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GEM NEWS

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TUCSON '92

As in years past, the Gem News editors traveled to Tucson, Arizona, in February to attend the many concurrent gem shows. These range from sophisticated presentations like the AGTA Gem Fair in the Tucson Convention Center to "tailgate" shows set up at gas stations and in open lots. Following are some of the highlights of this year's events, based on the editors' observations and those provided by other GIA staff members.

DIAMONDS

Colored diamonds. Colored diamonds were abundant in small sizes. Brownish yellow to grayish yellow to brown were most common, although one booth was filled with natural pink diamonds. Most unusual was a series of white "opalescent" diamonds from the Panna mine in India, displayed by Mahlotra Inc. of New York. Colored diamonds with a well-documented geographic origin are rare. GIA Research tested three of these "opalescent" stones. The properties of all were typical of this kind of diamond: All were pure type IaB, with unusually intense hydrogen-related absorptions in the infrared region of the electromagnetic spectrum, and all had pervasive whitish graining.

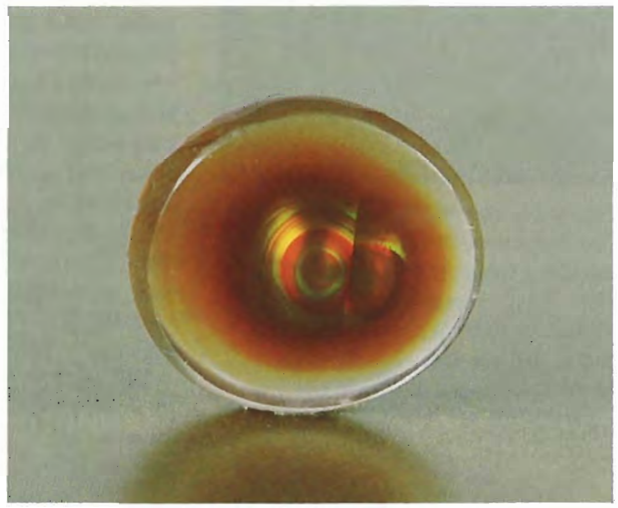

Figure 1. This 6.04-ct fire agate has a natural frame of near-colorless, almost transparent chalcedony. Photo by Maha Smith.

COLORED STONES

Unusual fire agate. Although some exceptionally fine fire agates were displayed in the main shows this year, the most interesting specimen seen by the editors was found at a small roadside stand. The iridescent botryoidal center of this 6.04-ct (15.66 × 14.31 × 3.87 mm) agate is surrounded by almost transparent, near-colorless chalcedony instead of the typical brown translucent to opaque material (figure 1).

Figure 2. These fine-quality amazonite cabochons, 4.03 ct (left) and 3.07 ct (right), are from the Marambaia region of Minas Gerais, Brazil. Photo by Maha Smith.

Fine amazonite from Brazil. Fine-quality amazonite from the Marambaia region of Minas Gerais, Brazil, was available in cut form. This particular greenish blue material showed little of the white, grid-like mottling we usually associate with this feldspar variety (figure 2), although close examination revealed a somewhat uneven texture and the subsurface sheen typical of amazonite. Standard gemological testing yielded properties consistent with those reported in the literature for amazonite.

Baltic amber more plentiful. With the opening of Eastern Europe, Baltic amber has become more plentiful. We saw a number of dealers from Poland, primarily selling polished pieces and jewelry such as pendants. Although most of what we saw was promoted as—and appeared to be—natural amber, some dealers also offered reconstructed material. Visual examination of some of the latter specimens revealed the grain boundaries typical of this sintered material.

Faceted apatites from Madagascar. Greenish blue apatite from Madagascar first appeared at Tucson last year, mostly in the rough. This year, large quantities of faceted material from this occurrence were available, with clean stones over 3 ct fairly common. It is surprising to see apatite being faceted for jewelry use because it is too soft (5 on the Mohs scale) for use in items such as rings.

African aquamarine. We noted aquamarines from several African sources. The firm of Gebrüder Bank displayed a few dozen beautifully faceted medium-dark-blue stones ranging up to 16.41 ct. Peter Kiecksee reported that these were from a new find in Mozambique, a country that is a known source of stones of this exceptional color. It was not clear whether this material was from a new locality or from a recent find in a previously worked mine.

The firm of Gebrüder Henn of Idar-Oberstein had several dozen extraordinary specimen-quality crystals that reportedly were from a new source in Nigeria. The dark greenish blue crystals were transparent and heavily etched. Some measured almost 10 cm (4 in.) long.

Aquamarines from Zambia were again available. These stones were typically slightly grayish blue in some of the darker tones in which this beryl variety is found.

Axinite from Russia. We saw a small number of exceptionally fine crystals of the rare gem mineral axinite, with edges so sharp that one of the editors actually cut a finger on a crystal. William W. Pinch, of Pittsford, New York, provided a large, fine example for examination. This 36.6-mm-long crystal (figure 3) showed gemological properties consistent with axinite. Mr. Pinch reported the locality as the Poly Ural Mountains, Komi Region, northern Russia. Because of their rarity and exceptional form, it is unlikely that these crystals will ever be used as faceting material.

