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ARAGONITE

A 55.10 × 37.80 × 9.04 mm white translucent carved pendant (figure 1) was recently submitted to the West Coast laboratory for identification. It had been represented to the client as nephrite jade.

The piece was similar in appearance to nephrite and had a comparable specific gravity of 2.84. Magnification revealed an aggregate structure. No absorption spectrum was seen with a desk-model spectroscope. The refractive index measurements, which were vague and difficult to determine because of the poor polish, gave values of 1.50 and 1.65. There was a decided "blink" effect when the Polaroid plate was rotated.

Other gemological properties were: moderate yellowish white fluorescence to long-wave ultraviolet radiation (with yellow fluorescence in fractures), moderate light yellow fluorescence to short-wave UV, and effervescence when touched in an inconspicuous spot with a minute droplet of a 10% hydrochloric acid solution. Although these properties were not sufficient to identify the material, they proved that it was not nephrite. The effervescence, together with the R.I. "blink" effect, indicated that it was a carbonate. X-ray powder diffraction analysis identified the carving as aragonite.

Aragonite is not often used as a gem material because of its low hardness (about 4 on the Mohs scale). A blue massive aragonite from Peru, with gemological properties slightly



Figure 1. This carved pendant resembled nephrite, but advanced testing techniques proved that it was aragonite.

different from those of this specimen, was described in the Winter 1992 Gem News section (pp. 269–270).

SFM and MLJ

DIAMOND**Different Colors from the Same Rough**

Yellow to brown colors in diamond are usually caused by nitrogen impurities found in various states of aggregation (see "Colour Centres in Diamonds," by A. T. Collins, *Journal of Gemmology*, 1982, Vol. 18, No. 1, pp. 37–75). It has been shown that

nitrogen is often distributed unevenly in the diamond crystal (see, e.g., "Fractionation of Nitrogen Isotopes in a Synthetic Diamond of Mixed Crystal Habit," by S. R. Boyd et al., *Nature*, Vol. 331, February 18, 1988, pp. 604–607). Consequently, it is common that two near-colorless diamonds cut from the same piece of rough will differ by a few color grades. Hydrogen impurities may also cause an uneven distribution of gray or brown color in diamond (see "Gemological Properties of Type Ia Diamonds with an Unusually High Hydrogen Content," by E. Fritsch and K. Scarratt, *Journal of Gemmology*, Vol. 23, No. 8, 1993, pp. 451–460).

Last fall, a diamond dealer shared a particularly vivid example of the consequences of such variability with staff members in the East Coast lab. Although he had noticed some unevenness to the color before sawing the rough diamond into the two pieces shown in figure 2, he had expected that the rough would produce two fancy-color stones. However, the larger of the two pieces yielded a 3.79 ct "radiant" cut with a color grade of Fancy Brownish Yellow, whereas the smaller piece finished out as a 0.78 ct pear shape of G color.

Although the two pieces had some similar gemological proper-

Editor's note: The initials at the end of each item identify the contributing editor(s) who provided that item.

Gems & Gemology, Vol. 32, No. 3, pp. 204–212

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Figure 2. These two pieces are from the same brownish yellow rough diamond. Nearly all the color ended up in the 7.32 ct portion, whereas the 1.35 ct piece is near-colorless.

ties—such as inclusions in both of small brown crystals (probably garnet, judging from their partly dodecahedral shape)—there were substantial differences in their infrared spectra, which reflect their different impurity concentrations. The larger, brownish yellow piece had strong peaks due to nitrogen and moderate hydrogen peaks; however, the near-colorless piece showed moderate nitrogen and weak hydrogen absorptions. The nitrogen in both pieces had the same aggregation state, with approximately equal amounts of A and B aggregates. Much of the color in the brownish yellow piece was concentrated in a

swirling cloud in the center, a distribution sometimes seen in hydrogen-rich diamonds (again, see the Fritsch and Scarratt reference cited above).

IR

Imitation Crystals

Since its introduction in the early 1970s, cubic zirconia (or “CZ”) has revitalized the diamond simulant market. Its availability in nearly every shape and facet arrangement provides ample evidence of its popularity. We have occasionally reported on CZ being fashioned into carvings and shaped into diamond-like crystal forms. Some of these “crystals” have had very believable diamond-like features, such as engraved triangular depressions to simulate trigons, engraved parallel lines to simulate growth striations, and “frosted” surfaces (see Gem Trade Lab Notes, Fall 1982, p. 169, and Winter 1988, p. 241).

