GEM N.E.W.S

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TUCSON '97

For the colored stone market, the new year begins not on January 1, but in late January to early February, at the many shows in Tucson, Arizona. The Gem News staff visited 17 of the 23 "official" shows—of gems, minerals, beads, and finished goods. We also combed the blocks-long bazaar of open-air booths and tents that paralleled the Interstate 10 highway.

This year, a one-week gap separated two of the biggest shows, the American Gem Trade Association (AGTA) show and the retail segment of the Tucson Gem and Mineral Society (TGMS) show, both held at the Tucson Convention Center, so the overall "Tucson experience" lasted just over three weeks (from January 26 through February 16). Several of the more interesting materials and individual stones that we uncovered are discussed here, and more will be profiled throughout the year. Special thanks go to GIA Gem Trade Laboratory gemologists Maha DeMaggio (who also photographed many of the specimens), Cheryl Wentzell, Nick DelRe, and Phillip Owens for their tireless questing after the new, the unusual, and the downright odd.

DIAMONDS

"Opalescent" and other unusual diamonds. Although the Tucson shows primarily showcase colored stones, some interesting diamonds were also available, including black diamonds, treated-color green and blue diamonds, and naturally "colored" (by cloud-like inclusions) "white" diamonds. These "white" diamonds are sometimes called "opalescent" because flashes of spectral colors, caused by dispersion from the back facets, resemble play-of-color when viewed through their milky white body color. One such diamond is shown in figure 1: In the table-down position, it has a "J" color grade and is faintly brown. Similar diamonds were also discussed in the Spring 1992 Gem News section (p. 58).

Diamond crystals were prominent at the TGMS show. David New, of Anacortes, Washington, showed diamond crystals from many localities, including five from the new Kelsey Lake mine in Colorado and a "Star-of-David" twinned made from South Africa. (A similar crystal is described and illustrated on pp. 117–118 of the Summer 1991 Gem News section).

Diamond "pearls." For some time, one editor (MLJ) has been intrigued by the idea of a cabochon diamond. This year, at the booth of Crystal Classics, Okehampton, Devon, England, she found the next best thing: diamond "pearls" (figure 2). Dr. Heinz Malzahn, of Berlin, Germany, has adapted the technique for making round pearlescent diamonds from one used by De Beers around 1970 to process industrial diamonds. According to Dr. Malzahn, rough diamonds with roundish shapes are ground to rough spheres and then "'cooked" in sodium carbonate, in an inert atmosphere at about 800°C, to produce the pearly surface. This process is sometimes referred to as chemical polishing by selective

Figure 1. This 0.03 ct "opalescent" diamond was among several marketed by Malhotra Inc., New York City. Photo by Maha DeMaggio.

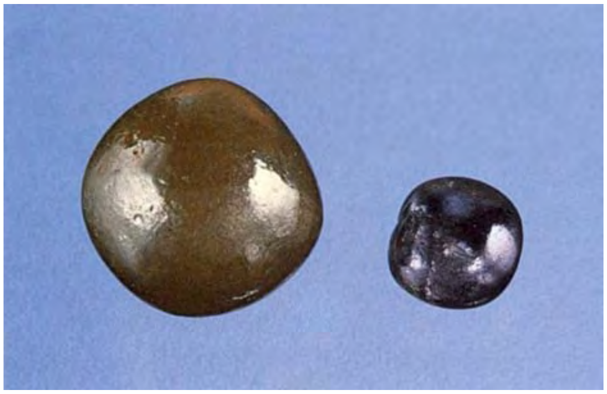


Figure 2. These 1.66 and 0.28 ct diamond "pearls" were polished by selective dissolution in hot sodium carbonate. The larger "pearl" measures about 5.76 ×5.58 mm. Photo by Maha DeMaggio.

dissolution: Comer sites on the surface of the diamonds etch faster than edge sites, and edges dissolve faster than flat or curved surfaces, resulting in a smoothly polished round stone. Because the process is destructive, we have only seen the results of treating "industrial" (non-gem) diamond crystals.

Custodiam, a Brussels firm, is also marketing "diamond pearls," according to the December 1996 issue of *Antwerp Facets* (pp. 37, 39). They also grind rough diamonds into spheres, which they then "polish" by chemical etching. Belgian designers—such as Christiguey and Jan Pycke—are using these "pearls" in jewelry.

COLORED STONES AND ORGANIC MATERIALS

Andradite from Arizona. Mineral collectors are familiar with the clusters of brownish green andradite crystals, some with iridescent surfaces, that have been found for many years at Stanley Butte in Graham County, Arizona. Although these specimens typically have bright surfaces and sharp crystal faces, they are not transparent enough to facet. This year at Tucson, however, Charles Vargas of Apache Gems, San Carlos, Arizona, was offering gem andradites (figure 3) from a new locality near Apache Camp on the San Carlos Apache Reservation,- this is about 10 miles (17 km) from the Stanley Butte locality.

These garnets come from a contact zone between carbonate-rich basement rocks and basalt lava flows, according to Mr. Vargas. The garnet deposit was discovered only recently, in June 1996, and there was no evidence that it had been worked earlier. The garnets occur as dodecahedral crystals, with calcite, in pockets in multiple decomposing dikes within a 15 square-mile (about 40 km2) area; up to 18 inches (about 45 cm) of topsoil covers the dikes. As of early April 1997, Mr. Vargas reports, the largest fashioned andradite weighed about 4 ct; production was a few kilos per month of faceted stones, ranging in size from melee to just over 1 ct.

We examined 10 andradites (see, e.g., figure 3), which weighed 0.10 to 1.51 ct. All had properties typical for andradite garnet: brownish greenish yellow to yellow- brown color, singly refractive optic character, R.I. greater than 1.81 (over the limit of a standard refractometer), and no reaction (inert) to both long- and short-wave ultraviolet radiation. Specific gravity values—determined hydro—statically-averaged 3.92 (18 readings on nine stones). All 10 samples had a line at 440 nm in a desk-model spectroscope. Visible through the microscope were healed fractures, "fingerprints," growth banding, a few dark crystals (in two stones), and two-phase inclusions (in four stones). The growth banding was visible as linear or roiled features in plane-polarized light and showed first- to low-second-order interference colors between crossed polarizers. No "horsetail" inclusions were seen.

