With incandescent light, colors ranged from pink-brown through brownish pink and purple; under fluorescent light, colors included yellowish brown, grayish violet, and grayish greenish blue. Documentation of both the faceup colors and color change was complicated by strong color zoning. For instance, among the distinct colors noted with magnification (in incandescent light) were yellow, green-blue, blue, purple-pink, and brownish pink. Other features seen with magnification include dark red-brown crystals (possibly rutile), exsolution needles (also most likely rutile; some showed twinning), pinkish orange crystals that looked like garnet, and light brown crystals similar in appearance to clinozoisite crystals found in Montana sapphires from Dry Cottonwood Creek.

Gemological properties for these stones were: R.I. of $o = 1.770$ to 1.771, $\varepsilon = 1.761$ to 1.762, and birefringence = 0.008 to 0.009; S.G., determined by hydrostatic weighing, of 4.00–4.03. All the stones appeared red through the Chelsea color filter, were inert to both long- and short-wave UV radiation, and showed an absorption spectrum combining absorption features typical of ruby and pink sapphire with iron-related lines at about 450, 460, and 470 nm. Energy-dispersive X-ray fluorescence analysis confirmed the presence of both chromium and iron.

Faceted sphalerite and other collector stones from Canada. Tucson is the place where collectors of rare gems congregate in search of the new and unusual. We saw a number of new gem materials that we had not documented before, as well as some exceptional examples of already known species.

One of the editors (EF) was shown an interesting collection of gems from Quebec and elsewhere in Canada by Montreal collectors Guy Langelier and Gilles Haineault. Many of these gems were from Mt. St. Hilaire, outside Montreal; several of these are noted below because of their quality or rarity.

Faceted *sphalerite*, ZnS, from Mt. St. Hilaire is not new, but the 3.98-ct hexagonal cut in figure 9 is the first we have seen in this saturated, medium bluish green, devoid of any yellow overtones. The nicest green color previously seen was a medium-dark yellowish green. (Other colors include yellow, brown, red, orange, and black; it also may be colorless.) The R.I. of this particular stone was over the limits of the gemological refractometer. S.G. was measured at 4.10, typical for low-iron sphalerite. We observed a weak orange fluorescence to long-wave UV radiation only. In the hand-held spectroscope, we saw weak, moderately broad bands at about 480, 500, and 560 nm—and a stronger one at 590 nm. There was total absorption above 620 nm. EDXRF analysis revealed that the gem was almost a pure zinc sulfide (which confirmed the identity of the stone). There was a small peak for calcium, and traces of manganese and iron.

Origin of color was established by UV-visible spectroscopy, which showed small absorption bands at 475, 491, 564, and 591 nm, with total absorption between 660 and 740 nm. These features come from Co^{2+}. None of the iron-related absorptions known to cause a yellow-to-brown color component were

Figure 9. Rare stones from Mt. St. Hilaire include (clockwise from upper left) remondite-(Ce) (1.70 ct), sugilite (4.14 ct), sphalerite (3.98 ct), manganotychite (0.28 ct), shortite (0.23 ct), and serandite (0.79 ct).

observed, as one would expect since only a trace of iron was found. It is not surprising that EDXRF did not detect cobalt, although we believe cobalt—a very strong absorber of light in even minute amounts—to be the cause of color. A few parts per million Co^{2+}, which is below the detection limit of our instrument, is sufficient to cause this intensity of coloration. Finally, the trace of Mn^{2+} present may explain the orange luminescence.

Serandite, $Na(Mn^{2+},Ca)_2Si_3O_8(OH)$, is one of the best-known minerals found at Mt. St. Hilaire. It usually crystallizes as blade-like, opaque, slightly pinkish orange ("salmon") crystals. Very rarely, parts of these crystals are gem quality. Most faceted serandites are very small, or not totally transparent. The 0.79-ct stone we studied recently is unusual for its size, remarkable transparency, and very bright orange color (again, see figure 9). Its indices of refraction are approximately $\alpha = 1.679$, $\beta = 1.680$ to 1.681, and $\gamma = 1.711$. S.G., measured hydrostatically, was 3.47. The stone was inert to UV radiation. In the hand-held spectroscope, it showed total absorption up to about 420 nm, and a strong, broad band centered at about 520 nm. UV-visible absorption spectroscopy confirmed this and showed absorption decreasing from the ultraviolet to about 600 nm, sharp peaks at 343 and 408 nm, a shoulder at about 420 nm, and a moderately broad band centered at 520 nm. These features are typical of Mn^{2+} absorption. EDXRF analysis demonstrated that silicon and manganese were major components (sodium cannot be detected with our instrument at the expected concentration), with minor calcium and zinc. The predominance of manganese over calcium in the composition is typical of crystals from Mt. St. Hilaire.