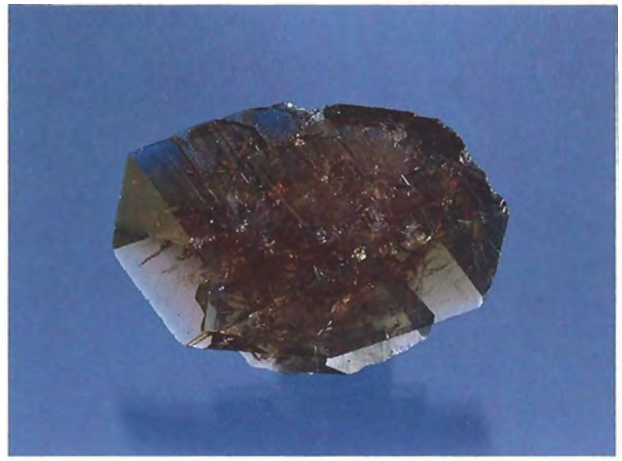

Figure 3. This exceptional axinite crystal, 36.6 mm long, is from Russia. Courtesy of William W. Pinch; photo by Maha Smith.

Beryl from Russia. The need for hard currency in Russia was apparent from the abundance of yellow to blue beryl from this region seen at Tucson this year.

Chrysocolla-colored chalcedony from Mexico. One of the more vividly colored varieties of chalcedony is the slightly greenish blue material colored by finely disseminated inclusions of the copper mineral chrysocolla. Much of the fine-quality material we have seen has come from copper-mining areas of Arizona.

This year, in addition to the Arizona material, we saw large quantities from a locality in central Mexico. According to two California dealers, Michael Randall of Gem Reflections and Glenn Lehrer of Lehrer Designs, the material is recovered from a large copper mine, on a level some 350 m below the surface.

The material we saw was semi-transparent—some facet quality (figure 4)—to almost opaque. Generally, the Mexican chrysocolla appears evenly colored, although examination in strong transmitted light revealed a mottled texture in several specimens.

One interesting feature of this Mexican material is its porosity. Both color intensity and transparency can be

Figure 4. Mexico is reportedly the source of this 0.82-ct faceted chrysocolla chalcedony. Photo by Maha Smith.

Figure 5. The 9.456-ct chrysocolla cabochon on the left is untreated; the 9.319-ct one on the right was soaked in water for several hours, with an apparent improvement in color and diaphaneity. Courtesy of Chris Boyd, CB Gems, Scottsdale, Arizona; photo by Maha Smith.

improved by leaving the stones in water from one to several hours, similar to the effect observed in hydrophane opal. To illustrate this effect, the editors borrowed two bullet cabochons of nearly identical size and color. They retained one cabochon as the control sample (figure 5, left) and immersed the other in water for several hours. The water produced a notable change in both color and diaphaneity (figure 5, right) as well as an approximately 0.25% increase in weight (from 9.296 ct to 9.319 ct). Some dealers said they were experimenting with polymer impregnation to produce a more permanent enhancement.

Commercial "fantasy" cuts. Gems that combine faceting and carving techniques, known as "fantasy" cuts, were again prevalent. This year, though, these included not only the typical one-of-a-kind miniature works of art, but also large quantities of calibrated, commercial-quality gems such as blue topaz and amethyst. Some hybrid cuts were very simple, with traditional outlines, modified faceting styles, and a series of grooves cut into their pavilion facets (figure 6).

Cat's-eye emerald. Although usually quite rare, cat's-eye emerald was offered by a number of dealers. David Kaassamani and Co. brought a collection of 75 cat's-eye green beryls and emeralds that ranged from a few points up to approximately 6 ct. Mr. Kaassamani reported that all had been mined within the last six months at Santa Terezinha de Goiás, Brazil. James T. Drew, Jr., of Star Gem, who was also offering some of these stones, added that most of the chatoyant material is found in isolated pockets in what is known as "area 67" of Santa Terezinha.

Moldavite plentiful. Czechoslovakian moldavite tektites seemed more plentiful this year, with several dealers specializing in this material. One notable specimen contained an exceptionally long (8 mm) bubble (figure 7).

Fire opal from Mexico. Faceted opal from Querétero, Mexico, in colors ranging from orange to orangy red, was being offered by several dealers. CB Gems of Scottsdale, Arizona, was selling cut gems as large as 71.92 ct. Rough material was also available, with one dealer offering matrix specimens.

Update on peridot. An unusual number of large, good-color peridots were available this year. In the past, relatively few faceted stones over 2 ct have been offered, with many of the larger ones having a strong, undesirable brown component.

One dealer explained that these larger stones come from a new area of the San Carlos deposits. Traditionally, much of the peridot in the market was extracted from diggings at the top of a basalt mesa on the San Carlos Apache Reservation. Recently, however, Apache miners started working new deposits in a canyon below the mesa. First, they remove the overburden with a bulldozer. Then, they use drills and explosives to extract large blocks of basalt. Last, they break the blocks open with sledgehammers and pry bars, revealing pockets that sometimes contain better-color pieces in the 5- to 35-ct range.

