Gem Trade LAB NOTES

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DIAMOND

Flights of Fancy

From time to time we encounter examples of some new creation or artistic achievement that is the product of someone's imagination. The "crusader" diamond illustrated in the Gem Trade Lab Notes column of the Winter 1982 issue of *Gems & Gemology* and the fish-shaped diamond pictured in the Spring 1983 column are examples of this. Occasionally we see inclusions in stones that stimulate our own imagination, resulting in what might be called flights of fancy. Most of our readers have heard of Jonathan Livingston Seagull and his wonderful flights. In figure 1, taken in our New York laboratory, he appears to be coming in for a landing. Imagination has created something beautiful out of a feather (please pardon the pun) in a diamond. Another diamond, also seen in New York, has a cloud-like inclusion that very closely resembles a portrait of the third president of the United States, Thomas Jefferson (figure 2).

Figure 1. A flight of fancy. Magnified 25×.

Figure 2. Portrait in diamond. Magnified 53×.

Painted Pink Diamond: The Big Switch

During the presale viewing of gems and jewelry that were scheduled to be auctioned by Sotheby Parke Bernet galleries in April 1983, an attractive 9.58-ct fancy pink, potentially flawless emerald-cut diamond (figure 3) was replaced by a 10.88-ct light yellow emerald cut that had been painted quite evenly with pink nail polish (figure 4). The polish evidently did not prevent the diamond tester from giving a positive reaction for diamond when the stone was routinely checked prior to being returned to the display case.

The New York GIA Gem Trade Laboratory issued a report in late 1982 for the pink diamond. It measured 13.80 × 10.88 × 7.10 mm. In May 1983, we issued a report for the substitute diamond. After the nail polish was removed, it was found to be approximately U to V range in color and VS2 in clarity. It measured 14.84 × 11.83 × 7.32 mm.

Figure 3. A 9.58-ct fancy pink diamond stolen from Sotheby's in New York.

Figure 4. A 10.88-ct yellow diamond coated with pink nail polish that was substituted for the stone in figure 3. The pink band seen in the pavilion facet is representative of the color face-up.

Sotheby's pre-auction estimate for the pink stone was in excess of $500,000; the yellow substitute was valued by their appraisers at approximately $12,000–$15,000.

Rose Cuts

The rose cut originated in India over 400 years ago and was introduced into Europe by the Venetians very early in the 16th century. The early rose cuts were often fashioned from cleavage fragments of diamonds having trisoctahedral or hexoctahedral faces, thus yielding very shallow stones with natural facets. Rose cuts have a flat base, which usually corresponds to the plane of the original cleavage, and a shallow, dome-shaped crown covered with triangular facets terminating in a point at the center (see figure 5).

Although rose cuts do come into the lab from time to time, only infrequently do we see a large rose cut set over a concave metal base to simulate a heavier diamond. The ring shown in figure 6 was recently submitted to the Los Angeles laboratory for identification. The center diamond measures approximately 20 mm in diameter. The depth and weight could not be measured because of the nature of the mounting, but the stone was visually estimated to be only 2 or 3 mm deep. On the basis of these dimensions, the weight of the stone was estimated to be approximately 8–12 ct. A full-cut diamond of the same diameter would have weighed approximately 30 ct.

The thin rose cut was set in a closed-back mounting, over an engraved, concave metallic reflector that gave the illusion of a much larger diamond with greater depth and with pavilion facets. Between the stone and the reflector was a hollow space. Figure 7 illustrates the construction of this type of mounting; with a bottom view of the concave metal reflector (labeled A) on the left, and a top view—illustrating the stamped or engraved patterns that are intended to create an illusion of pavilion facets—on the right.

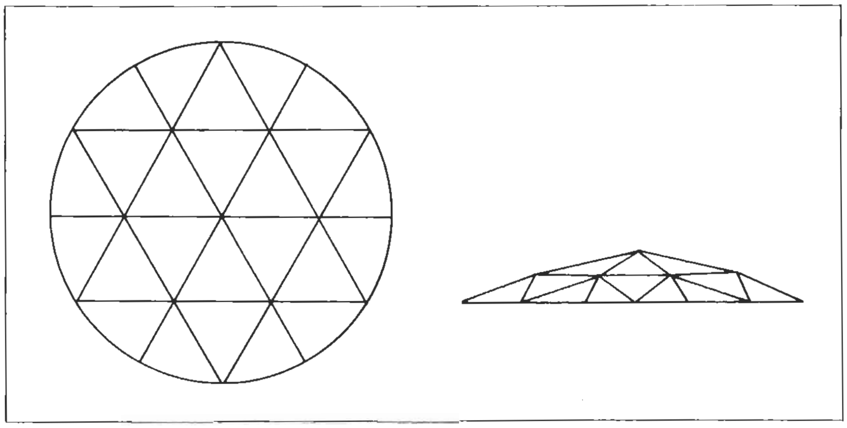


Figure 5. Diagrams of the crown (left) and profile (right) of a rose-cut diamond.