A good example of this deception was recently seen in the East Coast lab: five fashioned CZ “crystals” (figure 3) that very much resembled modified octahedra, a shape common in rough diamonds. For comparison, we photographed five diamond crystals of similar size (see figure 4) to show just how convincing in appearance the look-alikes really were. Not only was the overall resemblance in shape striking, but one of the imitations (at the upper right in figure 3)

even had parallel lines engraved on a “face.” These lines closely mimicked the striations often seen on dodecahedral faces of rough diamonds with modified octahedral habit (see the upper right stone in figure 4), which are occasionally found on the small natural surfaces sometimes left on polished diamonds.

The ersatz “diamond” rough was submitted to the lab because the observant dealer noted that the “heft” did not feel quite right for diamonds. The specific gravity (5.80 compared to 3.52 for diamond), hardness, and ultraviolet fluorescence of these “crystals” were all consistent with published values for cubic zirconia.

GRC and TM

Natural, with Unseen “Flaws”

Rarely is any gemstone examined as carefully for the presence of inclusions as is diamond. This is just as true for pieces of rough as for polished stones. A client submitted both partially polished halves of what was originally a 40+ ct crystal to the East Coast lab for examination. The two pieces were worked on a day apart. Both fractured spontaneously (figure 5) in the early stages of cutting.

The highly experienced owner was surprised and puzzled that this had occurred. His rough stones were routinely examined before manufac-

Figure 3. These five imitation diamond crystals (4.62–26.24 ct) are actually cubic zirconia.



Figure 4. Compare the appearance of these five diamond crystals, ranging from 5.27 to 8.67 ct, to that of the imitations in figure 3.





Figure 5. These two diamonds, a 16.48 ct blocked round and an 18.15 ct blocked square, were cut from the same piece of rough, both fractured due to strain.



Figure 6. Here the diamonds shown in figure 5 are oriented and repositioned to demonstrate their original crystallographic relationship.

turing, both with a microscope to detect visible inclusions and with a polariscope to detect any extraordinary strain or graining. Some diamond categories and colors, such as browns, are noted for their high degree of internal strain. In these diamonds, the presence of strain often influences how the crystal is fashioned. For example, manufacturers will sometimes opt to forgo traditional sawing and keep the stone "whole" to avoid damage. Other times, they may orient the stone so that the sawing does not intersect the center of strain.

We repositioned the two pieces in their original relative orientation to illustrate their relationship in the original piece of rough (figure 6). Figure 7 (taken with a polarizing microscope) shows the blue first-order interference color from residual strain that is present in both pieces. The fractures in both pieces related to a single area of strain that was present in the rough crystal. Also present was a linear strain pattern along the octahedral graining near both culets, but its gray interference colors indicated that this strain was significantly lower.

Whether strain in a rough diamond will lead to spontaneous fracturing during fashioning is a matter of chance, but the presence of localized strain is an indication for concern. Sawing is thought to be the

most stressful event in diamond cutting; however, in this case the stone survived sawing perpendicular to the strain region, but the pieces fractured as faces were polished subparallel to the strain region. *TM and GRC*

Rare Color: Fancy Intense Pinkish Orange

Over the years, we have reported on a number of diamonds notable for their rare colors (see, for example, the Winter 1965–66 *Gems & Gemology*, p. 362, which illustrated a ring set

with natural green, blue, and red diamonds; Winter 1982, p. 228, which showed a chameleon diamond with a dramatic color change; and Summer 1988, p. 112, with a grayish purple round brilliant cut).

The 3.40 ct heart-shaped diamond in figure 8 is another addition to this list. It was graded Fancy Intense Pinkish Orange and Internally Flawless. (For a description of the GIA Gem Trade Laboratory color-grading system, see "Color Grading of Colored Diamonds in the GIA Gem Trade Laboratory," by J. King et al., *Gems & Gemology*, Winter 1994, pp. 220–242.) Not only was the hue unusual for diamond, but the saturation was unusually high for such a color: In the rare instances when we have seen diamonds in this hue, the depth of color has been much weaker (less saturated). The rough reportedly came from Angola.