Some very nice peridots from China were also available, notable for their "purer" green color. Also, Rudi Cullman of Idar-Oberstein indicated that peridot, mixed with yellow feldspar, is being smuggled out of Ethiopia. The color of the Ethiopian peridot is yellowish green, comparable to average Arizona material.

Figure 6. These two amethysts (1.46 and 2.85 ct) and blue topaz (2.90 ct) are examples of some of the commercial "fantasy" cuts available at Tucson. Photo by Maha Smith.

Pietersite from Namibia. Hawk's-eye is a dark blue, silicified form of the fibrous asbestos mineral crocidolite. It often contains oxidized yellowish brown areas of tiger's-eye where the crocidolite has been replaced by quartz. When cut *en cabochon*, this material displays chatoyancy. One major source of hawk's-eye is South Africa.

Pietersite is a lesser-known dark blue, silicified variety of crocidolite. Unlike hawk's-eye, the fibers in pietersite are not parallel but rather form an irregular patchwork of "bundles," some of which exhibit sheen (figure 8).

According to Hannes Kleynhans of Tiger-Eye Manufacturing, Hermanus, South Africa, pietersite is a brecciated form of hawk's-eye. It is named after Syd Pieters, who discovered the source in 1962 at a locality called Outjo approximately 350 km northwest of Windhoek, Namibia. Approximately 2.5 metric tons of the material was recovered over the past two years.

Figure 8. Pietersite (17.26 ct, left) is a brecciated form of hawk's-eye (19.23 ct, right). Courtesy of Hannes Kleynhans; photo by Maha Smith.

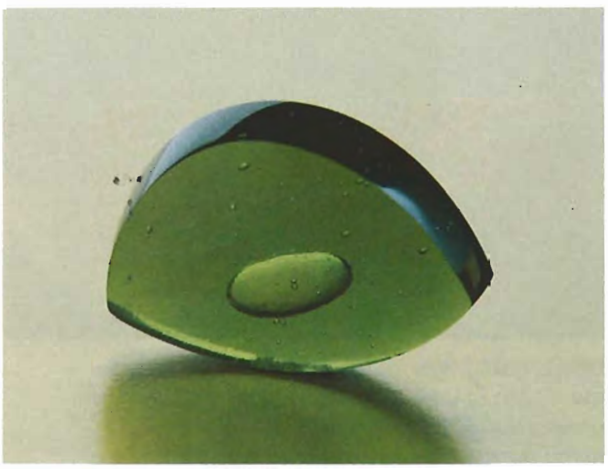

Figure 7. This 14.65-ct fashioned moldavite tektite contains a remarkable 8-mm-long bubble. Photo by Maha Smith.

Rubies and sapphires from Vietnam. Probably the most talked-about new source this past year, Vietnamese rubies and sapphires seemed to be everywhere. GIA staff members noted at least a dozen different dealers, with rubies and pink sapphires ranging from melee sizes to around 3 ct. The largest stone seen was a 7.18-ct oval-mixed-cut pink sapphire. One vendor had 11 faceted rubies in the 2- to 3-ct range; the largest weighed 3.14 ct and was of exceptional color and clarity. Also available were green and dark blue sapphires from Vietnam.

New ruby deposit in Namibia. Dr. Madan Aggarwal of Nairobi, Kenya, informed us that a new ruby deposit has been discovered near Wentrop, Namibia. The rock association is similar in appearance to that found in Longido, Tanzania: Large ruby crystals with gemmy areas are enclosed in a gray-green mica. Some of the crystals reach several centimeters in their longest dimension. Faceted, transparent stones of up to one carat could be cut from the gemmy areas.

Australian ruby. The Queensland Opal Corp. displayed several samples of pink sapphire and ruby from a mine they recently acquired in central Australia. These included several well-formed, platy, hexagonal crystals that were essentially opaque but contained some transparent areas. The largest crystal, although not of gem quality, was almost 7.5 cm (3 in.) long. Fashioned material displayed included three ruby cabochons in the 1- to 1.5-ct range and two relatively transparent star rubies in the 1-ct range.

Rubies and pink sapphires from Azad Kashmir, Pakistan. Shams-Ur-Rehman, a recent GIA graduate from Peshawar, Pakistan, had a large selection of mineral-specimen-quality, translucent to semi-translucent ruby and pink sapphire crystals in matrix from Nagi Mali, a remote area of northern Azad Kashmir, Pakistan. This relatively new locality is reportedly only a few hundred kilometers from the famous blue sapphire source in neighboring Kashmir, India.

Ruby in zoisite. This ornamental material from Longido, Tanzania, consists of opaque crystals of hexagonal ruby and pinkish purple sapphire in a green chromian zoisite matrix. Several dealers offered large quantities as irregular blocks of rough or as cabochons and beads, small carvings, spheres, and eggs (see figure 2 of the article on green zoisite in this issue for a photo of this material). According to one vendor, the mine continues in full production.