Figure 6. A rose-cut diamond, approximately 20 mm in diameter, set in a ring.

Some time after examining this ring we received an antique combination pin-pendant set with 24 rose-cut diamonds (see figure 8). These diamonds had the typical flat base but had much higher profiles than did the stone in the ring. Also, there was no engraved backing or hollow space behind the stones.

Simulants

In the past few months, the New York laboratory has received for diamond quality grading several brilliants that have turned out to be

Figure 7. Diagrams of bottom (left) and top (right) of the mounting illustrated in figure 6. A = the back of the metallic reflector. The stamped or engraved patterns on the front of the concave reflector are illustrated on the right.

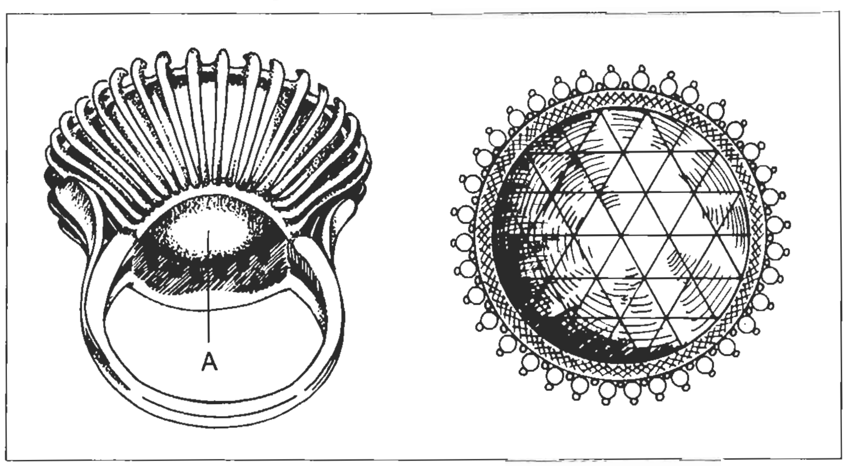


Figure 8. Rose-cut diamonds set in a combination pin pendant. The center stone measures approximately 11.8 × 7.4 × 2.5 mm; the other 23 stones range from approximately 1.5 mm in diameter × 0.8 mm deep to 6.5 × 3.5 × 1.1 mm.

cubic zirconia. Perhaps the most convincing one was a very light yellow stone with obvious flaws (figure 9). It weighed more than 11 ct while appearing to have the size of a diamond of 6.5 to 7 ct. It was exceptionally well cut and polished, and with the "cape" color it must have been taken for a diamond many times before it became damaged. The staff surmised that the stone was probably damaged by heat during some repair work on its mounting. There is no question that cubic zirconia is the most serious diamond imposter yet to reach the market.

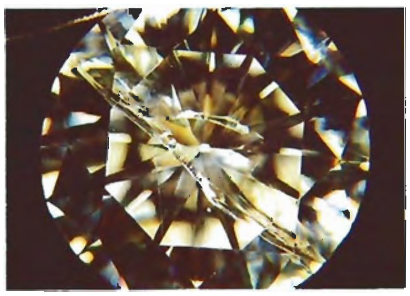


Figure 9. A yellow cubic zirconia submitted for diamond grading. Magnified 15×.

Treated Yellow Diamond

The Los Angeles laboratory recently received a yellow round brilliant diamond weighing slightly over 2.5 ct. The client explained that the diamond had an accompanying GIA Gem Trade Laboratory diamond grading report that stated the color grade as fancy light yellow, natural color. The client's suspicions were aroused because the color of this diamond was obviously more intense than fancy light yellow and would have been graded as fancy intense yellow.

The diamond and our grading report records were then examined. By comparing the measurements, weights, internal characteristics, and the like, we determined conclusively that this stone was the same diamond described on the report. Examination with the spectroscope, however, revealed that this diamond exhibited evidence of treatment in the form of a very strong line at 5920 Å, in addition to the moderate cape spectrum (lines at 4155, 4350, 4530, 4660, and 4780 Å). It was evident that this diamond had been treated to intensify the color after its original examination in the laboratory.