Infrared spectroscopy revealed that the stone was a type IIa diamond (i.e., lacking measurable amounts of nitrogen). The fluorescence was very strong orange to long-wave UV radiation and moderate orange to short-wave UV. The long-wave reaction further enhanced the color of the diamond when viewed in the daylight. The absorption pattern seen with a desk-model spectroscope consisted of a broad band centered at 550 nm.

TM and IR

Figure 7. First-order interference colors—shades of blue—seen here in the partly polished 18.15 ct piece were actually present in both halves, indicating the presence of residual strain. Magnified 10×.



A Suite of Treated-Color Pink-to-Purple Diamonds

The East Coast laboratory recently had the opportunity to examine six known treated-color pink diamonds borrowed from a local dealer. Although treated pink diamonds are relatively uncommon, we have seen and documented a number of them over the past 25 years. The diagnostic properties noted before (see *Gems & Gemology*, Summer 1976, p. 172; Summer 1988, p. 112; and Summer 1995, p. 121) were also observed in these diamonds; however this parcel provided a few surprises.

Two of the diamonds showed strikingly unusual colors, which are immediately apparent in figure 9. Although GIA GTL maintains a policy of not issuing color grades for stones of treated color, these stones were put through the color-grading



Figure 8. The Fancy Intense Pinkish Orange color of this 3.40 ct Internally Flawless heart shape is rare.

process in order to locate their positions in color space and to compare them to the range of colors seen in natural-color pink diamonds. Treated pink diamonds are usually highly saturated, but dark in tone. The 0.05 carat orangy pink diamond, comparable to a grade of Fancy Vivid, was surprisingly light in tone for a treated-color pink, as well as being highly saturated. The pink-purple color of the 0.07 carat diamond is truly extraordinary, comparable to a grade of Fancy Vivid. Purple is an extremely rare color in diamond, and seldom



Figure 9. Among the colors displayed by this suite of treated diamonds are some that match or exceed the brightest natural pink colors seen in the lab to date. The 0.05 ct orangy pink and the 0.07 ct pink-purple stones, right, are particularly notable for their high saturation.

has the lab seen a purple of this high saturation in either a treated- or natural-color diamond. The orangy pink stone is at least as saturated as any natural-color diamond we have seen of similar hue. The colors of the other four diamonds lie on the edges of the distribution we have seen for natural-color diamonds, with the high saturations and medium-to-dark tones that are typical of treated-color pink stones.

In a desk-model spectroscope, all six showed the diagnostic spectrum for treated-color pink (or purple or red) diamonds: sharp absorption lines at 575, 595, and 637 nm. Most of these diamonds showed emission lines at 595 and 637 nm as well. They also luminesced the characteristic strong, bright orange to both long-wave and short-wave UV that is associated with the 637 nm color center. Last, although graining was present in all six diamonds, it was phantom graining (for the meaning of this term, see "The Elusive Nature of Graining in Gem Quality Diamonds," by R. E. Kane, *Gems & Gemology*, Summer 1980, pp. 294-314) with no relationship to the distribution of color within the gems. (By contrast, most natural-color pink diamonds show most, or all, of their color as colored graining.) One stone had a "streaky" color distribution (figure 10), but magnification combined with immersion revealed that this color lacked the planar appearance of colored internal graining and was largely confined to the surface.

Although the face-up appearance of both natural- and treated-color pink, purple, or red diamonds can be similar, the causes of the color are entirely different. Natural-color pink diamonds are type Ia or IIa and show a smooth, broad band in the visible spectrum at about 550 nm. (See E. Fritsch and K. Scarratt, "Natural-Color Nonconductive Gray-to-Blue Diamonds," *Gems & Gemology*, Vol. 28, No. 1, Spring 1992, pp. 38-39, for a complete discussion of diamond type.) Treated-color pink diamonds must contain at least some type Ib component, and are sometimes pure type Ib. Their visible spectra show the three sharp lines mentioned

Figure 10. The streaky pink color seen in this 0.05 ct treated-color pink diamond might be confused with the pink graining seen in natural-color diamonds. Examination at 10× to while the stone was immersed in methylene iodide reveals that the color is largely confined to the surface.



above, with a broad feature formed from the overlap of their sidebands. Vacancies in the atomic structure are created in these diamonds by laboratory irradiation, and then mobilized during an annealing process. Some of the vacancies become trapped at single substitutional nitrogen atoms, creating the NV center with its strong absorption at 637 nm.