Chinese blue spinel. China continues to produce small quantities of interesting natural gems. Pete and Bobbi

Flusser of Overland Gems, Los Angeles, offered several medium-dark violetish blue "cobalt" spinels from China. All pieces were fairly large, from 4 to 14 ct. One contained unusual whitish needles that appeared to be oriented at 90° degrees to each other.

Tourmaline from Paraíba, Brazil. Although the saturated tourmalines from Paraíba, Brazil, were available from many different dealers this year, there were significantly fewer stones than in the previous two years. However, a knowledgeable source reported that the conflict over mining rights has been resolved and mining has been resumed.

Fine tourmalines from Africa. GIA staff members noted attractive tourmalines from various African sources. Carl Friedrich Arnoldi displayed medium-light to medium-dark pink tourmalines—many resembling fine kunzite—from Nigeria. The stones averaged 2 ct and appeared to be relatively clean.

Both Bill Barker and Pala International offered nice-color rubellite from a recently discovered gem pocket in Namibia. They reported that a few hundred kilos of gem-quality material from this find was being fashioned.

Also noted were some vividly colored pink tourmalines from Madagascar, in sizes averaging 2 ct. The dealer who had them indicated, however, that he suspected the unusual color was due to artificial irradiation.

Green zoisite from East Africa. Green zoisite was the subject of considerable interest, but only a few faceted stones were available. Many were brownish green; only a few were the much-publicized "emerald" green. [*Editor's note: See the article by N. R. Barot and E. Boehm in this issue for a detailed discussion of green zoisite.*]

Rare gemstones from Mont St.-Hilaire. Art Grant of Hannibal, New York, and Gilles Haineault of Montreal, Canada, had some rare faceted gemstones from the famed Poudrette quarry in Mont St.-Hilaire, Quebec. These included very brilliant, near-colorless cryolites up to 1.35 ct, and yellow to green, somewhat cloudy, shortites up to 2.37 ct. Faceted colorless pectolite as large as 0.85 ct represents the rare transparent variety of this gem species, which is best known for its opaque-to-translucent blue variety (sold under the trade name "Larimar"). Also notable were a 1.49-ct included, "pistachio" green leucophanite with strong pink luminescence and two rare, transparent, predominantly orange serandites, 1.36- and 1.38-ct emerald cuts. Most interesting was burbankite, a newcomer to the gem world, which shows a remarkable color change from greenish brown in fluorescent light to reddish brown in incandescent light. The largest piece weighed 6.62 ct and was very clean.

ENHANCEMENTS

Update on diffusion-treated sapphires. Blue diffusion-treated sapphires were the most talked-about enhanced gem at

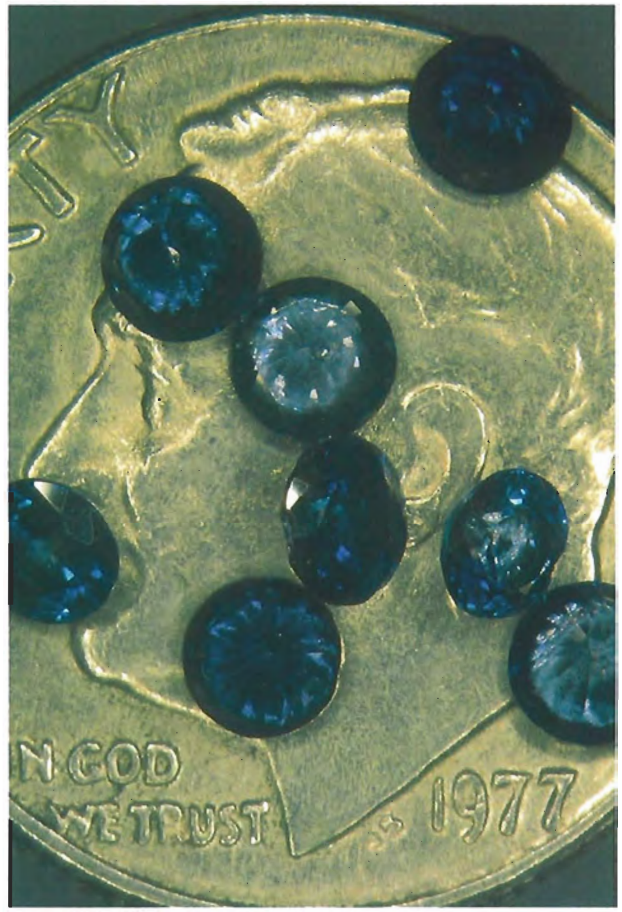

Figure 9. At 3 mm in diameter and with an average weight of 0.12 ct, these were the smallest commercially produced blue diffusion-treated sapphires encountered by the editors. Photo by John I. Koivula.

Tucson this year, with significant quantities available. Joseph A. Rott of Sabeena International, New York City, told the editors that he had approximately 12,000 ct at the show, with a total of 120,000 ct of fashioned goods in inventory.

Apparently, production has been geared to meet the needs of large-scale jewelry manufacturers. For example, Novastar Corp. of Fairfield, Iowa, was offering a number of traditional cuts—rounds, ovals, marquises, pear shapes, heart shapes, and emerald cuts—in a range of calibrated sizes. Stones were also available in a variety of weights, from under 20 points to over 50 ct.