Even though the 5920 Å line was very easy to observe in this particular stone, it serves as a reminder that treated yellow diamonds may exhibit a cape series in addition to a line at 5920 Å (which may be easy or difficult to observe). This diamond also exemplifies the fact that treatment or damage can occur after a stone is examined by a laboratory.

EMERALD, Synthetic

Examples of a new synthetic emerald reportedly being manufactured in the USSR were seen in both the New York and Los Angeles labs at about the same time. All four stones submitted had quite obvious whitish seed plates, and two were color banded. Figure 10 shows one stone in which the seed plate was parallel to the culet. Spike-like inclusions pointing to the plate originate in the near-colorless zone at the culet. The stone shown in figure 11 has zoning of a different sort, unrelated to the seed plate. All the stones exhibited unusual crystal-growth disturbance, as illustrated in the lighted area of figure 12. The appearance of the stones in the microscope suggests

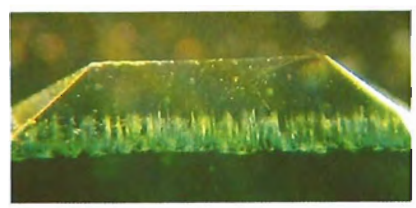
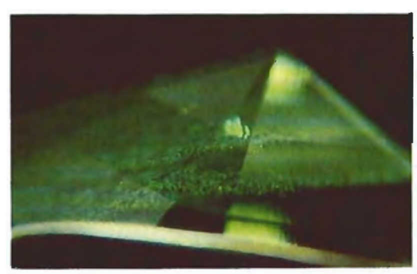


Figure 10. Colorless seed plate of a synthetic emerald immersed in methylene iodide. Magnified 63×.

Figure 11. Color zoning in a synthetic emerald. Magnified 63×.



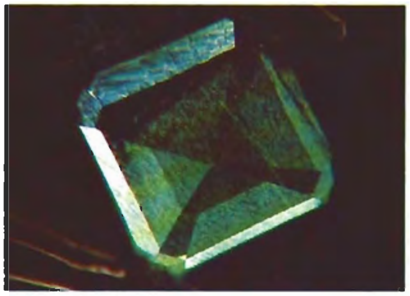


Figure 12. Growth disturbances visible in a synthetic emerald at 15×.

hydrothermal manufacture. However, unlike other hydrothermal synthetic emeralds with which we are familiar, these stones lack ultraviolet fluorescence and display very little red color with the color filter. The refractive indices average approximately 1.572–1.580. The birefringence, approximately 0.008, is high for any beryl, synthetic or natural. The specific gravity was determined to be slightly greater than 2.67.

JADE, Dyed Blue Jadeite

The Los Angeles laboratory was recently asked to identify the 8.98-ct translucent blue cabochon shown in figure 13. To the unaided eye, the interwoven structure typical of jadeite was apparent. A refractive index obtained by the "spot" method revealed a value of 1.66. Spectroscopic analysis was performed, revealing a sharp line at 4370 Å in the violet-blue region, and the characteristic dye band centered at 6500 Å in the orange-red region of the visible spectrum. This blue cabochon was therefore identified as jadeite jade, treated color. As with other materials that are frequently dyed, or stained, jadeite can be dyed virtually any color, but green is the one most commonly encountered.

OPAL, Black and White

A very unusual natural opal was brought to the Santa Monica laboratory for identification. As shown in figure 14, this specimen consisted of an almost opaque black center area that was entirely surrounded by translucent, yellowish brown opal. The play of color was faint and definitely confined to the outer, translucent opal layer. Examination under the microscope revealed an irregular web-like structure visible only at the more translucent edge of the black center material and a botryoidal flow structure surrounding the black area.

The piece of rough material had one flat polished surface which gave a refractive index of 1.44; it measured approximately 23 × 21 × 4 mm. We were advised that this unusual piece had been found in Lightning Ridge, Australia.

Figure 13. An 8.98-ct dyed blue jadeite.

PEARLS

Black Non-Nacreous Natural "Pearl"

One would almost think he were looking at a polished baroque stone when observing an item that was sent in for identification to our New York lab. However, as the "stone" was turned in the light under magnification, a peculiar beaver fur–like appearance somewhat resembling the flame structure of a conch "pearl" was observed (figure 15).