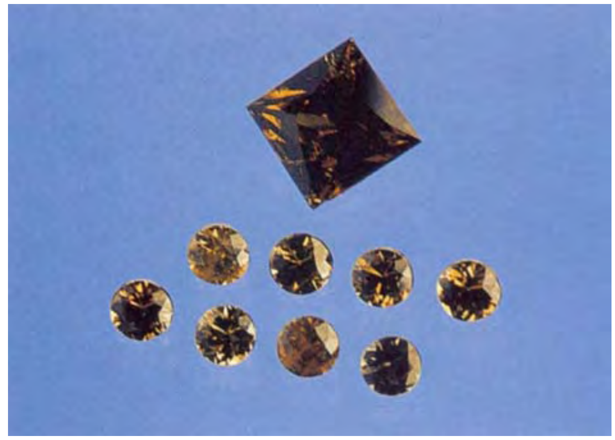


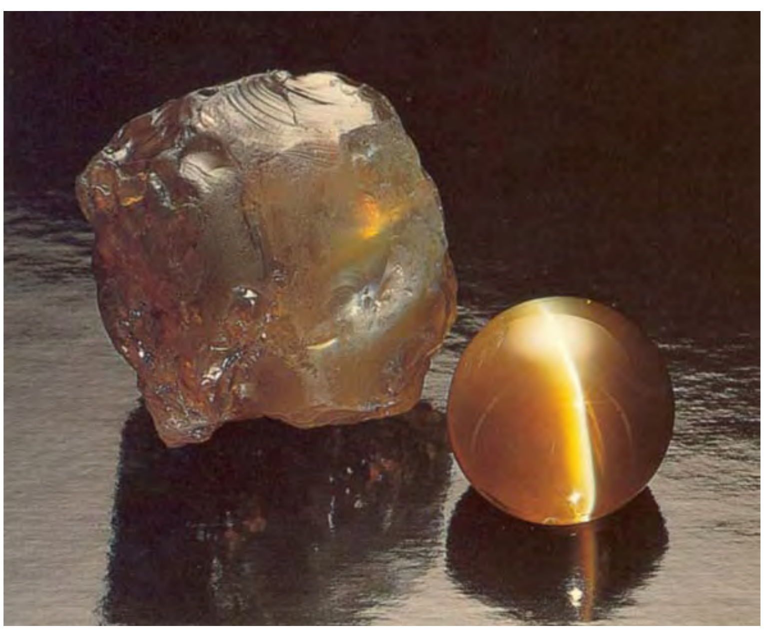
Figure 3. These nine faceted andradites (0.10–1.51 ct) are from a newly discovered contact metamorphic deposit on the San Carlos Apache Reservation in Arizona. Stones courtesy of Apache Gems-, photo by Maha DeMaggio.

Carved aquamarine with natural crystal faces. In the Winter 1996 Gem News section (p. 283), we reported on faceted stones that had incorporated naturally etched faces of the original crystal. The stones illustrated were gem varieties of beryl; this mineral, occurring as it does in late-stage pegmatites, often shows shattered or dissolved surfaces that have healed into well-defined crystal faces. Mark Herschede Jr., of Turmali and Herschede, Sanibel, Florida, showed one of the editors another variation on this same idea using aquamarine from the Ukraine. Not only did the approximately 45 ct stone include part of the natural crystal, but carver Glenn Lehrer (Lehrer Designs, San Raphael, California) had also fashioned the bail as part of the pendant (figure 4).

Cat's-eye chrysoberyl. One of the notable stones at the AGTA show was a large, fine cat's-eye chrysoberyl (figure 5), shown by Evan Caplan of Los Angeles, California. The 72.68 ct cabochon is reportedly from the Faisca area in northeastern Minas Gerais, Brazil, which has been producing relatively large quantities of fine chrysoberyl since 1939 (see, e.g., K. Proctor, "Chrysoberyl and Alexandrite from the Pegmatite Districts of Minas Gerais, Brazil," *Gems & Gemology,* Spring 1988, pp.16–32). Two flat sur faces on the back

Figure 4. This approximately 45 ct aquamarine pendant, shown here as viewed from the side, was carved both to include faces from the original crystal and to provide its own bail. Carving by Glenn Lehrer, courtesy of Turmali and Herschede-, photo by Maha DeMaggio.

Figure 5. Some particularly fine cat's-eye chrysoberyl from Brazil was shown in Tucson this year, including this 72.68 ct cabochon and the accompanying 317.7 ct piece of rough. Courtesy of Evan Caplan; photo by Robert Weldon.



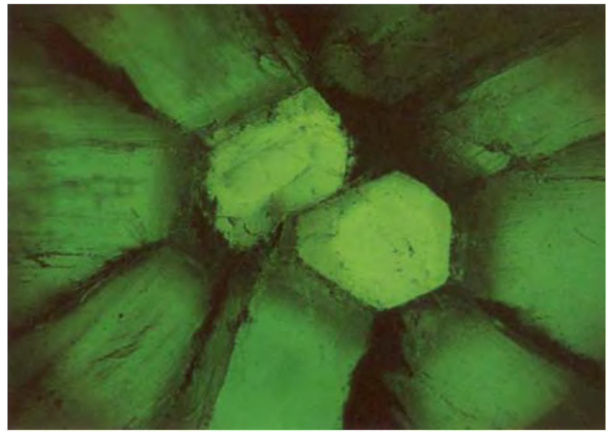


Figure 6. The double center in this 3.50 ct trapiche emerald is most unusual. Photomicrograph by John I. Koivula; magnified 5×

of the stone marked where two pieces had been removed to cut two smaller cabochons. Mr. Caplan the also had a large (317.7 ct) piece of rough chatoyant chrysoberyl that also reportedly originated from the Faísca area.