In examining these six stones, we found that four were type Ib, as expected, but one had some additional type IaA component and one of the paler stones had what appeared to be a pure type IaA spectrum and an H1b peak (due to a vacancy trapped at an A aggregate, a common feature in treated yellow diamonds; again, see the A. T. Collins reference cited in a previous entry). We had not seen such a mid-infrared spectrum in a treated pink stone before. Although the infrared spectrum implied that this diamond had only A aggregates, the visible spectrum showed the 637 nm peak, so there must have been at least some single substitutional nitrogen to trap the vacancies.

The nitrogen content of all six of these diamonds was extremely low, and some of the initial infrared results suggested that a few of them

might have no nitrogen at all. For the stone that showed type IaA, it is probable that there was not enough single substitutional nitrogen to produce a detectable signal in the infrared spectrum. These diamonds demonstrate the time-honored gemological principle that identification must rely on *all* of the observed properties. A cursory examination might lead one to conclude that the paler stones are natural-color type IIa pink diamonds with orange fluorescence and faint pink graining. However, in our experience, such stones rarely show the 637 nm line, and never show the 595 nm line, in the hand spectroscope.

John King, Elizabeth Doyle, and IR

HERDERITE

In spring 1996, the West Coast lab received for identification a large ($25.86 \times 18.55 \times 13.31$ mm) pear-shaped stone that was transparent yellowish green (figure 11). The 38.91 ct stone proved to be an extraordinarily large herderite.

We recorded the following gemological properties for this stone: biaxial negative, with R.I. values of $\alpha =$

1.580, $\gamma = 1.611$, and β between 1.600 and 1.606; S.G. (measured hydrostatically) of 3.04; no reaction (inert) to long-wave UV radiation, but faint yellowish green fluorescence to short-wave UV. With a desk-model spectroscope, we observed an absorption line at 585 nm.

Microscopic examination revealed a small feather under the table, as well as scattered "pinpoint" inclusions in the stone. However, the most pronounced feature seen with magnification was the strong doubling of the back facets visible through the table. This was not surprising given the strong birefringence (0.031) and the depth of the stone.

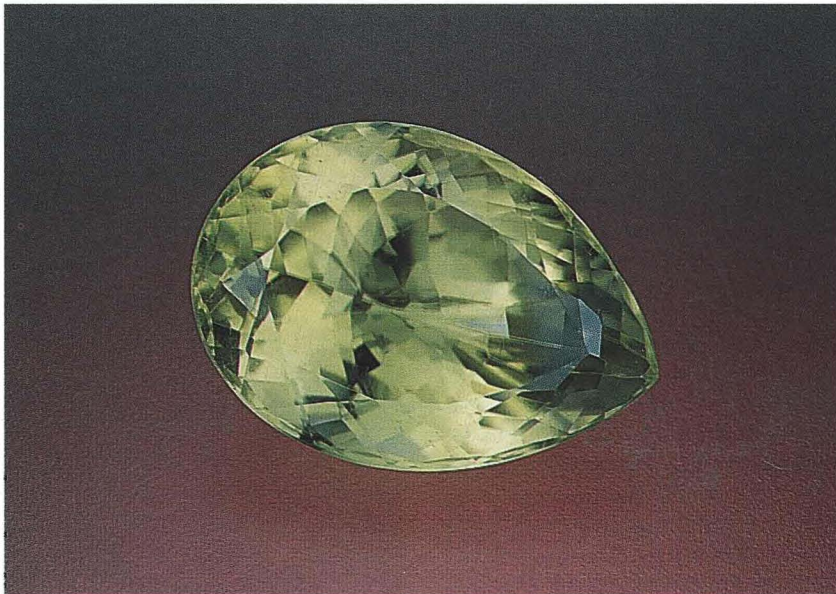
To satisfy our curiosity about this stone—and to characterize the material for our data files—we submitted it to energy-dispersive X-ray fluorescence (EDXRF) analysis. Calcium (Ca) and phosphorus (P) were the major elements found, along with minor manganese and trace amounts of lead, strontium, and yttrium. Gem herderite consists of material in the mineral series that has herderite, $\text{CaBe}(\text{PO}_4)\text{F}$, as one end-member and hydroxylherderite, $\text{CaBe}(\text{PO}_4)\text{OH}$, as the other. Because the elements beryllium (Be), oxygen (O), fluorine (F), and hydrogen (H) cannot be detected with our EDXRF system, we could not determine which end-member in the herderite-hydroxylherderite series is dominant in this stone. The manganese is probably responsible for the yellowish green color, which is similar to the color caused by manganese in some spodumenes. *MLJ*

JADEITE

An intricately carved hairpin (figure 12) with a dragon motif was submitted to the East Coast laboratory to determine if it had been treated. Reportedly, this ornate piece was from the Chinese Qing dynasty (1644–1912), which popularized the use of jadeite jewelry and *objets d'art*.