Figure 14. Unusual specimen of black and white opal, measuring approximately 23 × 21 × 4 mm thick.

Here and there were patches resembling clearings in a forest (figure 16). These took on an iridescent, almost opal-like quality when turned in the light. It was determined that the "pearl," which weighed in excess of 100 grams, was indeed a calcareous concretion with specific gravity the same as for natural pearls. We do not know what mollusc produced it.

Early Mabe?

Recently submitted to the New York laboratory for identification was a lattice-work pearl choker in which what appeared to be gold spacer bars were enameled white (figure 17). The necklace consisted of 76 "pearls," each approximately 8 mm in diameter, in four rows of 19 each. With a loupe, one could easily see that the "pearls" were assembled and probably mabes. The radiograph in figure 18 shows a peculiar rectangular insert as well as the hemispherical center, the drill hole, and the peg. The "pearls" did not fluoresce to X-rays, but we would not expect them to if saltwater shell had been used for the filler material.

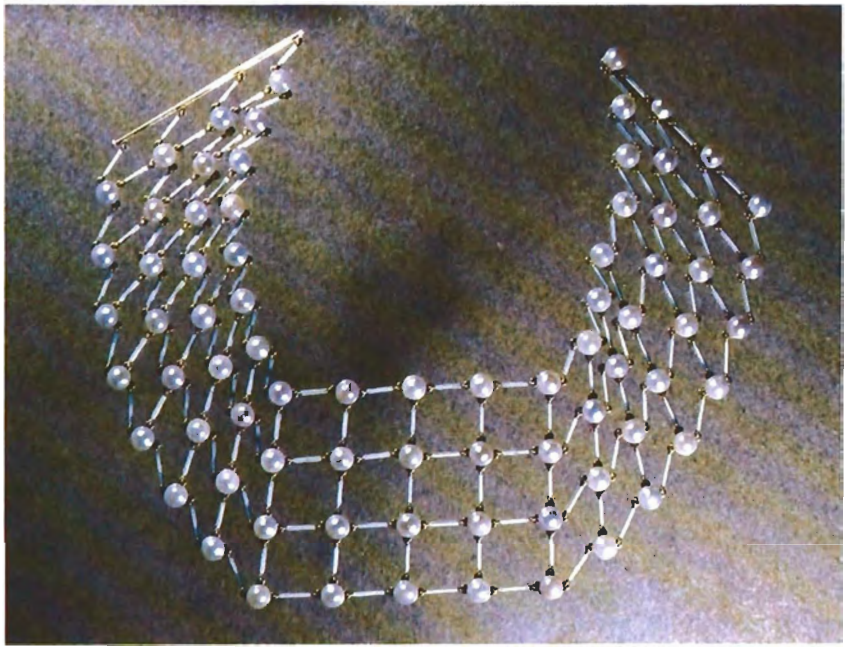


Figure 17. Mabe pearl necklace.

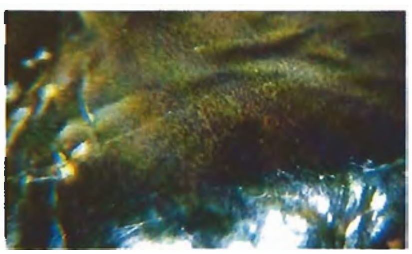
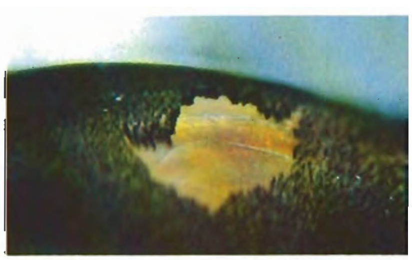


Figure 15. Surface characteristics shown by an unusual calcareous concretion. Magnified 20×.

Figure 16. "Bald" patch on the "pearl" illustrated in figure 15, taken at 45×.



In our attempts to determine if these might have been produced by Japanese technicians before they were able to grow whole cultured pearls, we learned that as early as 1890, up to 50,000 cultured blister pearls were being produced yearly. However, exactly how the blisters were prepared at that early time remains a mystery.

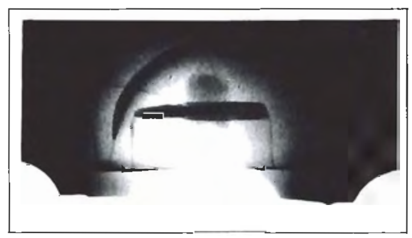


Figure 18. X-ray of one of the mabe pearls seen in figure 15.