Shortite is a rare sodium-calcium carbonate, $Na_2Ca_2(CO_3)_3$, which occurs very sparsely in the Mt. St. Hilaire deposit. Most crystals are less than a millimeter in longest dimension and yellow. However, some exceptionally large and transparent crystals have been found and faceted (the largest-known gem is a 3.52-ct yellow square cut). We examined a 0.23-ct, slightly greenish yellow, cut-corner rectangular mixed cut (again, see figure 9). Such stones are strictly collectors' items, as the crystals are water soluble. We noted a moderate pleochroism from very light yellow to greenish yellow and colorless. R.I.'s were $\alpha = 1.530$, and both β and γ very close to 1.568, for a birefringence of approximately 0.038. S.G. was measured hydrostatically (quickly and without damage to the stone) at 2.58. The stone was inert to UV radiation and did not show any spectral features in the hand-held spectroscope. With magnification, we noted several healed fractures with liquid or two-phase inclusions. We confirmed the identity of this gem by exploring its chemistry with EDXRF analysis. A peak for sodium established that this element was a major constituent; calcium was also present in large amounts. We did not detect any other element.

Manganotychite, $Na_6Mn_2(SO_4)(CO_3)_4$, is a very rare mineral in itself. Rarer still are large transparent crystals that can be faceted. This species also is water soluble, making faceting a real challenge. We studied a 0.28-ct emerald cut (again, see figure 9). The stone appeared brown, but on close examination that color was found to be due to a superficial coating, presumably resulting from alteration of the surface. We found no pleochroism, and the R.I. was 1.552. The specific gravity, measured hydrostatically (also quickly), was 2.83. The stone was inert to UV radiation; it showed a sharp band at about 414 nm in the hand-held spectroscope (presumably due to Mn^{2+}). Magnification revealed healed fractures and negative crystals. EDXRF analysis confirmed the presence of sodium, manganese, and sulfur as major components. However, it also revealed fairly large amounts of iron, although we would estimate the iron concentration to be significantly lower than the manganese concentration. This confirmed that the gemstone was manganotychite, but not a pure end member.

Sugilite, $KNa_2(Fe^{+2},Mn^{+2},Al)_2Li_3Si_{12}O_{30}$ (again, see figure 9), is a popular gem best known as a purple, polycrystalline, opaque material from the manganese deposits of Hotazel, South Africa. We were surprised to discover that large single crystals of light purple sugilite had been discovered in 1994 at Mt. St. Hilaire. We examined several dozen such crystals, which ranged from a few millimeters to over 2 cm. They exhibited a hexagonal pyramid habit, truncated at the top by a basal plane. Some crystals contained portions that were transparent and suitable for faceting. We borrowed one such crystal for further study.

Only a very weak pleochroism in slightly different intensities of purple was detected. In the hand-held spectroscope, the crystal showed a strong absorption at about 420 nm. It was inert to UV radiation. EDXRF analysis showed silicon, iron, and sodium to be major components; potassium as a minor constituent; and traces of zinc, rubidium, calcium, titanium, and zirconium.

We obtained polarized UV-visible absorption spectra of the crystal using a Hitachi 4001 spectrophotometer and calcite polarizers. The two spectra were very similar, with two intense doublets at 350–363 nm and 413–419 nm, and two weak, broad bands centered at approximately 555 and 770 nm. Such an absorption spectrum is typical of Fe^{3+} in octahedral coordination. Although the color was very similar to that of manganoan sugilite from South Africa, the cause of color was different. The band at 555 nm induced the purple color, while the doublet at 413–419 nm was the feature seen in the hand-held spectroscope. The 365-nm peak was stronger than the 350 peak in the $E \perp c$ direction compared to the $E \parallel c$ direction. We could not see any significant difference in the intensity of the 555-nm band between the two orientations, which explained the very weak pleochroism.