Unusual trapiche emerald. Ron Ringsrud of Constellation Colombian Emeralds, Saratoga, California, displayed a variety of trapiche emeralds from Colombia at his booth in the AGTA show. One cabochon was particularly unusual, in that it had two central columns, each with the black "spokes" typical of trapiche emeralds (figure 6). The 3.50 ct oval cabochon measured 10.24 × 8.95 × 5.97 mm. The double-column structure extended completely through the stone and appeared to taper only slightly from the dome to the base of the cabochon. Perhaps the double center resulted from parallel growth of two individual crystals that were later incorporated into one piece as growth continued. This double-center trapiche emerald was the first that Mr. Ringsrud or any of the Gem News editors had encountered (although K. Nassau and K. A. Jackson showed a trapiche emerald slice with two inter-grown crystals in the April 1970 *Lapidary Journal,* p. 82).

The return of jet. The natural hydrocarbon jet became popular in mourning jewelry in the late Victorian era. With the recent interest in black opaque materials (see, for instance, "Some Gemological Challenges in Identifying Black Opaque Gem Materials" by M. L. Johnson et al, Winter 1996 *Gems & Gemology,* pp. 252–261), we noticed more jet at Tucson this year, including bead necklaces from Czechoslovakia. At the Pueblo Inn, Russian dealer Serguei Semikhatov of Lithos, Irkutsk, had blocks of massive jet and a few carvings, including the bear shown in figure 7. The material is being quarried near the village of Matagan, on a river leading into Lake Baikal north of the city of Irkutsk, according to Mr. Semikhatov. The Russian name for this material is "gagate."

"Bicolor" labradorite. So-called "spectrolitc"—

Figure 7. This 71.1 × 42.1 × 41.1 mm bear was carved from the hydrocarbon jet, which is being quarried near Matagan, Russia. Photo by Maha DeMaggio.

labradorite feldspar with iridescent schiller—is by no means a new material, and the locality at Ylämaa, Finland, is also well known. However, this year, G.P.G. Trading of New York City, in conjunction with Jogan Oy, Mikkeli, Finland, was marketing large quantitites of cabochons—in a variety of shapes—that had been cut from this material. Subsequently, one of the editors saw a nicely patterned 9.51 ct rectangular cabochon with a distinct delineation between two colors of sheen (figure 8) at the booth of another firm, the D&R Collection, Los Angeles.

According to Don Pier, of G.P.G. Trading, the leaseholder recently extracted 650 tons of material from this locality, using earth-moving equipment. The Ylämaa deposit is located close to the Russian border and the Arctic circle,- the nearest town is Lappeenranta. Mr. Pier estimates that the deposit is about 5 m wide by 40 m long by 80 m deep; because it is in a permafrost region,

Figure 8. This 9.51 ct labradorite cabochon from Finland (17.65 × 13.75 × 4.01 mm) has blue and orange schiller in a "bicolor" pattern; the center white stripe probably marks the boundary between two adjacent crystals. Photo by Maha DeMaggio.

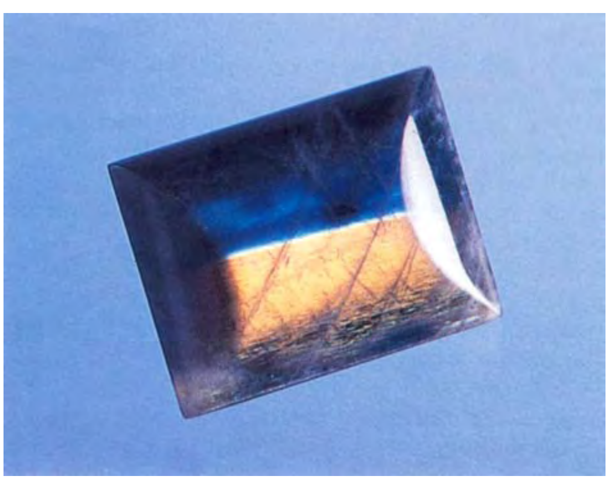


Figure 9. This 20.58 ct "rainbow" obsidian cabochon (19.20 × 16.39 × 10.91 mm) has been carved at its broadest point to produce a heart-shaped pattern of iridescence. Note the hole-visible on the right, where the cabochon has been drilled for easy stringing on a chain or cord. Photo by Maha DeMaggio.

mining is possible only three months a year. The labradorite is being fashioned into calibrated goods by cutters in Sri Lanka.

"Rainbow" obsidian hearts. We have reported in the past on "rainbow" obsidian from Mexico, which shows layered schiller in interference colors (see, e.g., Summer 1993 Gem News, p. 133). In 1996, many dealers were showing this material fashioned in a new way: A groove cut into the widest part of an oval or pear-shaped cabochon the size of a paperweight produced a pattern of concentric hearts. This year, Zee's of Tucson, Arizona, added yet another twist: Jewelry-size cabochons with the heart pattern were drilled through their tops, so that a chain or cord could be passed directly through the piece (figure 9).

Botryoidal white opal from Milford, Utah. The botryoidal opal from Milford, Utah, has been known for at least 20 years. Since 1996, William Cox, a gem cutter from Provo, Utah, has been cutting this material into flat-topped free-form cabochons with curved schiller—a result of the botryoidal internal layering. Mr. Cox is marketing these cabochons as Satin Flash opal.

We examined the cabochon shown in figure 10. With magnification, we saw a structure of curved layers throughout this material; some layers showed crazing in reticulated patterns, but cracks were confined to individual layers for the most part and did not extend through the stone. Some small rounded white crystals were also visible,- these were clumped in small patches rather than distributed evenly throughout the material. When examined with crossed polarizers, the stone did not

Figure 10. This 37.18 ct opal fmm Milford, Utah demonstrates schiller from its curved internal surfaces. Stone cut by William Cox, provided courtesy of Richard Shall, Out of Our Mines, Arcata, California; photo by Maha DeMaggio.

