GEM NEWS

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DIAMONDS

De Beers unveils Centenary diamond. On May 1, 1991, De Beers's Deputy Chairman, Nicholas Oppenheimer, unveiled the 273-ct Centenary diamond (figure 1). Described by De Beers as the largest reportedly flawless diamond outside the British Crown Jewels, the Centenary was fashioned from a 599-ct piece of rough recovered from the Premier mine in South Africa in July 1986. The rough was unveiled in Kimberley on March 11, 1988, to commemorate the 100-year anniversary (centenary) of De Beers Consolidated Mines Ltd.

The Centenary diamond is the third largest diamond to come from the Premier mine; the two largest are the 530.2-ct Great Star of Africa (Cullinan I) in the Imperial Sceptre and the 317.4-ct Lesser Star of Africa (Cullinan II) in the Imperial State Crown, both part of the Crown Jewels display in the Tower of London. These two stones, however, were fashioned prior to the development in the 1920s of modern, symmetrical cuts. The Centenary, therefore, is the largest modern-cut, top-color, apparently flawless diamond in the world.

A team of specialists spent three years preparing, cutting, and polishing the Centenary under the direction of famous cutter Gabi Tolkowski. Almost five months were needed for the initial shaping. Next, a total of 13 specific shapes were sketched and polished in hundreds of plastic models. By March 1990, a modified heart shape had been chosen and final polishing was begun; this process was completed more than a year later, in April of 1991. Although experts believe it is almost impossible to value, the Centenary diamond has been insured for over US$100 million.

The Premier mine, which is also where the Cullinan rough was found, is situated near the small Transvaal village of Cullinan, east of Pretoria. The kimberlite pipe on which the mine was established is the largest of 14 in the Cullinan area and, at an estimated 1,200 million years old, is one of the oldest known kimberlite deposits. The Premier mine is famous for large and beautiful stones, often of superb quality. It has produced almost 300 stones larger than 100 ct.

Figure 1. The 273-ct Centenary diamond is one of the largest faceted diamonds in the world. Photo courtesy of the Central Selling Organisation.

Large "chameleon" diamond. Among the most notable of colored diamonds are those referred to as "chameleon" diamonds because of the unique color alteration they show. These normally green stones will temporarily become yellow when they are either heated slightly or left in darkness for a period of time. The yellow color, however, is not stable, and the stones will revert in seconds or minutes to their original color when they are removed from the source of heat or exposed to light.

The editors recently examined an unusually large (9.92 ct) "chameleon" diamond, a round brilliant cut shown to us by Barry Shore of Dynamic Tangibles Corp., Los Angeles. Under normal conditions, the stone is light greenish yellowish gray (figure 2), but it temporarily changes to light brownish yellow when heated with the flame of an alcohol lamp.

Soviet production estimates updated. Vitaliy N. Efremov, deputy director of the Siberian branch of the USSR Institute of Geology and Geophysics, reported that 1989 production of diamonds in the USSR totalled approximately 15 million carats, half of gem quality. These represent the first production figures ever released by Soviet officials and exceed previous estimates by the

U.S. Bureau of Mines. (*Diamant*, October–November 1990)

Australian marine search for stones. The Australian company Cambridge Gulf Exploration is the first in that country to have obtained a permit to explore offshore waters for gems. The company believes that diamonds exist at the bottom of the Timor Sea. (*Diamond Intelligence Briefs*, October 18, 1990, p. 697)

World-record auction price for a diamond. At their November 14, 1990, auction in Geneva, Sotheby's sold a D-color, internally flawless, 101.84-ct diamond. The pear-shaped mixed cut brought a world-record auction price of $US12,760,000. The stone, purchased by international jeweler Robert Mouawad, has been named the Mouawad Splendour. (Sotheby's press release dated November 16, 1990)

Update on diamond mining in Brazil. On a recent trip to Brazil, Patricia Maddison, senior staff gemologist in the GIA Gem Trade Laboratory, visited an alluvial diamond mine located in the far north of the country near the border with Guyana.

Mining is carried out on a high plateau in an almost dry river bed. A hydraulic cannon loosens the sediments (figure 3), which are then fed via a pipeline into a crude separator jig used to recover both gold and diamonds (figure 4). As in other areas of Brazil, the diamonds are a secondary product of what began as a gold-mining operation.

Figure 2. At 9.92 ct, this is an unusually large "chameleon" diamond. Photo by Robert Weldon.