Leifite, $Na_2(Si,Al,Be)_7(O,OH,F)_{14}$, a rare alkali pegmatite mineral, is generally found as small acicular crystals unsuitable for faceting. We studied a light purplish pink, 2.30-ct modified fan-shape cut. The pleochroism was faint, from a slightly lighter to a slightly darker pink. The optical character was uniaxial positive. R.I.'s were o = 1.517 and ε = 1.522; S.G. was about 2.62. The stone was inert to both long- and short-wave UV radiation and did not show any noticeable absorption bands in the hand-held spectroscope. Numerous needles parallel to the optic axis (and perpendicular to the table) were seen with magnification, some arranged in a step-like growth pattern.

EDXRF confirmed the presence of the major components: sodium, aluminum, and silicon. Also detected were potassium, manganese, iron, zinc, gallium, rubidium, and cesium. UV-visible and near-infrared absorption spectroscopy showed a sharp band at about 375 nm (typical of Fe^{3+}), with a complex broad band—the cause of the color—centered at about 485 nm, and another broad band centered at about 1160 nm. We do not know the reason for the 485-nm broad band.

Again seen this year from Mt. St. Hilaire was the so-called burbankite, which has been shown to be actually *remondite-(Ce)*, $Na_3(Ce,La,Ca,Na,Sr)_3(CO_3)_5$ (also in figure 9). For more on this gem material, see the Winter 1992 Gem News, pp. 270–271.

Swarovski debuts machine-cut gems. A new line of calibrated, machine-cut natural-color natural gems, marketed under the "Swarogem" name, was introduced at Tucson by an Austrian firm well known for its synthetic gems and cut-crystal products.

Figure 10. Under its Swarogem brand name, D. Swarovski and Co. is manufacturing and marketing calibrated natural peridot, amethyst, citrine, and rhodolite in novel bubble-wrap packages. Photo ©Harold & Erica Van Pelt.

Applying its expertise in state-of-the art automated cutting, D. Swarovski and Co., of Wattens, Tyrol, is initially offering faceted peridot, rhodolite garnet (in "orchid," "pink rose," and "raspberry"), amethyst ("lilac" and "violet"), and citrine ("saffron" and "golden"). Each type will be available in 50 sizes and shapes, including round and "princess" cuts (2–4 mm), square step cuts (2–2.5 mm), ovals and pear shapes (5 × 3 mm and 6 × 4 mm), and marquise and baguette cuts (5 × 2.5 mm and 6 × 3 mm). According to a recent press release, all stones are cut to a maximum of 0.10-mm tolerance. The company experimented with larger sizes but found the yield too low given the quality standards, according to Swarogem Product Manager Stephen Kahler. Swarogem has the capacity to cut about 300,000 synthetic and natural gemstones a day, he said.

To meet promised consistency in color and quality, as much as possible Swarogem buys each gem material (in extremely large quantities) from a specific region: For example, the peridot is from Arizona, and the citrine is from South America. Initially they used rhodolite garnet from India, but thought the overtones too bluish gray. They switched to rough from an unnamed locality in Africa, according to Mr. Kahler.

Still, graders use master stone sets for each size and shape in order to match color intensity, Mr.

Figure 11. This 141.79-ct bicolored topaz was carved from material mined from the Wolodarsk pegmatite, in the Ukraine. Courtesy of Turmali & Herschede, Sanibel, Florida; photo by Shane F. McClure.

Kahler said. Clarity grading is more narrow. The company offers only one clarity grade: eye-clean in the faceup position.

Stones come in distinctive, sealed bubble-wrap packages, reminiscent of tamper-proof packaging for over-the-counter pills (figure 10). In the fall, Swarogem hopes to offer calibrated machine-cut ruby and sapphire in small rounds and squares.

Topaz and beryl from the Ukraine. In the Spring 1993 Gem News section, we reported on large greenish yellow to yellowish green beryls from a major pegmatite at Wolodarsk, Ukraine (pp. 54–55). A later entry (Summer 1994, p. 128) described topaz, some of it bicolored, from western Russia and the Ukraine.

At the 1995 Tucson show, we saw more topaz from these sources, including a carving fashioned from the 1,644-ct Ukrainian rough that was shown on page 129 of the Summer 1994 Gem News (figure 11). Tais International, of Miami, Florida, was marketing Ukrainian gem materials fashioned by members of a Moscow art group, Tais-Panin, including some very large, light orangy brown topazes. They showed us faceted triangular brilliants of 715, 780, and 975 ct; a 2,520-ct faceted free form; and a 4,128-ct faceted egg shape. Particularly interesting were large faceted topazes with images—such as Abraham Lincoln and the Great Seal of the United States—carved intaglio-style into their table facets. The firm also had some sizable faceted aquamarines from this source, including a 108-ct stone. Tais-Panin also fashions copies of famous gems, according to a brochure from the firm.