Figure 12. This rough section of a concretion from the Volga River, and the cabs cut from similar material, have surfaces of naturally iridescent drusy pyrite. The largest cab measures 21.73 × 13.02 × 4.61 mm. Stones courtesy of foe Jelks; photo by Maha DeMaggio.

show the extremely high strain characteristics of hyalite opals from most localities. The cabochon had a typical opal R.I. of 1.45, and a specific gravity—measured hydrostatically— of 2.14; it was inert to both long- and short-wave UV.

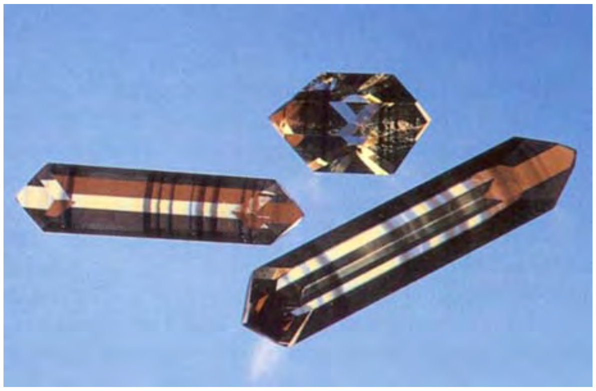
Similar opal from Utah—banded in translucent brown and translucent-to-transparent white—was seen in the booth of Charles R. Richmond, Blountville, Tennessee. Marketed as Candy-Stripe opal, this material could be carved into cameos or striped cabochons, depending on the orientation.

Petrified palm wood as an ornamental material. Women's fashions sometimes affect the popularity of certain gemmaterials. For instance, last year's emphasis on bright orange, yellow, and lime green clothing helped spark interest in "Mandarin" spessartine garnets, peridot from Pakistan, and grossular-andradite garnets from Mali. This year, one fashion trend is a growing interest in "animal prints"—fabrics designed to resemble the hide patterns of leopards, zebras, and other animals. Joe Jelks of the Horizon Mineral Co., Houston, Texas, markets cabochons of certain naturally patterned stones as "animal print" cabochons, including Australian "zebra rock" (sec, e.g., Gem News, Summer 1994, pp. 128–129). Another material that is enjoying increased popularity—in part because of its resemblance to animal patterns—is petrified palm wood from Louisiana, Texas, and Arkansas. Although this is not a new material, custom jewelry makers are beginning to explore its design possibilities. The three pieces of petrified palm wood in figure 11 show some of the colors and patterns in which the material is available. The 45 × 42 mm brooch, by Nature/Man, Lyons, Colorado, contains tan wood with a leopard pattern in black; while the rough samples from Ancient Earth, Hurricane, Utah, are reddish brown with tan patterns and tan with brown patterns.

Figure 11. Petrified palm wood shows a variety of colors and animal patterns. Photo by Maha DeMaggio.

Drusy iridescent pyrite from Russia. The interest in drusy materials continues unabated. One new material this year was drusy pyrite, found as crystals lining concretions in the bed of Russia's Volga River. We borrowed samples of rough and fashioned material (figure 12) from Joe Jelks of the Horizon Mineral Co. The concretions are gathered from one section of the Volga when the water is shallow. The pyrite is naturally iridescent, according to Mr. Jelks, and has not been artificially tarnished. The concretion material itself is sufficiently strong that a separate backing material is not required.

"Wasp-tail" citrine/smoky quartz. Klaus Schafer, a young gem carver from Idar-Oberstein, Germany, cuts exacting stones from humble materials. This year, he showed several bar-shaped faceted stones cut from a



Figuie 13. These quartz "wasp-tails" (4.4 to 9.61 ct) were cut from a chunk of heat-treated citrine/smoky quartz from Brazil. Stones courtesy of Klaus Shäfer; photo by Maha DeMaggio.

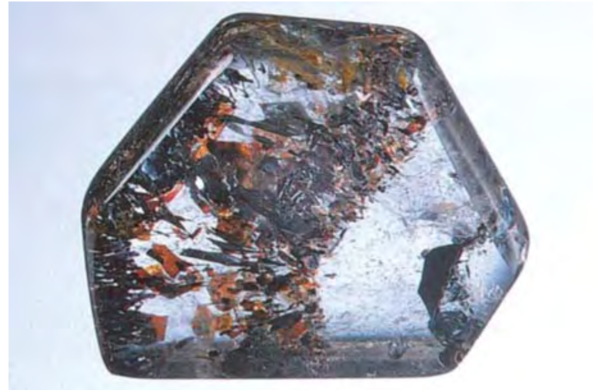


Figure 14. Thin plates of bright red-to-black hematite, with an iridescent "rainbow" tarnish, are visible in this 25.59 ct polished free-form hexagonal tablet of quartz from Yakutia. Photo by Maha DeMaggio.

single heat-treated piece of banded citrine and smoky quartz (figure 13). The bars had been carefully cut—perpendicular to the growth zoning that paralleled a rhombohedral face—so that the color bands were distinct. Mr. Schäfer calls these pieces "wasp-tail" quartz, but he agreed that they also looked like bar codes. He showed these at the booth of Richard Bernhard and Company, Idar-Oberstein.

Quartz with "rainbow" hematite inclusions . . . We have seen quartz included with red iron oxides from Madagascar (Fall 1995 Gem News, pp. 209–210) and Kazakhstan ("strawberry quartz," Spring 1995 Gem News, pp. 63–64). This year at Tucson, Vladimir Chernavtsev of Charmex, Moscow, was showing quartz included with very thin hexagonal to irregular plates of hematite, showing an iridescent "rainbow" tarnish; this material came from Aldan Mountain in Yakutia. A 25.59 ct polished free-form hexagonal tablet (22.20 ×18.47 × 6.50 mm) is shown in figure 14. The thicker hematite plates look black and opaque, but those that are thin appear transparent red and some plates show regions of both colors.