Figure 3. A hydraulic cannon loosens the sediment prior to separation at this alluvial mining operation in northern Brazil. Photo by Patricia Maddison.

The owner of the mine stated that diamond production averaged approximately 15 carats a month; most of the diamonds Ms. Maddison saw were distorted octahedral and twinned crystals ("macles"), of gem quality. She visually estimated the weights as ranging from about 10 points to 3 ct. Many of the crystals had what appeared to be brown or green radiation stains on their surfaces, as is commonly seen on diamonds from Brazil. Ms. Maddison was told that a number of similar mines—with comparable production—were being operated elsewhere in the area, including across the border in both Guyana and Venezuela.

Jewelry-quality diamond crystals. While cutting is usually required to bring out the elegance of most "rough" gem-quality diamonds, occasionally we encounter natural crystals so beautiful in form that cutting seems

Figure 4. The separator jig shown here is used to recover both gold and diamonds in this Brazilian alluvial mining operation. Photo by Patricia Maddison.

unwarranted. Recently, the editors had the opportunity to examine two such crystals (figure 5) that were loaned for study by Marvin Finker, president of Trillion Diamond Co. of New York. The well-matched crystals weighed 0.97 ct and 0.92 ct, respectively, and measured 6.71 and 6.89 mm. Mineralogically, they would be classified as twins. Their form suggests that of twisted macles, with one twin member displaced by a rotation of 60° from the other, so that distinct hexagrams are formed. These six-pointed stars are in the shape of a Magen David (Star of David). Because of their similar size and weight, these make an exceptional pair.

Bluish gray synthetic diamond thin films grown on faceted diamonds. Since the mid-1980s, great progress has been made in the low-pressure synthesis of diamond (see, e.g., Fritsch et al., *Gems & Gemology,* Summer 1989, pp. 84–90). Although a number of industrial applications for these thin films have been developed, until recently the process was not refined to the point where it was useful with gem materials. Now, however, the deposition of a very thin film of type IIb blue synthetic diamond on the surface of a faceted near-colorless diamond has been accomplished, which has considerable potential for the gem industry.

To explore possible identification criteria for such a treatment procedure, Dr. Emmanuel Fritsch of the GIA Research Department had two faceted emerald-cut diamonds (0.33 ct and 0.36 ct) and a rough octahedron (1.15 ct) covered with such a thin film by Dr. Andrew Phelps, who at the time was with the Diamond Materials Institute, State College, Pennsylvania. The faceted stones originally color graded G and H–I (figure 6, left).

Deposition was carried out using the hot-filament technique. After a careful cleaning, the stones were placed on the assembly surface table-down, so only the pavilion and part of the crown could be coated. The substrate assembly was heated to 950°C during deposition. Carbon monoxide, used as a source of carbon, was metered into the reactor in the hydrogen gas stream. Boron was introduced into the growth environment as the extremely poisonous gas diborane, also diluted in hydrogen. Deposition time was typically 25 minutes.

The results were dramatic: All three stones appeared dark bluish gray (figure 6, right). Both the dark color and the high electrical conductivity (130 v on a Simpson meter, compared to 20 to 50 v for most natural blue diamonds) are attributed to the high concentration of boron in the thin film (approximately 220 ppm). The film produced is approximately a third to a quarter of a micron thick. It is monocrystalline, growing in atomic continuity with the substrate diamond.

Examination of the stones with a gemological microscope provided the most useful identification criterion: The thin film does not cover facet junctions very well, creating a whitish appearance similar to minor abrasion (figure 7). This feature typically is not seen on natural blue diamonds.

Figure 5. These "Star of David" diamonds (0.97 and 0.92 ct, respectively) make beautiful gems in their uncut form. Photo by Robert Weldon.

Figure 6. A dramatic difference can be seen in these two near-colorless faceted natural diamonds (0.33 ct and 0.36 ct) and one rough octahedron (1.15 ct) before (left) and after (right) they were coated with a synthetic bluish gray diamond thin film grown by low-pressure synthesis technology. Photos by Robert Weldon.

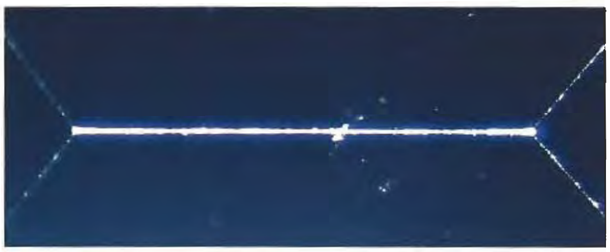

Figure 7. Whitish irregularities at the facet junctions of a diamond coated with a colored synthetic diamond thin film provide proof that this treatment procedure has been used. Photomicrograph by John I. Koivula; magnified 10×.