The smallest commercially available stones we saw were 3-mm rounds, weighing an average of 0.12 ct (figure 9). According to Joseph Rott, this is the smallest size his firm markets, because anything smaller cannot be priced competitively against natural-color stones. Jeffrey Bergman of Gem Source, Las Vegas and Bangkok, further explained that the surface layer damaged by the diffusion-treatment heat is essentially the same depth regardless of the size of the stone. Stones smaller than 3 mm are uneconomical because more than half the weight of the stone would be lost in repolishing. However, Mr. Bergman showed the editors a number of diffusion-treated stones approximately 2 mm in diameter that he had produced for experimental purposes.

Although rumors abounded of diffusion-treated sapphires with a much greater depth of color penetration, we were shown no stones that were reported to have been so treated. Using a portable instrument designed to detect diffusion treatment (see entry below), GIA researchers performed spot-checks on the full range of sizes of blue diffusion-treated sapphires offered by various firms. These examinations revealed diagnostic features consistent with those previously reported in the literature for diffusion-treated sapphires.

We saw no diffusion-treated corundum in colors other than blue, although more than one dealer stated that they were experimenting with other hues, including red and yellow. Two dealers reported some success in diffusing a red layer into the surface, but penetration was shallow and produced only a pink overall body color after repolishing.

Blue enhanced opal. Gerard and Joyce Raney of Redwood City, California, showed one of the editors some unusual enhanced opals that resembled Australian black opals. They reported that the starting material, from Brazil, is a highly porous, chalky white, hydrophane opal with a weak play-of-color (figure 10, left). The rough material is first soaked in a chemical mixture of potassium ferrocyanide and ferric sulfate to produce a dark "Prussian blue" color throughout. Once it is dry, the rough is placed in a slightly warmed plasticizing liquid that is composed of methyl methacrylate with a small amount of benzoyl peroxide catalyst. This step seals the pores and clarifies the opals to the point where they are almost transparent. Before the mixture solidifies completely, the now-treated rough is removed and cleaned in preparation for fashioning into polished cabochons. The end result is an enhanced opal with a blue body color so dark that it is almost black (figure 10, right). Regardless of their outward appearance, these opals should offer no identification problem for jewelers and gemologists: The treated opals generally seem too light for their size, have a slightly plastic feel, and, most importantly, reveal their intense, deep blue body color when examined under the microscope or in transmitted light.

Figure 10. Brazilian hydrophane opal before (left) and after enhancement (right). The cabochon weighs 2.43 ct and measures 10.98 mm in longest dimension. Opals courtesy of Gerard and Joyce Raney; photo by Maha Smith.

Irradiated green topaz. Artificially irradiated blue topaz, in a range of tones and saturation levels, has long been a staple of the colored-stone market. At Tucson, however, we saw green irradiated topaz. Advertised as "Ocean Green Topaz," this irradiated topaz is reportedly from Sri Lanka. It was offered by a few firms.

The material the editors saw ranged from light to medium tones and from yellowish and brownish green through more saturated green to slightly bluish green hues. The smallest stone we saw measured 7 × 9 mm; the largest, 25 × 40 mm. GIA researchers are currently investigating this material.

SYNTHETICS AND SIMULANTS

Synthetic alexandrite gets new name. In the Spring 1991 Gem News column we reported on a Czochralski-pulled synthetic alexandrite marketed by J.O. Crystals that debuted at Tucson last year. This year, considerably more material was available, in darker colors with a more pronounced color change. This product is now being promoted as "Nicholas Created Alexandrite." Judith Osmer of J.O. Crystals reported that the chromium content has been adjusted to create a better change of color. The center part of the Czochralski rod contains myriads of small "bubbles" that are actually crystallographically oriented gaps or negative crystals. When viewed with lateral lighting, the effect is similar to the "rain" in Kashan synthetic rubies. The center of the rod is used primarily for cabochons; faceted stones are cut from the periphery.

More on hydrothermal synthetic beryls. This year, we again saw hydrothermal synthetic beryls from Russia and Australia (see Gem News, Winter 1988, p. 253, and Spring 1991, p. 54). The Russian material, in a range of colors, was shown by Kyle Christianson Ltd., of Sylvania, Ohio, a firm that markets a number of laboratory-grown gem materials produced in Novosibirsk (see CZ entry below). Although these synthetic beryls were for display only, we learned that they may become a commercial reality in the near future.

Kimberley Created Emeralds markets the Biron synthetic pink beryl, an Australian product; at the show, they were offering approximately a dozen faceted stones in the 2-ct range. They also had two bicolored, "watermelon," synthetic beryls. These square step cuts consisted predominantly of synthetic pink beryl with a green (synthetic emerald) zone at the culet, which produced distinct pink and green zones face-up. These synthetic beryls are currently being investigated by GIA researchers.

Colored CZ plentiful. Although relatively little colorless cubic zirconia was seen this year, many color varieties were found in abundance in both rough and cut form. These included green, blue, orange, orangy red, yellow, and purple varieties in predominantly high saturations. One of the more frequently seen colors was a medium light to medium tone of purple, sometimes being sold as "Lavender Ice."