Standard gemological tests revealed properties that were consis-

Figure 11. This 38.91 ct faceted herderite is unusually large for this material.



tent with jadeite jade. The strength of the "chrome" lines in the absorption spectrum varied with the intensity of the green color. There was no reaction with a Chelsea filter. Even with magnification, no visible reaction was observed when a "hot point" was brought near the surface. In addition, the carving revealed a compact intergrowth pattern very different from the "honeycomb" structure sometimes seen in bleached and impregnated jadeite. Infrared spectroscopy showed no evidence of impregnation.

Unlike the simple Western definition of "Imperial jade" (jadeite of uniform intense green color and exceptional translucency), Asian criteria are more complex and take into account a combination of factors, including the highest quality green color and translucency, as well as the carving's quality and style (see "Asian News Section: Jadeite Jewellery in the Qing Imperial Court," *Christie's International Magazine*, May 1996, p. 73). We suspect that this hairpin might be considered "Imperial" by either standard.

The difficulty in detecting that a piece of jadeite has been bleached and polymer impregnated, which is now a common practice in the marketplace, has made it necessary to test all important pieces, regardless of their purported history. *GRC and TM*

OPAL, an Assemblage

An opaque gray free-form cabochon, displaying primarily green and blue play-of-color, was sent to the East Coast laboratory for identification. Since the stone was bezel set in a closed-back pendant mounting (figure 13), the client wanted us to determine if this opal was a quartz-top doublet or triplet, as is frequently encountered in the trade.

Visual examination showed that the top portion of the cabochon was obviously transparent. The play-of-color was not visible near the surface of the stone, but appeared to be confined to a deeper, somewhat opaque



Figure 12. Reportedly from the Qing dynasty, this 20.3-cm-long jadeite hairpin showed no evidence of polymer impregnation.

layer. The refractive index of the top, obtained by the spot method, was 1.52, which is lower than the 1.54–1.55 of quartz. Because of the irregular shape and the bezel mounting, it was difficult to determine an

optic character between crossed polarized plates, but the transparent top appeared to be singly refractive with little anomalous double refraction. When exposed to long-wave UV radiation, the cabochon fluoresced a

strong bluish white with a distinct phosphorescence. However, when the stone was exposed to short-wave UV, we noticed a faint chalky yellow fluorescence, which is not characteristic of colorless quartz. These properties proved that the transparent top portion was not quartz, but a different material.

Magnification did not reveal any obvious inclusions. However, using standard overhead illumination, we did locate a tiny gas bubble deep inside the transparent layer. This confirmed that the top was glass. Further examination of the underly-



Figure 13. This assemblage, which measures about 30 × 22 mm, has a colorless glass top over natural opal.

ing colored layer with strong light showed the usual structure of natural opal. We did not find any evidence of cement planes, so we could not determine if the cabochon was a doublet or triplet without unmounting it. Therefore, we simply identified the piece as an assemblage, with a colorless glass top over natural opal.

KH



Figure 14. Numerous thread-like "inclusions" were seen in these gray-blue assembled cultured blister pearls, which each measured about 6.35 mm in diameter.

Assembled Cultured Blister PEARLS, With Thread-Like Inclusions

Although gemologists do not expect to observe inclusions when examining pearls, staff members at the West Coast lab noticed some interesting internal features in cultured pearls that arrived last year for identification. The assembled cultured blister pearls, each of which measured about 6.35 mm in diameter, were an attractive light gray-blue. They were surrounded by old European brilliants, all set in a pair of earrings (figure 14).

The fact that these pieces were assembled was readily apparent with microscopic examination. Fiber-optic illumination revealed gas bubbles in the curved interface between the nacre and the half-bead nuclei. The flat bases of the cultured pearls had soft, wax-like backings attached. Not only was the gray-blue color unnatural, but fiber-optic illumination also revealed vivid color concentrations reflecting along hairline fractures in the nacre. Although these features indicated an artificial coloring process, we could not prove that one had been used.