COLORED STONES

African gem update. On a recent trip to Idar-Oberstein, Dr. Emmanuel Fritsch received updates on gem production in a number of African countries. Eckehard Petsch gave GIA two parcels of tourmaline rough. One represents the wide range of colors produced at Karibib, Namibia. These include blue, bluish green, yellow, saturated pink, orange, and "watermelon." Some pieces were in the form of distinct gem nodules. The other parcel shows the range of colors from Chipata, Zambia: predominantly brownish green and brownish orange. Mr. Petsch also donated samples of rough morganite and emerald from Madagascar.

Local dealers reported that ruby production from the Morogoro area (Matombo and Maheng) of Tanzania has increased. The Umba Valley in Tanzania is now producing pink sapphires with an orangy secondary color that is reportedly much closer to a true "padparadscha" color than the so-called "African padparadscha" that has been on the market for several years.

Madagascar is producing large quantities of brownish purple ("wine") colored tourmaline, although much is of a very low quality that is purchased primarily by Indian dealers for their domestic market. Karoi, Zimbabwe, is the source of large quantities of aquamarine. Some of the material is rather translucent but makes good cabbing material. This locality also produces cat's-eye aquamarine.

Amethyst from Afghanistan. Amethyst has one of the widest distributions of all gem materials. Among its commercial sources are Brazil, Uruguay, Namibia, Zambia, Mexico, Sri Lanka, South Africa, the U.S., and the USSR.

Recently, Gary Bowersox of Gem Industries, Honolulu, Hawaii, came across a new source: Pasmazal, an area in Afghanistan that lies between Parian Village in the northern Panjshir Valley and the Anjuman Pass. He loaned GIA one fashioned and two rough specimens for gemological investigation. The 13.70-ct fantasy cut (fashioned by Bart Curren) is transparent and dark grayish purple (figure 8). All gemological properties were

Figure 8. Afghanistan is the source of the rough amethyst from which this 13.70-ct fantasy cut was fashioned. Photo by Robert Weldon.

Figure 9. These specimens, reportedly from Pakistan near the border with Afghanistan, consist of corundum and green muscovite mica. Photo by Robert Weldon.

consistent with those reported in the literature for amethyst. Magnification revealed color zoning and subhedral negative crystals, both of which are typical inclusions in this gem species.

Unusual corundum/mica carving material. One of the more unusual carving materials to be seen in recent years is a purple-to-red corundum in green zoisite matrix from Tanzania, which is popularly called "ruby in zoisite." Recently, Gary Bowersox showed the Gem News editors rough and fashioned pieces of a similar green-matrix material with center portions that ranged in color from pink-purple to red (figure 9). The samples superficially resembled the East African material but were mined near Wear Village, Timargara District, Dir, Malakand Agency, Northwest Frontier Province, Pakistan. Mr. Bowersox subsequently loaned some fashioned pieces, and donated a rough specimen, to GIA for gemological study.

One 22.81 × 18.12 × 5.19 mm fashioned piece tested had a translucent, purple-pink center with a thin, translucent, green "rim." Refractometer readings taken on the partially polished base revealed vague shadow edge readings of 1.76 for the central portion and 1.70 for the perimeter. When examined between crossed polars, both portions gave aggregate reactions. When exposed to long-wave ultraviolet radiation, the center portion fluoresced a very strong patchy red; the rim was predominantly inert, with two areas that fluoresced a moderate chalky greenish white. To short-wave U.V., the center fluoresced a moderate to strong patchy reddish purple while the rim was essentially inert. When examined with a desk-model prism-type spectroscope, the center portion showed an absorption pattern typical of ruby and purple sapphire; no distinct absorption features were noted for the rim. Magnification revealed numerous twinning planes in the "core" and some whitish veining in the rim.

X-ray diffraction analysis of a minute sample from the rim was performed by Christopher Smith, of the West Coast GIA Gem Trade Laboratory. The pattern produced matched the standard ASTM pattern for muscovite mica. On the basis of this final piece of information, this particular piece of carving material was identified as a rock consisting of purple-pink sapphire and muscovite mica.