QUARTZ, Green

Submitted to the Los Angeles laboratory for identification was the 9.19-ct green oval modified brilliant shown in figure 19. Microscopic examination revealed only a few cloudy areas of minute inclusions. The refractive indices were determined to be 1.544 and 1.553. A bull's-eye uniaxial interference figure was observed when the stone was examined in convergent, polarized light, thus proving it to be quartz.

Green quartz of this intensity has not been reported to occur in nature, but is known to be produced by the heat treatment of some amethyst. This material is sometimes referred to as "greened" amethyst. Although this stone was fairly devoid of inclu-

Figure 19. A 9.19-ct "greened" amethyst.

Figure 20. Two 1-ct taaffeites.

sions, the ones that were present suggested natural origin. It should be noted, however, that this color could possibly be produced in synthetic quartz by the heat treatment of synthetic amethyst.

SAPPHIRE, Color Restoration

Recently in New York we were shown a ring containing a natural colorless sapphire that the client said was a pleasant "Ceylon" yellow before a recent repair job. Dr. Kurt Nassau had suggested that the client bring the ring to us for the purpose of exposing it to X-rays. On two occasions in the past, Dr. Nassau had restored the color to red tourmaline that, thought to be ruby, had lost it through overheating. In these two cases the color, apparently permanent, was restored by the use of gamma rays.

To control our experiment with the colorless sapphire, we exposed the ring and another colorless sapphire from our own collection. When the two stones reached a medium dark brownish yellow, we put them both in a sunny window for about four hours. When removed, our loose stone was again colorless, but the ring stone was now a pleasant yellow, which the owner stated looked very much like her original stone. Evidently the natural color center is different from an induced center, though heat can change them to colorless in both cases. We anticipate that the restored color will be permanent under normal conditions.

TAAFFEITE

Figure 20 illustrates two taaffeites, each weighing approximately 1 ct. Both stones were very "clean," with the typical color of taaffeite, and were submitted by the same client to our New York lab. The census of this rare material would probably show that only 45 or 50 of these gemstones have been reported thus far.

TURQUOISE, Imitation

Within a short period of time at the Santa Monica laboratory, we have seen two quite different kinds of imitation turquoise. One item was a drilled rondelle, measuring 8 mm in diameter by 3.3 mm thick, shown in figure 21. Note the uneven distribution of color and also the much lighter colored area around the drill hole. The material had a refractive index of approximately 1.58 or 1.59. The specific gravity, as determined by the hydrostatic method, was approximately 2.35. There was no absorption spectrum. The material was fairly soft; it could easily be scraped with a needle, thus exposing the underlying colorless material. An X-ray diffraction analysis of this material indicated that it was primarily gibbsite, a clay-like aluminum hydroxide, which had been dyed to simulate turquoise.

The other item we identified as imitation turquoise was a block of rough material measuring approximately 26 × 19 × 15 mm (figure 22). The properties of this material were as follows: refractive index, 1.57; specific gravity (hydrostatic method), 2.27; no absorption spectrum. Again, X-ray diffraction analysis was performed. The resulting pattern indicated a mixture of several materials, the main constituents being silicon dioxide and zinc oxide.

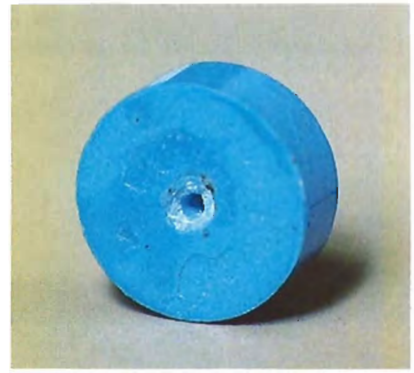


Figure 21. Drilled bead of imitation turquoise, 8 mm in diameter.

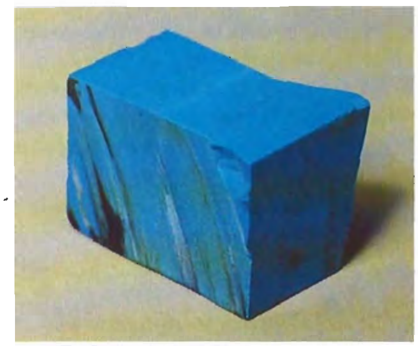


Figure 22. A block of imitation turquoise measuring 26 × 19 × 15 mm.

ACKNOWLEDGMENTS

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