Also exhibiting was gemologist Vladislav Iavorskii, from Kiev, Ukraine. Among materials that he offered were fashioned beryls and topazes from the Wolodarsk pegmatite, including a 105-ct faceted aquamarine egg, some bicolored topaz, and a 35.40-ct orangy brown egg faceted from topaz.

Miscellaneous notes on tourmaline. The bright tourmalines from Paraíba, Brazil, were scarce this year. What limited quantities we saw were primarily in the greenish blue to blue-green range and in melee sizes. In their absence, people looked for similarly colored tourmaline from other sources. Ron Ohm Exotic Stones, of Carmel, California, was offering material from Bahia, Brazil, with a color similar to, but less saturated than, that of Paraíba tourmaline. We also saw some fine-quality tourmaline with a color close to that of the greenish blue Paraíba stones. Reportedly it came from the Araçuaí area of Minas Gerais, Brazil. Good blue-to-greenish blue stones are also coming from the area of Itambacuri, a town about 35 km southwest of Teófilo Otoni, according to Jerry Manning, of MCM Gems, Middletown, Ohio. He said that about 300 ct of exceptional material was produced in late 1994. He loaned us a 30.17-ct oval modified

Figure 12. This 30.17-ct tourmaline (18.82 × 17.79 x 13.42 mm) was mined near the town of Itambacuri in Minas Gerais, Brazil. Courtesy of MCM Gems; photo by Shane F. McClure.

brilliant that was recovered from this area in November (figure 12). EDXRF analysis revealed that the stone contained no copper, which is the primary coloring agent responsible for the vivid blue-to-green colors of the Paraíba material.

As for other colors of tourmaline, Fernando Otavio da Silveira, of Braz-G-Can International Trading, Rio de Janeiro, had some interesting bicolored Brazilian tourmaline—matched pairs cut perpendicular to the crystal's c-axis, like watermelon tourmaline is typically cut. However, unlike watermelon tourmaline, this material had a medium green core surrounded by a light "mint" green outer layer.

INSTRUMENTATION

Inclusion-viewing system. Gemstone inclusions, which frequently provide diagnostic information for experienced gemologists, can also be fascinating to observers of any level of sophistication. Photomicrographs have even been used to market amber with insect "inclusions" (see, e.g., Summer 1994 Gem News, p. 124).

Recently, GIA GEM Instruments introduced a system for displaying the internal world of gemstones. The GEM MicroVision system consists of a CCD camera, which attaches to the eyepiece of a gemological microscope. The camera is connected to a high-resolution video monitor and a color printer (figure 13). The GEM MicroVision system can display just about anything that the microscope "sees" under various lighting methods (darkfield, brightfield, fiber-optic, polarized). Calibrated and proportion-indicating eyepieces can also be used. The system adjusts to mimic different color temperatures, allowing the operator to show true colors or to enhance contrast.

Such a remote-viewing technique has obvious advantages over a traditional microscope. For example, more than one person can watch, and individual features can be preserved for future reference as photographs or on videotape.

Figure 13. The GEM MicroVision system includes a CCD camera that is attached to a microscope eyepiece, a high-resolution video monitor, and a color printer. Courtesy GIA GEM Instruments.

New magnet for gem testing. Until recently, magnetism was a property with little practical application in gem testing. By and large, magnetic minerals are few and far between. Even fewer are used in jewelry. Now, however, that has changed.

Testing for magnetism is being used to help identify gem-quality synthetic diamonds, as those examined to date have been grown in iron-nickel fluxes. Inclusions of such flux—sometimes so small that they are not resolvable with a standard gemological microscope—can cause the stones to be attracted to a strong magnet (see, e.g., "The Gemological Properties of Russian Gem-Quality Synthetic Yellow Diamonds," *Gems & Gemology*, Winter 1993, pp. 228–248).

At Tucson, Scottish gemologist Alan Hodgkinson showed the editors a magnetic device developed to detect the magnetic properties of certain synthetic diamonds. Called the "Magnetic Wand," it consists of a small, powerful neodymium iron boron magnet about 5 mm in diameter that is mounted on a 60-mm-long wooden rod. According to literature provided to the editors with a sample magnet, neodymium iron boron alloy is the most compact magnetic material available. Experiments by Mr. Hodgkinson proved that the instrument is very effective in detecting magnetism in a range of synthetic diamonds. Preliminary testing by the editors on De Beers, Sumitomo, and Russian gem-quality synthetic diamonds supported Mr. Hodgkinson's findings.