Joint venture for Russian emeralds. According to the Mazal U'Bracha News Service, a joint venture has been established to polish emeralds from the Ural Mountains in the Soviet Union and market them in the West, with a projected annual revenue of about $40 million. The joint-venture company, known as Emural, was established by the USSR Ministry of Nuclear Energy, which is responsible for the production of Uralian emeralds. The Soviet partners in the joint venture are Moscow Plant Polimetal, Techsnabexport, and Malysheva Mines Management; the non-Soviet partner is Panama-based Vanico Group Inc., which is collaborating with an Israeli group that has the polishing skill and technology as well as the experience in marketing emeralds worldwide. Ben-Zion Harel of Hargem, in Israel, is chairman of the Emural board of directors.

Emural will be based in Moscow and is scheduled to employ about 160 Soviet citizens in two cutting factories, one in Moscow and one near the mine. Workers will be trained in Israel both to operate the cutting equipment and to sort, price, and market the finished goods. The joint venture will reportedly have at its disposal the entire emerald production from the Urals and intends to process standard sizes as well as matched stones. The emeralds will be marketed through four sales offices on as-yet-unspecified "different continents."

Large carved labradorite. At the February 1991 Tucson show, Regal Reflections, of The Woodlands, Texas, was offering a large selection of phenomenal labradorite from Madagascar. These were fashioned into various geometric shapes, including cubes of 50 and 70 mm on a side and spheres ranging from 20 to 200 mm in diameter. The material has a predominantly gray body color with blue labradorescence. The firm's owner, Robert Walker, stated that he had approximately 900 kg (one ton) of the material on hand, all of which had been fashioned in Madagascar.

Fine greenish blue opal. Most of the opal used in jewelry exhibits at least some play-of-color. Notable exceptions are those transparent-to-translucent materials with vivid body colors (such as the orange to red fire opal from Mexico) and those with saturated body colors (such as the yellowish green prase opal from Tanzania).

At the February Tucson show, we saw another attractive nonphenomenal opal. This material, fashioned as free-form cabochons, looked very similar to the finest chrysocolla in chalcedony: It was translucent to semitranslucent with a strong, medium slightly greenish blue "turquoise" body color (figure 10). According to Nanette Forrester of American Lapidary Artists, Los Angeles, the material was mined in the Andes Mountains of Peru. After it was identified as opal at the GIA

Figure 10. Copper is probably the cause of the unusual color of these opal cabochons (1.05 and 4.58 ct), which are reportedly from Peru. Photo by Maha Smith.

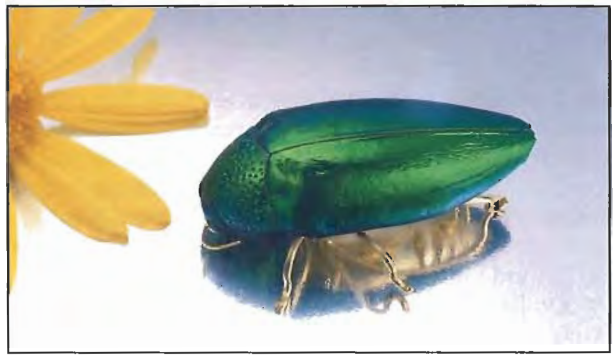

Figure 11. This iridescent beetle has been fitted with brass wire legs, antennae, and a mounting pin for use as a brooch. Courtesy of Erika Koivula; photo by Robert Weldon.

Gem Trade Laboratory, it was examined by Dr. Emmanuel Fritsch of GIA Research. EDXRF and U.V.–visible spectroscopy revealed Cu^{2+} as the coloring agent. Dr. Fritsch hypothesized that the copper is present as submicroscopic inclusions, as is the case with similar-appearing chalcedony colored by the mineral chrysocolla.

Another phenomenal organic gem material. A number of organic materials are used for ornamental purposes; among these, pearl and the mother-of-pearl variety of shell are especially prized for their iridescent colors, on the basis of which they are classified as phenomenal gems.

Another phenomenal organic "gem" was reported in the Fall 1989 Gem Trade Lab Notes section of *Gems & Gemology*: the chitinous, iridescent exoskeletons of beetles that embellished a diamond-set brooch. Recently, the Gem News editors came across similar insects being used for jewelry purposes: iridescent, yellowish green beetles approximately 1½ in. (38 mm) long with brass wire legs, antennae, and mounting pins. These had been fabricated for use as brooches (figure 11). According to the vendor, the beetle pins originated in Thailand.