... And with pyrite inclusions. Aventurescence in quartz is generally thought to be caused by the presence of many tiny platelets of the chromium-colored variety of mica known as fuchsite. In such quartzes, the inclusions are randomly oriented. Thus, in almost any cutting orientation, a sufficient number of the platelets show essentially the same reflective direction, so that aventurescence occurs in reflected light without a special need to orient the rough before cutting.

However, Gem News editor John Koivula acquired another form of aventurescent quartz from the Gemological Center, Belo Horizonte, Brazil. The host material was a 70.48 ct oval faceted rock crystal quartz that measured 40.01 × 21.44 × 12.67 mm (figure 15). Here, the mineral inclusion causing the aventurescence was pyrite.

The pyrite inclusions creating the distinctive reflectance did not display the isometric crystal habits typical for this mineral. Instead, these crystals grew as disks in a fracture plane in the quartz host. As seen in figure 16, these inclusions strongly resemble the so-

Figure 15. Aventurescence in this 70.48 ct rock crystal quartz is caused by light reflecting off a multitude of pyrite inclusions. Photo by Maha DeMaggio.

Figure 16. The disk-shaped aventurescence-causing pyrite inclusions in the stone shown in figure 15 formed along a single fracture plane. Photomicrograph by John I. Koivula; magnified l0×.

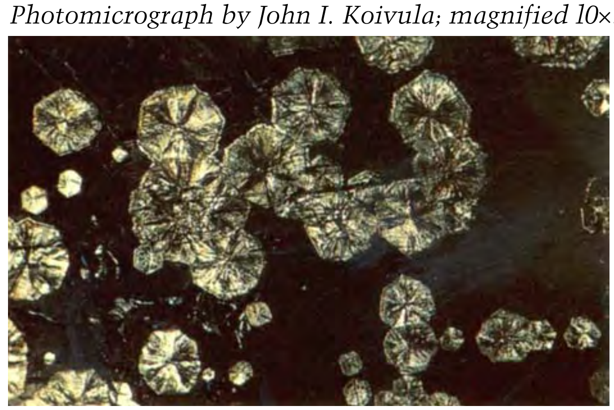


Figure 17. The color in this 2.28 ct Tundura sapphire is exceptionally vivid. Courtesy of Malhotra Inc.; photo by Maha DeMaggio.

called pyrite "sand dollars" or "suns" that are found as concretions between bedding planes in black and gray shale and slate.

To create the unusual aventurescence, the lapidary had to position the layer of pyrite disks at an angle just off-parallel to the table facet. This was done so that the aventurescent effect could be seen without the distraction of light reflections off the table facet surface. This need for specific orientation of the inclusion plane is in direct contrast to the random orientation of cutting quartz in which the aventurescence is caused by fuchsite.

Orange sapphire and other gems from the Tundura region. East Africa continues to produce astounding gems. One example is shown in figure 17: a 2.28 ct bright slightly reddish orange natural sapphire from the Tunduru region of Tanzania, shown by Malhotra Inc., New York City. Mr. Malhotra said that he had not seen a stone of such color in his 40 years in the trade. The stone had been cut in Bangkok and may have been heat treated.

Other unusual materials from Tanzania (seen at the booths of New Era Gems, Grass Valley, California) included: peridot and "mint" (light green) and "honey" (brownish yellow) grossular from Mcrelani; and light-pink and light-purple to "rose pink" spinel from Pokot, near Tunduru. According to Bill Vance of New Era Gems, some blue-to-purple spinels from Tunduru look pink when viewed through the Chelsea filter, so he suspects that they contain cobalt.

Tanzanite in abundance: Gem carvings and "enhydro" crystal section. Tanzanite was readily available in Tucson this year. One possible reason was that-in addition to the "traditional" tanzanite mines (see, e.g., Summer 1996 Gem News, pp. 135–136)—the gem is now being recovered as a byproduct of large-scale graphite mining in the Merelani region, as reported in the *Mineralogical Record* (T. Moore, "What's New in Minerals: Denver Show 1996," Vol. 28, No. 1, 1997, especially p. 60). In addition to plentiful supplies of calibrated goods, we saw some notable individual pieces. New Era Gems showed several examples, including a 255.75 ct terminated blue crystal that contained an obvious fluid inclusion, with a movable gas bubble (figure 18). They also showed contributing editor Shane McClure a trio of tanzanite gem carvings: a rabbit, a frog, and a horse head (figure 19).

Another firm, Affro Gems of Dallas, Texas, had some tanzanites with unusual colors, including a medium-toned grayish blue stone that was similar in color to some blue zircons.

Tourmaline from the Neu Schwaben region, Namibia: A major new player. After an initial offering at the Hong Kong show last September, tourmaline from Indigo Sky Gems of Windhoek, Namibia, made its U.S. debut at Tucson. The Neu Schwaben deposit is alluvial in nature, according to the company's managing director

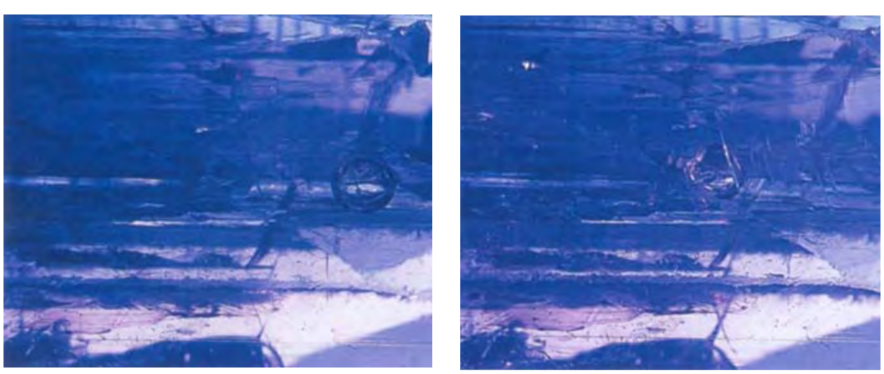


Figure 18. This 255.75 ct tanzanite crystal contains a fluid inclusion with a large gas bubble that, as is evident in these two photos, moves freely within the liquid. Courtesy of New Era Gems; photos by Maha DeMaggio.