The most interesting characteristic of these assembled cultured blister pearls were the thread-like inclusions in the nacre, which were again best observed with fiber-optic illumination. For the most part, these abundant inclusions appeared to be randomly oriented; they were long, curved, and continuous, with some shorter, more kinked threads splitting

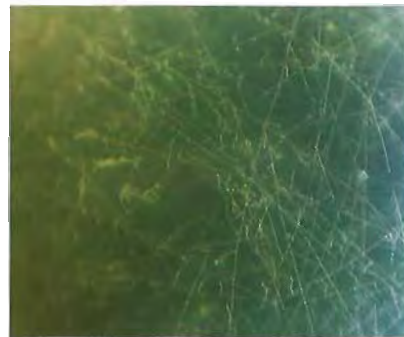


Figure 15. The long curved fibers in the assembled cultured blister pearls of figure 14 seemed, for the most part, to be randomly oriented. Magnified 25×.

off to the sides (figure 15). The laboratory was unable to identify the composition or origin of these inclusions.

CYW

QUARTZ, Single-Crystal Green

Last winter, the East Coast lab had the opportunity to examine a turn-of-the-century ring, stamped "Tiffany & Co.," set with an oval mixed-cut green quartz that was surrounded by fine-quality old-European brilliant cuts (figure 16). Both the setting and the company name indicated more respect for this gem than is typical today for similar single-crystal quartz of grayish green color. The ring may well represent an example of Tiffany's interest in promoting American gemstones, as green quartz was known at that time to occur in several localities (see G. F. Kunz, *Gems and Precious Stones of North America*, 2nd ed., 1968, Dover Publications, New York, pp. 120–122, 263). If so, it joins such American gems as Montana sapphires, chrome pyrope garnets, and American freshwater pearls, among others (see Gem Trade Lab Notes, Spring 1989, p. 37, and *The Tiffany Touch* by J. Purtell, 1971, Random House, New York).

This color of single-crystal quartz was rare until the mid-1950s, when it was discovered that amethyst from the Montezuma mine in Minas Gerais, Brazil, would turn green with



Figure 16. This turn-of-the-century ring from Tiffany features green natural quartz.

heat treatment. Such treated-color quartz is commonly known by the trade name "prasiolite." In recent years, the lab has also seen a few pieces of synthetic quartz with this grayish green color.

The stone in the ring proved to be natural quartz, as it demonstrated both Brazil twinning and parallel color zoning. However, it is not currently possible to distinguish naturally green quartz from heat-treated material. *GRC and IR*

SAPPHIRE, Unusual Treated Natural Sapphire

In the Spring 1996 issue of *Gems & Gemology*, we reported on flame-fusion synthetic corundum oddities. Earlier this year, within a short period of time, the East Coast lab received two rather odd natural sapphires of treated blue color. The first was a 70.20 ct oval cabochon (figure 17) with an incised design on the back. Microscopic examination revealed numerous fluid-filled "fingerprints" and unidentified crystals that were altered in ways consistent with heat treatment. Exposure to long-wave UV radiation produced little reaction, but the stone fluoresced a patchy chalky blue to short-wave

UV, further supporting the conclusion that it had been heat treated.

When examined with magnification in diffused light, several of the cavities and shallow fractures revealed blue color concentrations reminiscent of the effect sometimes seen in diffusion-treated stones (see, e.g., R. E. Kane et al., "The Identification of Blue Diffusion-Treated Sapphires," *Gems & Gemology*, Summer 1990, p. 124, figure 10). In this stone, the apparent color "bleeding" was actually a blue "dye," as was evident when the stone was immersed in methylene iodide (di-iodomethane; see figure 18). When we re-examined the stone with short-wave UV radiation and low magnification, the areas that luminesced corresponded to those with the blue dye. This treatment could easily have been confused with diffusion treatment because of the shallow penetration of the blue color in some areas.

The second stone (figure 19) was a diffusion-treated natural sapphire that had been quench crackled, making it more challenging to identify. Quench crackling, a relatively common procedure, is most often seen in quartz and beryl, which are quench crackled and then dyed green to imitate emerald. In the Summer 1996 Lab Notes section (pp. 125–126), however, we reported on a parcel of quench-crackled synthetic rubies. The crackling in this sapphire made it difficult to see the very small crystals and silk, which had been reduced

Figure 17. The color distribution in this 70.20 ct natural sapphire suggested some form of treatment.



from needles to lines of small unconnected dots. More importantly, it also disguised the surface diffusion treatment. Immersion again revealed the telltale outlined facet junctions and uneven surface coloration.