Cultured pearls auction. The first auction of Cook Islands cultured black pearls was held in Rarotonga, Cook Islands, on June 12 of this year. Buyers from 32 companies, most of which were based in Japan, were in attendance. Fifty-four lots comprising 39,000 pieces were offered; 20, comprising 22,671 pieces, sold. The remaining lots were withdrawn when bids failed to reach the reserve price.

According to information provided the editors by the Cook Islands Pearl Farmers Association, some concern was expressed at the relatively large number of silvery gray baroque cultured pearls offered. Auction Administrator Reuben Tylor pointed out, however, that several buyers snapped up these pearls, preferring them to those with stronger hues.

Green zoisite. One of the newer topics mentioned at the 1991 International Colored Gemstone Association (ICA) Congress and the International Gemological Symposium, both held last June, is the availability of green zoisite from Tanzania. According to Idar-Oberstein gem dealer Horst Krupp, who has worked extensively in Tanzania, some of this material is a rich "emerald" green color reminiscent of some of the green tourmalines from Paraíba, Brazil (figure 12). Although the existence of green zoisite has been known for years, the material that has come on the market recently represents the first significant production. Dr. Krupp informed us that the rough was found at a site called Opec in the Merelani district, which is the major source of tanzanite. Because

Figure 12. Commercial quantities of green zoisite have recently emerged from the Merelani district of Tanzania. This stone (over 2 ct) is courtesy of Pala International, Fallbrook, CA; photo © Tino Hammid.

this deposit was discovered during the Gulf War and the color of some of the material apparently resembled that of the Iraqi army uniforms, the local miners refer to it as "combat." A number of people in the trade are marketing this material as "green tanzanite" or "chrome zoisite"; some have suggested the name "Güblinite" in honor of Dr. Edward Gübelin.

Dr. Krupp reported that gem-quality pieces as large as 60 grams have been recovered from this primary deposit. The color ranges from a dark "petroleum-like" green to yellowish ("olive") to bluish green to greenish blue (similar to aquamarine). Production figures are not available at the present time.

ENHANCEMENTS

Faceted Aqua Aura update. In the Fall 1990 Gem News section, we reported on faceted quartz and topaz gems that had been treated with the Aqua Aura process, that is, the application of a thin film of gold to produce a blue apparent color with overlying iridescence. This note included information relating to the durability of the treatment.

In response to that entry, the editors were contacted by Al Gilbertson of Gem Profiles, Portland, Oregon, who subsequently did some durability testing of his own, which he kindly offered to share with our readers.

Because his concern centered on how the treatment would hold up under normal handling conditions when stones were mounted in jewelry, he gently buffed one of the stones on a buffing wheel with jeweler's rouge—the kind of abrasive action a stone might face when prongs were buffed. This procedure resulted in the removal of some of the gold coating from the stones where it came in contact with the polishing wheel. In a follow-up experiment conducted by the editors, similar damage was observed during the polishing of prongs on a ring set with an Aqua Aura–treated topaz. The fact that normal polishing in the course of jewelry manufacture or repair will remove some of the gold coating should be taken into consideration by anyone working with Aqua Aura–treated gems.

Plastic-treated jadeite. Plastics and synthetic resins have found a number of applications in the enhancement of gemstones. For example, Opticon, an epoxy resin, is used to fill surface-reaching breaks in emeralds; plasticizers have been used to seal the growth tubes in cat's-eye tourmalines.

Recently, the use of such a substance to enhance jadeite has been noted in the literature. A report in the November 1990 issue of *Jewellery News Asia* ("Coating on Jadeite"), based on information from Mrs. C. M. Ou Yang of the Hong Kong Gems Laboratory, described a resinous coating on polished jadeite that appears to improve both transparency and luster. Such treated material had been seen in both Japan and Hong Kong.

This article was soon followed by a press release from the Gemmological Association and Gem Testing Laboratory of Great Britain that was subsequently distributed as ICA Laboratory Alert No. 43. This describes the GA/GTLGB's examination of a similar plastic-treated polished jadeite disc obtained in Hong Kong. They found that the R.I., S.G., Chelsea color filter reaction, and absorption spectrum as viewed through a desk-model spectroscope were consistent with untreated jadeite. Key identifying features of the treatment were the relative absence of the fine surface "fractures" normally associated with jadeite when viewed under magnification; concentrations of the coating material forming irregularities on the surface of the specimen (figure 13); and a melting, or softening, of the coating when a thermal reaction tester was placed close to the sample's surface. Infrared spectroscopy carried out on a surface scraping of the coating material identified it as a type of epoxy resin. Kenneth Scarratt, chief executive of the GTLGB, stated his belief that the treatment described in the *Jewellery News Asia* report is the same as that used on the specimen examined by his lab.