In our test, seven synthetic diamonds were individually suspended from a thread. The magnet was then brought close to each stone to see if there would be an attraction. Five of the stones were clearly drawn to the magnet. An alternative method, suggested in the product literature, is to make a small "raft" of plastic foam and float the gem in a glass of water. The diamond is then checked—actually, drawn across the water—with the magnet.

Dr. William Hanneman, of Hanneman Gemological Instruments, Poulsbo, Washington, is marketing the product and offered some precautions about it. Do not carry the magnet in or near your wallet. This could result in erasing the magnetic strip on credit cards and magnetic door keys. For the same reason, keep the magnet away from computers and computer diskettes.

Figure 14. This 0.84-ct Kashan synthetic pink sapphire is an example of lighter-toned material offered at Tucson. Photo by Shane F. McClure.

SYNTHETICS AND SIMULANTS

Faceted Kashan synthetic rubies and sapphires. Ruyle Laboratories, of Dallas, Texas, was offering faceted Kashan flux-grown synthetic rubies and pink sapphires in four quality grades, based on their clarity, and in calibrated sizes in a variety of cutting styles. They were being sold as "Kashan Created Ruby," further described in the firm's marketing flier as "permissively grown stones." According to the company's president, Steve Ruyle, they are using this tag line to distinguish this solution-growth product from what he calls "forced-growth" melt synthetics.

Mr. Ruyle further informed us that although all their Tucson material was from old stock, new production has begun and the first commercial material is expected to be available later this year. Mr. Ruyle added that the new material will be grown in a furnace he designed, using essentially the same method and flux as that used by Kashan in the past.

We had not seen many of the higher-quality, lighter-toned Kashan products, so we purchased for examination a 0.84-ct round, mixed-cut synthetic sapphire (figure 14). We determined that the properties of this transparent purplish pink stone were consistent with those reported earlier for Kashan synthetic rubies (see, e.g., "Some Aspects of Identification of Kashan Synthetic Rubies," by U. Henn and H.-W. Schrader, *Journal of Gemmology*, Vol. 19, No. 6, 1985, pp. 469–478).

Trace-element chemistry was determined using EDXRF analysis. This revealed the presence of chromium, but less than is typical for ruby—as would be expected given the lighter color. Titanium was also detected, however, in a concentration proportionally much lower (relative to chromium) than that typical of Kashan synthetic rubies.

More Russian synthetics and simulants. A number of synthetic and imitation gem materials from Russia were available. A firm new to the show this year, the Morion Company, of Cambridge, Massachusetts, offered both rough and cabochon-cut synthetic opals produced at the VNIISIMS facility in Alexandrov, Russia (for more on this facility, see the Winter 1994 Gem News, pp. 279–280). This material was available in both black and white body colors; it showed great variation in both color and distribution of play-of-color, ranging from multicolored pinpoint patterns to broad flashes of a single hue.

Morion also offered rough Czochralski-pulled synthetic alexandrite, hydrothermal synthetic emerald, and flux synthetic spinel (both red and blue). The latter two materials were produced at the Institute of Monocrystals in Novosibirsk. Synthetic quartz and split boules of flame-fusion synthetic corundum were available in a broad range of colors as well.

Among the imitation gem materials (that is, those with no natural gem counterpart) being offered by Morion was cubic zirconia (CZ) in a wide range of colors, including a color-change type. Both the blue and various shades of green CZ were produced at the Physical Institute, Russian Academy of Sciences, according to Dr. Leonid Pride, a geologist and president of the firm. He said that the acronym in Russian for this institute is PHAIN, from which the Russian trade name "Phainite" was derived for CZ. Other manufactured materials offered by Morion included VNIISIMS-produced pink yttrium aluminum garnet (YAG) and gadolinium gallium garnet (GGG) in several colors.

Figure 15. These synthetic zincites (1.35–3.26 ct) are accidental by-products of an industrial kiln in Silesia, Poland. Photo by Maha DeMaggio.

"Recrystallized" synthetics. Just before the show, the editors learned that TrueGem, of Las Vegas, Nevada, was beginning to market what it called "recrystallized" Czochralski-pulled synthetic ruby and synthetic pink sapphire. These are being sold under the trademarked names of "TrueRuby" and "TrueSapphire." The rationale behind this nomenclature, according to Larry Kelley, TrueGem executive director, is his claim that the materials are produced by a process in which natural ruby or pink sapphire rough is melted, purified, and then regrown. This last step is said to be performed using the Czochralski method. (For more information, see D. A. Catalano: "New Created Gem Irks Veteran Growers," *National Jeweler*, February 1, 1995, pp. 1, 146 and "Gem Recrystallization to Fore," *National Jeweler*, March 16, 1995, pp. 3, 75.) This material was introduced in Tucson.