Chris Johnston, it is expected to produce fine green, blue, and blue-green tourmalines of all sizes, from calibrated goods to major single gems, for many years to come. Several articles about this deposit have already been published in the trade press, including the November 1996 issue of *Modem Jeweler* ("Neu Schwaben Tourmaline," by David Federman, pp. 17-18); the December 1996 issue of Asia Precious ("Namibian Tourmaline Touches the Sky," by Robin Bower, pp. 96–98); and the January 1997 issue of Colored Stone ("Blue Tourmaline Makes Name for Namibia," by Greg Bartolos, pp. 539, 558–560). Mr. Johnston co nfirmed that the production information in these articles was essentially correct.

The Neu Schwaben deposit has been known to sources in Idar-Oberstein since 1925, but it has been mined by the present company only for the last year or so. Current estimates of the reserves are 12.5 million carats of gem-quality tourmaline (from 500,000 to 750,000 tons of alluvial gravels). The deposit covers a tourmaline-bearing dike—a potential source of additional material—that is about 1 km long. The Indigo Sky Company will only market cut stones, not rough; current production is 10,000 calibrated stones per month, about 10% of which are 1 ct or larger. Several large stones (see, e.g., figure 20) have been cut, with the largest to date approximately 65 ct.

The Indigo Sky Company is operating under Namibia's Export Processing Zone regulations, which are intended to encourage employment of local workers,- the company hopes to employ 150 local miners, with some of the profits being invested in providing regular medical care for workers and their families. According to Mr. Johnston, attempts are being made to mine the deposit in an "ecologically responsible fashion," so that sustainable long-term development over the mine's projected 20-year life will be accompanied or followed by reclamation of the mine site.

Gemological information on this material will appear in a forthcoming issue of *Gems & Gemology.*

TREATMENTS

Gold-electroplated jade and silver ore. Bill Heher of the Rare Earth Mining Company, Trumbull, Connecticut, always brings unusual material to Tucson. New this year were nephrite jade cabochons that had been electroplated with gold (figure 21). According to Mr. Heher, only the green and black nephrite from an old deposit near Victorville, California, responds to this treatment. This material contains magnetite inclusions, to which the gold attaches. Sometimes, only some of the black inclusions accept the gold plate (again, see figure 21). Mr. Heher first saw such treated material (not fashioned into cabochons) many years ago in Idar-Oberstein, and he had been trying to obtain some of this nephrite for many years. Finally, letters he wrote to several West Coast lapidary clubs resulted in the discovery of a few pounds of rough.

Figure 19. These are the first carvings made from gem tanzanite that the editors have seen. This 55 × 22 × 33 mm frog, 62 × 37 × 33 mm rabbit, and 44 × 26 × 12 mm horse head were at the booth of New Era Gems. Photo by Maha DeMaggio.

SYNTHETICS AND SIMULANTS

Assembled stones using inset gem material. It is well known that color concentrated in the culet of a stone will appear to be spread evenly throughout the gem

Figure 20. This 46.48 ct (23 × 18 mm) emerald-cut tourmaline from Neu Schwaben, Namibia, is representative of the fine material that this region produces. Stone faceted by Martin Key, courtesy of Indigo Sky Gems; photo by Maha DeMaggio.

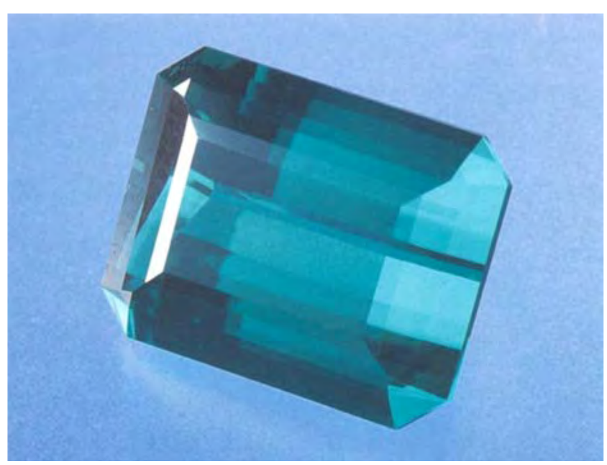


Figure 21. Magnetite inclusions in some nephrite, such as this 56.62 ct crescent-shaped cabochon (65.8 × 17.75 × 4.38 mm), form artistic patterns when electroplated with gold. Photo by Maha DeMaggio.

when that stone is viewed face up. David Brackna, a gem cutter from Germantown, Maryland, told staff gemolo-gist Cheryl Wentzell that he has found another use for this effect. For example, he set an approximately 3 mm cabochon of Australian opal within the culet area of a 14 × 12 mm faceted green beryl from the Ural Mountains in Russia (figure 22, left). Face up, the opal's play-of-color is reflected throughout the larger stone (figure 22, right). Mr. Brackna calls this technique "optical inlay."

To create this effect, Mr. Brackna first fashioned the rough beryl into an antique cushion mixed cut with a step-cut crown ("Harlequin cut"). The culet was cut off, and a concave "divot" was fashioned into the culet area of the main piece. A small opal cabochon was glued into the divot with UV-curing epoxy; the UV content of daylight was sufficient to set this glue in about 15 seconds. A replacement culet was then fashioned from a piece of beryl similar to the main piece. To increase the dispersive effects of the opal's play-of-color, Mr. Brackna carves high crowns on his pieces. The concave facet on the inside of each piece magnifies the effect of the inset material.