Most prevalent, however, were light to medium tones of pink, heavily promoted under such names as "Pink Ice" and "Nouveau Rosé." They were commonly set in sterling silver and gold-electroplated fashion jewelry. One randomly chosen faceted piece was purchased for gemological examination. It revealed a Chelsea color filter reaction, long- and short-wave U.V. luminescence, and absorption spectrum (as seen with a desk-model spectroscope) that were essentially the same as those noted for the pink nontransparent "CZ" recently investigated by the editors and colleagues (see *Gems & Gemology*, Winter 1991, p. 240). These nontransparent varieties were also available at Tucson for the first time this year.

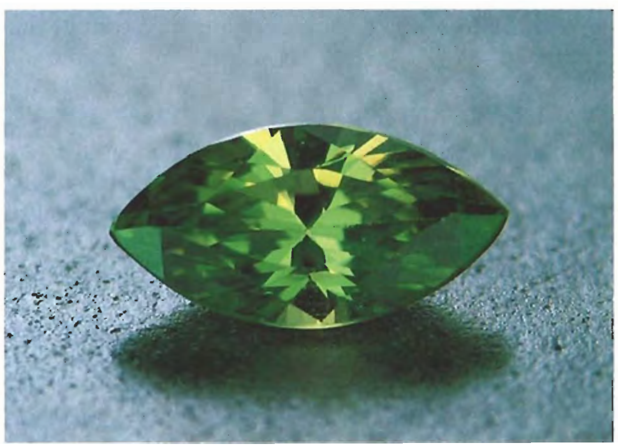

Figure 11. The color of this 2.00-ct cubic zirconia from Russia is similar to that of some dark green tourmaline. Photo by Maha Smith.

Kyle Christianson Ltd. was marketing a new, dark yellowish green CZ—reminiscent of some fine iron-colored tourmaline—that reportedly was obtained only recently in Russia. The 2.00-ct marquise cut shown in figure 11 was subsequently examined; it appeared green through the Chelsea color filter, was inert to long-wave U.V. and fluoresced a weak yellow-green to short-wave, and showed absorption bands at 443–450, 472, 483, 583, and 607 nm.

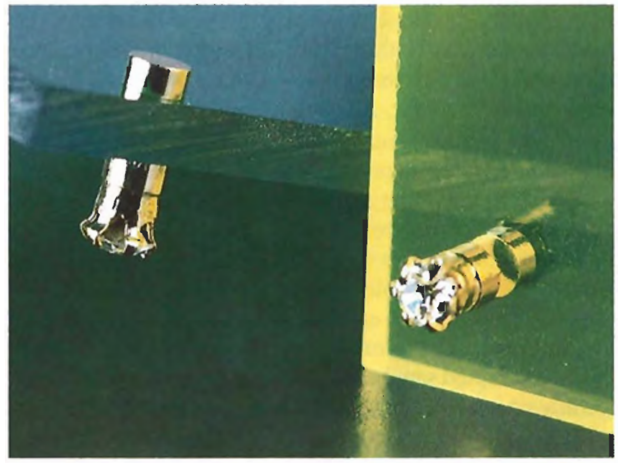

Figure 12. These glass imitation-diamond ear studs are held in place with tiny magnets. Photo by Maha Smith.

Rare laboratory-grown crystals. In addition to the large quantities of such well-known laboratory-grown gem materials as CZ, YAG, and synthetic corundum, emerald, and quartz, we also came across faceted samples of some very unusual laboratory-grown materials. These included germanium bismuth oxide, lead molybdate (synthetic wulfenite), and tellurium dioxide. Some older diamond simulants, not seen in the market for a long time, included strontium titanate and lithium niobate.

Magnetic "pierceless earrings." One jewelry item we came across was unusual not for the gem materials but for the method in which they were used. Marketed as "pierceless earrings" (figure 12), these were colorless-glass diamond simulants and imitation-pearl ear studs held in place by tiny magnetic "clips." They were promoted for use by those who do not wish to pierce their ears, especially for the multiple-earring look.

Another chatoyant glass. For several years, we have seen a semitranslucent, chatoyant glass composed of parallel optical fibers. Sometimes this material is deformed to produce a wavy reflective band when cut *en cabochon*. With both types, the cat's-eye effect is very pronounced, contributing to the rather unnatural appearance of the fashioned gems (see Gem News, Summer 1991, p. 123).

This year we encountered a more transparent variety of chatoyant glass with a less pronounced (i.e., more natural-appearing) "eye." When viewed face-up, the chatoyant band is seen to be intersected at right angles by a series of evenly spaced dark "lines" (figure 13).