GRC and TM

Flame-Fusion SYNTHETIC SAPPHIRE

When GIA was founded in the early 1930s, gemology was relatively uncomplicated and most identifications could be made with basic instrumentation. However, then as now, the identification of synthetics was particularly worrisome. When we consider the primitive gemological microscopes available at that time, the great concern for the proper identification of Verneuil flame-fusion synthetics—the only type then available—is understandable.

Pioneering work in Europe had established that the main identifying features in these synthetic sapphires and rubies were curved striae or growth lines, as well as gas bubbles, large or small. One of the first indications that features believed to be characteristic of natural sapphires were also seen in synthetics was reported in 1920 by Mr. E. G. Sandmeier of Locarno, Switzerland, and confirmed by Mr. W. Plato of Frankfurt, Germany: the discovery of polysynthetic twinning in synthetic corundum. It is significant that one of the first gemological notes written

Figure 18. Immersion in methylene iodide revealed both natural color zoning and evidence of a "dye" in the sapphire in figure 17.

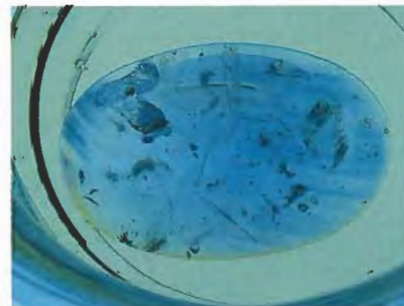




Figure 19. This quench-crackled natural sapphire owes its color to diffusion treatment. Magnified 10×.

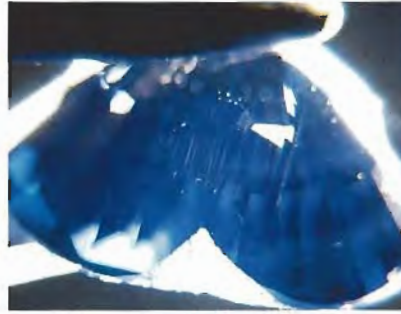


Figure 20. At first glance, the needle-like inclusions in this 4.18 ct heart shape seemed to indicate natural origin.

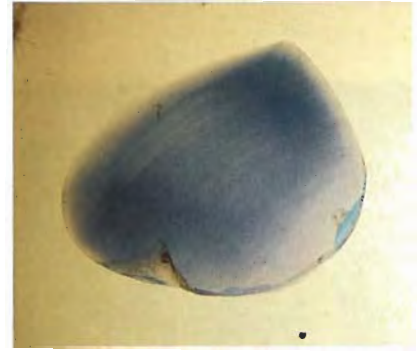


Figure 21. The curved growth lines easily seen with immersion in methylene iodide proved that the sapphire in figure 20 was synthetic.

by Robert Shipley Jr., in the second issue of the (then) new *Gems & Gemology*—March-April 1934—concerned his observation of nearly straight striae in a synthetic sapphire. Significant, too, is the fact that the very first (Summer 1942) of many well-illustrated feature articles in this journal by Dr. Eduard Gübelin addressed “Genuine Type Inclusions in New European Synthetic.” Occasionally, other similarities between synthetic and natural gems have appeared in the gemological literature. More recently, synthetics

with characteristics introduced to make them look natural, such as natural-appearing “fingerprints,” have been seen on the market (see, e.g., J. I. Koivula, “Induced Fingerprints,” *Gems & Gemology*, Winter 1983, pp. 220–227).

Another example of a natural-appearing inclusion in a synthetic stone was recently seen in the East Coast lab (figure 20). Needle-like inclusions near the cleft of this heart shape had convinced the client that the piece was natural. However, using only a loupe, he thought that

he also saw curved growth lines. His suspicion proved to be well founded, as the curved growth lines were easily resolved when this synthetic sapphire was immersed in methylene iodide (figure 21). *GRC and TM*

PHOTO CREDITS

Figures 1 and 14 were taken by Maha DeMaggio. Nicholas DelRe supplied the pictures for figures 2–7, 9, 13, and 16–21. The photo in figure 8 is compliments of Laurence Graff. Shane Elen took figure 10. Shane F. McClure provided figures 11 and 15. Figure 12 is compliments of Christie's International.

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