In the two months before the Tucson shows, Mr. Brackna cut and assembled 25 such stones. Other shapes are possible, including round and fancy cuts. For the bodies of these assembled stones, Mr. Brackna has used amethyst and citrine, as well as aquamarine and golden beryl.

Red and purple hydrothermal synthetic beryl. Two mysterious emerald cuts were turned over to GIA by the Tucson police in 1996. One, 0.81 ct, was red and the other, 0.90 ct, was red-purple (figure 23). Apparently, they had been found at a show that year and were never claimed by their owner. The red sample (measuring 7.06 × 5.10 × 3.30 mm) was strongly pleochroic—with orange (ordinary ray) and purple-red (extraordinary ray) colors; the pleochroism was so strong that the color of the sample varied from orangy red to purplish red depending on its position and orientation relative to the viewer and the light source. The red-purple emerald cut (7.05 × 5.16 × 3.64 mm) was also strongly pleochroic, with the ordinary ray orangy red and the extraordinary ray red-purple. The two samples were cut in different orientations: The optic axis ran down the length of the 0.81 ct piece, but through the width of the 0.90 ct piece.

Gem properties in common for both samples included: specific gravity (2.68, measured hydrostatically), lack of reaction (inert) to both long- and short-wave ultraviolet radiation, lack of visible luminescence, and an orangy red color when viewed through a "Chelsea" color filter. Features visible with magnification were "chevron" growth zoning (typical for hydrothermal synthetic beryl), pinpoint inclusions,

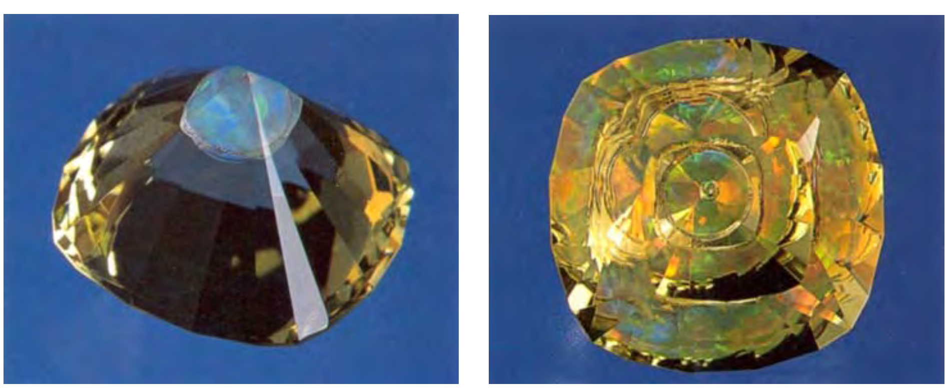


Figure 22. Left, a small opal cabochon was inserted into the culet area of this 11.82 ct assembled stone, and then covered with a replacement culet of green beryl similar to that used for the body. Right, when the stone is viewed face up, the play-of-color from the opal appears throughout. Courtesy of David Brackna; photos by Maha DeMaggio.

and stringers. The samples differed in some properties, however: The 0.81 ct red had refractive indices of 1.568-1.572 (birefringence 0.004) and a complicated absorption spectrum when viewed through the handheld spectroscope—with a diffuse band at 420 nm, a broad 435-465 nm band, a faint band at 500 nm, a diffuse weak band at 530 nm, a strong 545 nm band, and lines at 560 and 585 nm. In contrast, the red-purple 0.90 ct emerald cut had refractive indices of 1.575–1.581 (birefringence of 0.006) and a simpler absorption spectrum—a diffuse 435 nm band, a diffuse band at 540–580 nm, and weak lines at 650, 660, and 670 nm. EDXRF revealed major amounts of Al and Si in both samples, as well as trace amounts of Mn, Fe, Ni, Cu, Zn, Ga, and Rb; the red-purple 0.90 ct example also contained Ti and Cr. All these properties were consistent with hydrothermal synthetic beryl; the samples' complicated absorption spectra are not surprising, given the many chromophores present.

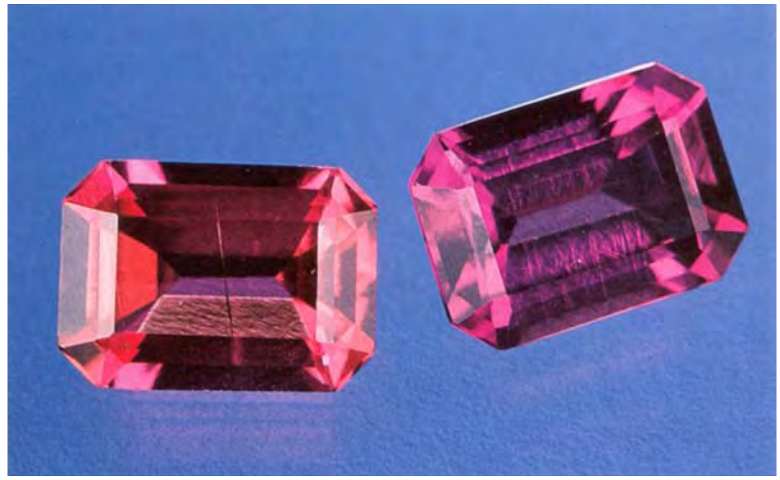


Figure 23. These samples (0.81 and 0.90 ct), left unclaimed after the 1996 Tucson show, turned out to be hydrothermal synthetic beryls. Photo by Maha DeMaggio.

Dichroic glass as an opal imitation. Nancy Goodenough is an artist from San Francisco, California, who works in glass. She creates dichroic glass cabochons (figure 24) that could be mistaken for white opal, nonphenomenal white opal, and the blue opal from Peru. Another artisan, Susan Slayton of Earthly Enchantments, Covina, California, has been creating free-form cabochons of dichroic glass that she then etches to create a matte surface (again see, figure 24). Neither artist creates these items specifically to imitate opal. However, we saw a display at one show in which such cabochons were scattered among free-form cabochons of boulder opal. They could easily have been mistaken for opals by the unsuspecting.