Microscopic examination from the side and perpendicular to the chatoyant band revealed the expected honeycomb structure, with the individual cells having hexagonal outlines. The individual fibers were thicker than

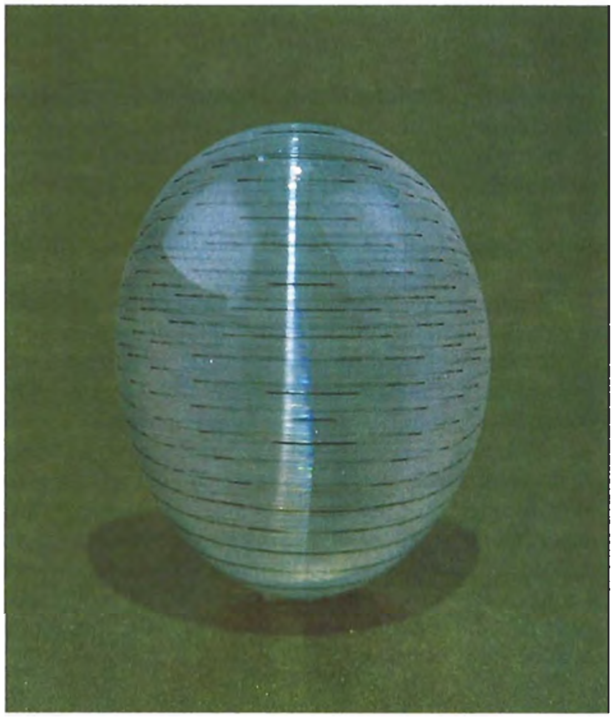

Figure 13. The reflective band on this 11.00-ct cat's-eye glass cabochon is less distinct than that usually noted on this type of manufactured gem. Photo by Maha Smith.

Figure 14. This 0.83-ct "Gemulet" simulant for crystal opal consists of a single synthetic opal fragment embedded in colorless glass. Specimen courtesy of Manning International; photo by Maha Smith.

those noted in the materials mentioned above and exhibited nontransparent peripheries. Both these features contributed to the less distinct chatoyancy. Magnification also revealed that the dark parallel lines were slender, parallel, dark brown "inclusions" of square cross-section. When taking an R.I. on the cab's dome, we noticed that the parallel fibrous structure produced two separate "striped" spot readings of about 1.48 and 1.62.

Novel crystal opal imitation. One of the more interesting novelty "gems" at Tucson was a composite product marketed by Manning International of New York and Hong Kong. Promoted under the trademark name "Gemulet," this product consists of colorless glass in which small fragments of synthetic opal have been embedded (figure 14). Because the glass used has a refractive index (1.47) that is very close to that of the synthetic opal (1.45), the latter has very low relief. Consequently, the play-of-color appears to be coming from the larger "gem," rather than from the included opaline material. The material is marketed in teardrop shapes (for pendants and earrings) and as faceted pieces.

Faceted synthetic quartzes. In last year's Tucson report, the editors mentioned the availability of large quantities of Russian-grown synthetic quartz in a number of colors. Most of that material was rough; this year, significantly more faceted material was seen.

Figure 15 illustrates three representative samples. The yellow specimen shown is a synthetic citrine; we also saw some synthetic yellowish brown quartzes that were reminiscent of "sherry" topaz. The green specimen, which is darker and more saturated than any natural single-crystal quartz we have encountered, could be an effective simulant for green tourmaline. Both the yellow and green varieties owe their color to the presence of iron. The blue synthetic quartz, also with no natural counterpart, is reminiscent of some irradiated blue topaz. The most popular variety of synthetic quartz remains synthetic amethyst.

Figure 15. These Russian-grown hydrothermal synthetic quartzes (left to right: 6.18, 6.42, and 6.20 ct) are representative of some of the faceted material now available. Photo by Maha Smith.

Figure 16. Titanium is the coloring agent of this 2.40-ct Czochralski-pulled synthetic pink sapphire. Photo by Maha Smith.

Knischka synthetic rubies. Knischka synthetic ruby, a flux-growth product of Paul O. Knischka of Austria, was marketed at Tucson this year by the Argos Group of Los Angeles, California. According to a recent news release, Argos has been appointed the exclusive North American distributor of Professor Knischka's products.

Synthetic blue and green sapphires grown by Czochralski pulling. The Washougal plant of Union Carbide in Washington state produces blue and green Czochralski-pulled synthetic sapphire. The rod fragments that we examined exhibited concentric color zoning from the core to the rim, similar to that observed in flame-fusion synthetic blue sapphire. Medium-tone, slightly violetish blue faceted stones were available through the Argos Group of Los Angeles and were loupe clean.

Figure 17. These YAGs (2.44–3.53 ct) represent some of the colors seen as faceted stones at Tucson. Photo by Maha Smith.

Titanium-doped synthetic pink sapphire. Flame-fusion synthetic pink sapphire has long been available in the gem trade. It typically owes its color to chromium. These synthetic pink sapphires characteristically appear red through the Chelsea filter, fluoresce red to long-wave—and pinkish purple to pink to short-wave—U.V. radiation, and reveal a "chromium" absorption spectrum.