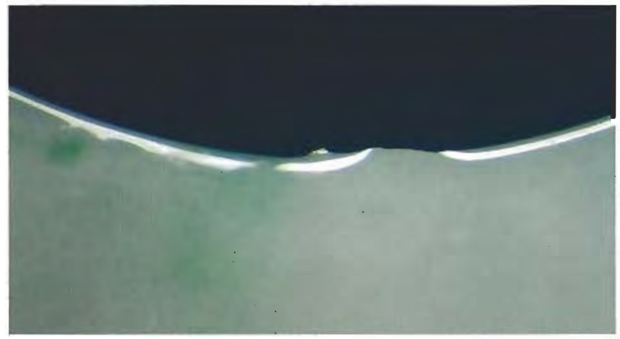

Figure 13. Concentrations of the transparent colorless coating on this carved jadeite were evident as irregularities on the inner surface of the hololith when examined under magnification. Photomicrograph by John I. Koivula; magnified 10×.

Dyed quartzite imitation of dyed jadeite. Yet another interesting imitation was spotted at a gem show recently: uniform strands of semitranslucent beads being offered as "dyed lavender jadeite." The Gem News editors purchased one strand of approximately 10-mm beads for study (figure 14).

Although at first glance the beads appear to be uniform in color, closer inspection revealed darker color concentrations. Magnification quickly showed these to be confined to a dense network of fine, surface-reaching cracks; the material itself was essentially colorless. To determine the depth of penetration of the dye, we split one of the beads in half; the dye was distributed throughout, from the surface to the core (figure 15).

Gemological testing readily identified the material as quartz. We concluded that the beads are dyed quartzite imitations of dyed lavender jadeite.

SYNTHETICS AND SIMULANTS

Chatham signs agreement with Japanese crystal grower... In a move designed to increase production and meet growing demand, Chatham Created Gems has agreed to a joint effort with a Japanese crystal growing concern in Kobe, Japan. In 1980, Earth Chemicals LTD, a multi-faceted conglomerate, purchased the production rights and facilities from Gilson S.A. of Geneva, manufacturers of Gilson synthetic emerald, opal, turquoise, and imitation coral. According to a Chatham spokesperson, the current agreement will reportedly lead to the production of Chatham Created Emeralds at the facility in Japan, while Chatham will become exclusive distributor in the U.S. and Canada for Gilson synthetic emerald (Gilson synthetic opal will continue to be marketed in the U.S. by the Gerry Manning Co. of New York).

... and issues warning on trademark infringements. In response to what it sees as growing misuse and abuse of the Chatham® name, Chatham Inc. has issued reminders to the jewelry industry to use the Chatham name only when selling Chatham products.

According to the Chatham firm, infringements on their trademarked name have taken two forms. In some cases the materials being passed as their products were of the same basic type as theirs but were manufactured by other firms. In other instances, the materials were imitations such as CZ and YAG. While some of the misidentification is attributed to misinformation, other cases are seen as deliberate misrepresentation with intent to deceive. Anyone who has ordered the firm's products by name but questions the authenticity of the goods received may send the questionable material to Chatham's California office for identification and, where possible, confirmation of supplier.

Novel fiber-optic glass. Man-made glasses consisting of bundles of parallel optic fibers have been used for many years to produce imitations of chatoyant gems. These have been marketed under such trade names as "Catseyte" and "Cathaystone." These gems are oriented in cutting so that the optic fibers are parallel to the base and at right angles to the length of the cabochon, thereby centering the chatoyant band across the length of the dome.

This past year the editors came across similar material being sold at local gem shows under the name "Fiber Eye." According to a flier provided by the vendor, Andria Bree Gem Co. of El Cajon, California, this material is a "product of the laser industry." It was available in two colors, white and brown. Some of the brown material, sold as both "rough" cylindrical sections and as cabochons, had been deformed so that the optic fibers were no longer straight. In some cabochons, this produced a sharp, wavy band across the dome that was reminiscent of a lightning bolt.