Figure 24. These cabochons of dichroic glass could be mistaken for opals. The large free-form piece, by Susan Slayton, measures 34.38 × 24.24 × 10.61 mm and weighs 64.82 ct; the round cabochons, by Nancy Goodenough, range from 1.30 to 4.40 ct (the largest is 10.4 mm in diameter). Photo by Maha DeMaggio.

Aventurescent synthetic quartz. In the quest to develop more varieties of synthetic quartz, not all experiments are successful. One exhibitor from the state enterprise VNIISIMS (the Russian Research Institute for the Synthesis of Minerals and Pilot Plant), Alexandrov, Vladimir Region, Russia, showed contributing editor Shane F. McClure two examples of an experiment gone awry. The scientists at VNIISIMS were attempting to synthesize aventurescent quartz by including flakes of copper in their hydrothermal synthesis; however, the copper flakes attached only to the middle seed plane of the synthetic quartz (figure 25).

Synthetic opal in glass. Opal is in some respects an atypical gem material because of its durability problems,- however, the beauty of opal gives it considerable value despite the risks of damage inherent in wearing it. Gilson synthetic opal is actually more durable than most natural opal, in our experience, as it is more heat resistant and does not craze. Using this durability advantage, Gerry Manning of Manning International, New York City, was offering briolettes, hearts, and spheres (figure 26) of glass with Gilson synthetic opal chips in the center, similar to the faceted "Gemulets" mentioned in the 1992 Tucson Gem News report (Spring 1992, p. 65). When examined between crossed polarizers, two spheres showed strain colors up to first-order blue, as well as flow lines and spherical gas bubbles. This implies that the glass was in a molten state when it was poured around the synthetic opal chips. A natural opal probably would not have survived this treatment.

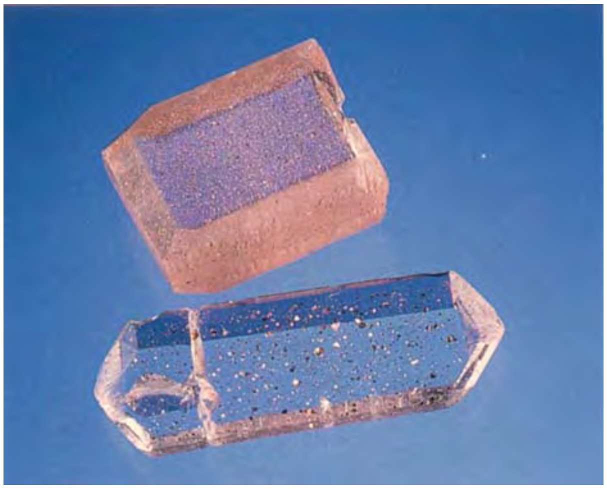


Figure 25. These two crystals of synthetic quartz (44.28 and 15.28 ct, respectively) were produced in an attempt to simulate aventurescent quartz. The spangled inclusions are metallic copper. Samples courtesy of VNIISIMS; photo by Maha DeMaggio.

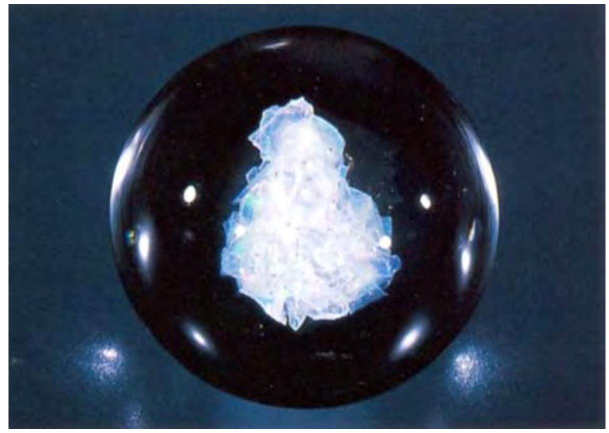


Figure 26. This 26.55-mm-diameter sphere has a center of Gilson synthetic opal. Photo by Maha DeMaggio.

MISCELLANEOUS

"Amphoragems." Many brightly colored gemmy materials are primarily available as small crystals or crystal fragments; they only appear as larger pieces on rare occasions, or at prohibitive prices. While thinking about the design possibilities inherent in a small Paraiba tourmaline crystal, Brian Charles Cook of Nature's Geometry, Graton, California, had the idea of amplifying the effect of its color by enclosing it in a magnifying setting of optical-grade quartz. This idea is the basis of the assemblages that he calls "Amphoragems," in which small euhedral crystals with saturated colors are placed in liquid-filled wells in curved quartz bottles (figure 27). Crystals of more than one material may be used in the same piece, and the cap of the "amphora" may be quartz or another material. The "bottles" may stand alone or be worn as pendants. Among the materials that have been placed in the centers of these "Amphoragems" are spessartine and chrome pyrope garnets, Paraiba tourmalines, red beryls, gold nuggets, diamond crystals, and abalone pearls; materials chosen for the caps include chrysoprase, chrysocolla, rutilated quartz, amethyst, aquamarine, and black jade.

ANNOUNCEMENTS

Gems & Gemology wins three out of five. For the third time in the past five years, *Gems & Gemology* won first place as best journal in the prestigious American Society of Association Executives (ASAE) Gold Circle competition. *Gems & Gemology* has won awards in the competition for five consecutive years, including twice winning first-place trophies for best scientific-educational feature articles. *Gems & Gemology* Technical Editor Carol M. Stockton, of Alexandria, Virginia, accepted the award in early December on behalf of the journal.

Figure 27. The "Amphoragem" assemblage in this necklace contains crystals of (top to bottom): green gahnite, spessartine from Brazil, and red beryl from Utah. The body of the piece is quartz and the cap is rhodochrosite from Tadjikistan. Courtesy of Nature's Geometry; photo by Maha DeMaggio.