A number of vendors at Tucson were marketing another type of synthetic pink sapphire (figure 16). Produced by the Czochralski method, this material owes its color to doping with titanium (as confirmed by GIA Research). This "titanium sapphire" is grown in large amounts by companies such as Union Carbide for use in the laser industry. Preliminary gemological testing revealed a strong orangy red color through the Chelsea filter, a moderate orange fluorescence to long-wave—and a very strong bluish violet fluorescence to short-wave—U.V., and no distinct absorption features in the spectrum obtained with a desk-model spectroscope. GIA researchers are currently conducting a more detailed study of this material.

Imitations of sugilite and other nontransparent gems. In the Spring 1991 Gem News section, we reported on a convincing lapis lazuli imitation that consisted of barium sulfate in a polymer matrix with pyrite inclusions. We also regularly see rectangular blocks of a reportedly similar composition in colors that imitate coral, turquoise, sugilite, black "onyx," malachite, and azurite-malachite.

Such "rough" material was again at Tucson, but this year a large number of fashioned pieces were also available. Most prevalent were necklaces of beads in various shapes, sizes, and colors. Especially prevalent were imitations of azurite-malachite, but these were only moderately convincing.

We purchased a 2.52-ct square tablet resembling sugilite for examination. Gemological testing revealed a vague spot R.I. in the mid-1.50s and an S.G. of 2.26. When the surface was gently rubbed with an acetone-dipped cotton swab, it became dull and appeared to "lose" its polish; a thermal reaction tester ("hot point") applied to the base caused white discolorations and produced an acrid odor. All these properties are similar to those of the imitation lapis mentioned above.

Examination with ultraviolet radiation produced interesting reactions: a strong chalky orange luminescence to long-wave and a weak to moderate chalky orangy red luminescence to short-wave. These reminded us of the reactions we have noted in some jadeite dyed to imitate natural-color "lavender" material. The color concentrated in fractures of such material is very similar to the body color of this sugilite imitation.

Faceted colored YAG. Also seen in far greater quantities than in past years were various colors of YAG (figure 17), manufactured yttrium aluminum 'garnet' being sold in both rough and cut forms.

Figure 18. Standing approximately 6.25-in. (15.9 cm) tall, this cored crystal section of colored YAG was marketed as a "pencil holder." Photo by Maha Smith.

One notable color was a highly saturated, "fluorescent"-appearing yellow. Gemological examination of a 3.16-ct faceted sample revealed total absorption from 400 to 500 nm (in a desk-model spectroscope) and very strong yellow luminescence to both long- and short-wave U.V. radiation. EDXRF analysis revealed the presence of cerium as the coloring agent. Another type, colored by neodymium, had a light pink to purple color change.

Some samples were a saturated medium-dark, slightly violetish blue similar to some irradiated topaz. This material appeared red through the Chelsea color filter and showed a typical cobalt-type absorption pattern, with bands at approximately 560, 595 and 640 nm. EDXRF analysis confirmed the presence of cobalt as the coloring agent. Interestingly, the material was inert to both long- and short-wave U.V., perhaps because of a trace presence of iron. We also saw greenish blue material that resembled some cuprian tourmaline from Paraíba, Brazil (one large section weighed 2,310 ct). EDXRF analysis established the presence of both chromium and thulium (a rare-earth element), which are presumed to be the cause of color.

Saturated greens ranged in tone from medium to very dark. EDXRF analysis of a lighter-toned yellowish green specimen revealed the presence of chromium, thulium, and holmium, all believed to contribute to the color. Similar examination of one of the darker, very slightly bluish green stones, however, revealed the presence of chromium alone as the chromophore.

Although these or similar colors are also available in CZ, the lower dispersion of YAG makes it perhaps a more effective simulant for some colored stones, most of which typically display little or no eye-visible dispersion.

YAG as an "ornamental" material. One interesting item was an unusual use for sections of Czochralski-pulled crystals of neodymium-doped YAG. Grown for laser rods, these large crystals had been extensively cored, typically leaving 12 or more holes of varying diameter running the length of the crystal sections. One enterprising vendor was marketing these as "synthetic garnet pencil holders" (figure 18).

INSTRUMENTATION

Instrument for detecting diffusion treatment. As previously noted, blue diffusion-treated sapphires are becoming increasingly prevalent. While thus far detection of this treatment has been relatively straightforward, the equipment required is not always conveniently available.

In response to this challenge, GIA GEM Instruments developed the Illuminated Immersion Cell (figure 19), a portable instrument that provides all the tools needed to detect diffusion treatment. Debuted at Tucson, it features a battery-powered, high-intensity krypton light source and reflector contained within the base of an immersion cell. This provides diffused transmitted light, the best illumination for detecting the diagnostic color inhomogeneities of the treatment. The instrument also features a 2 × lens, fitted into the screw cap of the immersion cell, which enables a magnified view of a stone's features. It can be used with a variety of liquids, including water, glycerine, or methylene iodide.

Although designed primarily for the detection of diffusion treatment in corundum, the instrument is also useful for observing other types of color zoning, including the curved color banding of flame-fusion synthetic sapphires. Additional uses include detecting assembled stones and carrying out relative relief tests (e.g., in the separation of diamond from its simulants).

Figure 19. GIA GEM Instruments' new portable Illuminated Immersion Cell is designed to detect diffusion treatment. Photo by Maha Smith.