Michael Gray, a local gem cutter, purchased some of this material and cut from it a very unusual faceted stone. With the optic fibers intentionally oriented perpendicular to the table, the back facets are "projected" onto the crown of the stone (figure 16). This is similar to the effect seen when the fibrous mineral ulexite is placed over newsprint, for which it has received the nickname "TV stone."

Figure 14. These 10-mm dyed quartzite beads were misrepresented as dyed lavender jadeite. Photo by Robert Weldon.

New glass imitation of lapis lazuli. Man-made glasses have been produced to imitate a great number of nontransparent gem materials. Recently, the ICA released Laboratory Alert No. 44, "New Glass Imitation for Lapis Lazuli," which contains information from gemologist Elisabeth Strack of Hamburg, Germany.

On two occasions in late 1990, Ms. Strack was asked to identify a material resembling lapis lazuli, first in the form of a bead necklace and then as a loose fashioned "stone."

Photo 15. Note the complete penetration of the dye through this quartzite bead. Photo by Robert Weldon.

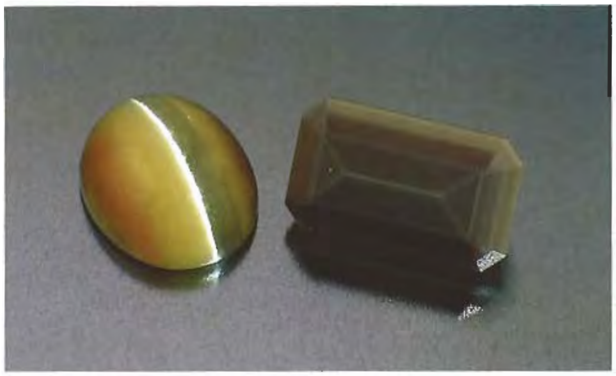

Figure 16. When this 4.13-ct (10.70 × 6.39 × 6.00 mm) "Fiber Eye" glass was faceted, the optic fibers were oriented perpendicular to the table, so that the back facets appear to be "projected." A typical cabochon is shown for comparison. Photo by Robert Weldon.

Figure 17. A thin slice of Mexican opal in acrylic resin is used to produce these "encapsulated" opal assemblages (13.34 × 9.68 × 7.50 mm, left; 12.13 × 9.13 × 6.76 mm, right). Photo by Maha Smith.

According to her report, the material is opaque and predominantly medium blue with darker blue portions that are distributed in a marbled pattern. It has a spot R.I. of 1.62, is inert to long-wave ultraviolet radiation, and fluoresces a very faint, powdery blue to short-wave U.V. The material displays a uniform distribution of tiny transparent, highly reflective, slightly brown flake-like spots, most of which were seen to have triangular outlines when examined with magnification. No doubt, these were intended to simulate pyrite inclusions in natural lapis lazuli.

"Encapsulated" Mexican opal. Thin slices of opal are often used to make both doublets and triplets, and we have also seen composites consisting of many small opal chips encased in transparent plastic.

At Tucson this year, Rockyland Gems & Jewelry of El Paso, Texas, had interesting composites that used opal from Jalisco, Mexico. Called "Opal Encapsulado" (encapsulated opal) by the firm's owner, Sergio Enrique Ávila Camino, these consisted of a slice of colorless, white, or orange opal encased within an oval "single cabochon" of acrylic resin (figure 17). They appear to have been made by first pouring some of the liquid resin into a dome-shaped mold, then inserting a slice of opal--its base coated with a black substance to provide contrast for the play-of-color--and, last, pouring a thinner second layer of resin to form the base and seal in the opal. Mr. Ávila Camino volunteered that these assembled stones were produced in Guadalajara, Mexico.

Plastic imitation opal from Thailand. One of the editors purchased from street vendors in Bangkok two unusual bracelets set with cabochons that somewhat resemble opal (figure 18). One of the pieces is set with eight very dark blue oval cabochons, ranging from approximately 6.0 mm × 9.0 mm to 10.0 mm × 15.7 mm; the other is set with eight black round cabochons of about 6.7 mm diameter each. All of the cabochons display eye-visible iridescent inclusions.