TrueGem was not the only firm offering synthetic ruby under the "recrystallized" moniker. Argos Scientific, of Temecula, California, was selling rough Czochralski-pulled "recrystallized" ruby. According to a company flier, they produce about 5–7 kg per month by taking Indian ruby, Montana sapphire, and "Cr+ for color, " melting it all, and then pulling crystals. "Chakravorty Ruby," reportedly produced in India, was marketed by Creative Gems, of Seagoville, Texas. This "recrystallized" material reportedly contains 15% natural ruby.

Yet another firm, A. G. Japan Ltd., was selling "Agee Emeralds," which a company-provided flier described as "refined and recrystallized." The flier said that they crush Colombian rough emerald into a fine powder, "purify" the powder with a laser process, and then recrystallize it hydrothermally.

The editors cannot comment at this time on the feasibility of any of these processes. However, with respect to nomenclature, we would gemologically classify all these materials as *synthetics*. In all three instances the end products have been crystallized—manufactured—artificially in the laboratory.

Synthetic zincite from Poland. The Winter 1985 Gem Trade Lab notes contained an entry on faceted yellow synthetic zincite (p. 237). The client who had submitted the stone for identification said that it was a by-product of an industrial process used in Poland. Also mentioned was that synthetic zincite has been produced experimentally by at least two methods: hydrothermal and vapor growth.

This year the editors encountered a considerable amount of this material. While most were single crystals up to 15 cm (6 inches) in length, and complex crystal aggregates, faceted stones were also being sold. The material ranged from a medium-toned yellow through orange and dark orangy red, with a few yellowish green crystals.

Danuta and Jacek Wachowiak, of Minerals and Gemstones, Krakow, Poland, shed more light on this material. Apparently, it was an accidental by-product of an industrial kiln in Silesia, Poland, that was used to produce zinc-based paint. The synthetic zincite formed spontaneously and randomly by vapor deposition in the air vents of the kiln's chimney due to some undetermined error in the commercial production process.

We purchased both rough and faceted samples for examination. Gemological properties, determined on three highly saturated modified round-brilliant cuts (figure 15) were: R.I. = over-the-limits (1.81+); optic character = doubly refractive (weak doubling noted with magnification); uniaxial; pleochroism = very weak, in slightly different tones of the body color; S.G. = 5.68–5.70 (determined hydrostatically); UV fluorescence = moderate to very weak yellow to yellow-orange to long-wave, and moderate yellow to orange or inert to short-wave, with the reaction slightly stronger to long-wave than to short-wave (the strength of the reactions was inversely proportional to the depth of the body color); absorption spectrum—a cut-off at about 430 nm and a weak band at about 500 nm for the lightest-colored specimen, with the other two showing cutoffs at about 510 or 530 nm; magnification—no inclusions noted.

This is not the first report of synthetic zincite crystallizing by accident. In "A Modern Miracle" (*Lapidary Journal*, 1983, Vol. 36, No. 12, pp. 1974–1979), author Marie Kennedy reported on some yellow and red-orange "amber"-colored crystals found at the Blackwell Zinc Smelter in Blackwell, Oklahoma, when an old furnace used to produce zinc ore concentrates was torn down.

New source of synthetic emeralds. The editors came across another firm that was marketing hydrothermal synthetic emerald as both rough crystals and fashioned gems. Sold as "Maystone, Siberian-Created Emeralds," the product was being offered by Russia-based Asia Ltd., of Novosibirsk. This material is produced at a facility other than that used by the Tairus joint venture, according to the firm's executive director, Oleg Yu.Yachny.

ENHANCEMENTS

Diffusion-treated sapphires. Although they seemed to receive little attention, small quantities of blue diffusion-treated sapphires were available from a few firms, including Budsol Merchandising, of Tacoma, Washington, and Super Shine Gems, of Nugegoda, Sri Lanka. The latter also had a 64-ct parcel of small diffusion-treated corundums in the pink-to-red-to-purple range. All these colors (plus orange) of diffusion-treated corundums were included in the firm's price list in both calibrated and noncalibrated sizes, in two color and two quality grades each.