Gemological properties were fairly consistent for the cabochons in both bracelets: vague spot R.I.'s of 1.57; a strong, chalky bluish white fluorescence to long-wave U.V. radiation and a moderate, chalky yellowish green fluorescence to short-wave U.V.; and, when examined with a desk-model prism spectroscope, a series of fine absorption lines at approximately 10 nm intervals from about 430 nm to 700 nm. One cabochon in each bracelet was tested for hardness and hot-point reaction. Both were readily indented and scratched with a metal pin, and the heated tip of the thermal reaction tester produced burn marks, smoke, and a somewhat acrid odor in both.

With magnification—and in some cases with the unaided eye—we saw a multitude of primarily spherical

Figure 18. The cabochon seen here in a bracelet from Thailand is a plastic imitation of opal. Note the telltale spherical bubbles. Photo by Maha Smith.

gas bubbles in all the cabochons. They also contained thin, transparent, highly iridescent inclusions of various shapes that in darkfield illumination looked like colored cellophane; these were reminiscent of the iridescent foils in the glass imitation opal known as "Slocum stone." On the basis of this examination, the "gems" in both bracelets were identified as plastic imitation opal.

Update on Soviet synthetics. The Spring 1991 Gem News column included an entry on synthetic gem materials seen at the February Tucson show. Recently, one of the editors received an informative letter from Dr. G. V. Bukin, chief director of the Special Design and Technological Institute of Monocrystals in Novosibirsk, USSR, which sheds further light on developments in this area.

Dr. Bukin has spent the last 25 years studying the growth of gems used for jewelry applications. During that time, the most promising advances have been in hydrothermal and flux-grown synthetic emeralds, synthetic alexandrite grown from melts, and flux-grown synthetic spinel. Dr. Bukin relates that the flux-grown synthetic red spinels recently reported in the literature were most likely produced at his institute. This material is grown using "defective crystals" mined in the Pamir Mountains as feed stock, so the properties of the finished synthetic are very similar to those of natural Pamir spinel.

This past year, Dr. Bukin initiated what he describes as "large-scale production of created gems for marketing and trade." Materials being produced include all those mentioned above.

INSTRUMENTATION

Loupe with true darkfield illumination. The most versatile lighting technique for gem identification and clarity grading is darkfield. With this technique, the stone is illuminated from the side, causing small inclusions to stand out in high relief. Several portable instruments have been marketed that combine a magnifier with a penlight-type illuminator. None of these, however, has provided true darkfield illumination.

In response to this need, GIA GEM Instruments has developed the new Darkfield Loupe (figure 19): A fully corrected 10x magnifier in a darkfield housing is placed over a penlight source of illumination. The result is a magnification-plus-darkfield illumination unit that can be used virtually anywhere.

Figure 19. The GIA GEM Instruments' Darkfield Loupe combines true darkfield illumination with a 10× magnifier.

New cutting machines developed. Two new automated machines have been developed for cutting and polishing facets along the girdle of a diamond. The Robodiam machine, developed by the Belgian firm Hakodiam, has a grain-seeking capability, can polish a wide range of shapes, and can produce finished stones as small as 0.15 ct, polishing from four to 200 facets.

The Roundiam multifacet machine, introduced by the Israeli firm Varticovschi, can place between 16 and 110 facets on a diamond's girdle and features a special sequencing device that allows for the selection of several operations to be executed one after the other (*Diamond International*, November–December 1990, p. 16).

For colored stones, Sarin Research, Development & Manufacturing (1988) Ltd. of Ramat Gan, Israel, has announced the availability of their ROBOGEM computerized manufacturing system. According to a news release provided by the firm, the system uses image-processing technology to provide "optimal yield," a concept that links a marketing approach to a controlled manufacturing process. The system is said to be cost-effective for cutting even the most expensive gem materials, while its software permits the cutting of all common commercial shapes. There are operation programs for obtaining maximum weight, for shape preference, and for producing pairs and graduated sets. The basic work plan permits ROBOGEM to photograph the rough, select among the shapes possible the one that will result in maximum weight retention, and immediately perform the girdling, all within 30 to 60 seconds.

ANNOUNCEMENT

The Canadian Gemmological Association will hold their Second Annual Gem Conference on October 26 at the Novatel Hotel in North York, Ontario. The keynote speaker, David Callaghan of the Gemmological Association of Great Britain, will cover the Duchess of Windsor jewelry. Other speakers include David Pendergast of the Royal Ontario Museum, who will talk about Mayan jade; and Willow Wight from the National Museum in Ottawa, who will discuss their gem and mineral collection. For further information, call (416) 652-3137. Space is limited and early registration is recommended.