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DIAMONDS

An untreated type Ib diamond exhibiting green transmission luminescence and H2 absorption. These contributors recently analyzed a small greenish brownish yellow ("olive yellow") diamond that exhibited green transmission luminescence (figure 1) as well as an unusual combination of absorption features. At first sight, the 0.12 ct diamond did not appear particularly remarkable, except for its UV luminescence, which was green to long-wave and greenish yellow to short-wave UV radiation. However, an infrared spectrum showed that the diamond was a low-nitrogen type Ib/IaA, with the single nitrogen clearly dominating the A-aggregates (figure 2; see specifically the inset showing the 1358–1000 cm^{-1} region). This was surprising, since green luminescence caused by the H3 center (the combination of paired nitrogen [A aggregate] with a vacancy) is commonly observed in type Ia diamonds but seen only very rarely in type Ib diamonds. Furthermore, the extremely low A aggregate concentration would not normally indicate the formation of distinct H3 luminescence. The total amount of nitrogen in the diamond was roughly

estimated from the spectrum to be 15 ppm by comparison with samples of known nitrogen content.

A strong "amber center" with its main peak at 4165 cm^{-1} was visible in the near-infrared region of the spectrum (again, see figure 2), indicating a deformation-related coloration. This also was unusual, since the amber center is typical for type Ia brown diamonds colored by deformation and related defects (L. DuPreez, "Paramagnetic Resonance and Optical Investigation of Defect Centres in Diamond," Ph.D. dissertation, University of Witwatersrand, Johannesburg, 1965). In "olive" and brown type Ib diamonds with deformation-related coloration, the main absorption of this defect has been found at 4115 cm^{-1} or as a doublet at 4165 and 4065 cm^{-1} (T. Hainschwang, "Classification and color origin of brown diamonds," Diplôme d'Université de Gemmologie, University of Nantes, France, 2003). A "single" amber-center peak at 4165 cm^{-1} in a type Ib diamond has not previously been described.

The deformation-related color was confirmed by observation in transmitted light between crossed polarizers. The diamond showed very distinct parallel gray to black extinc-

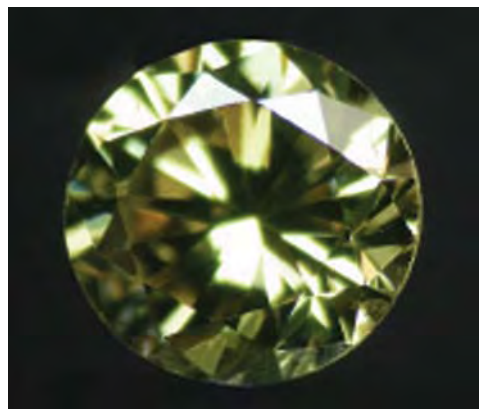


Figure 1. This 0.12 ct diamond, shown on the left in daylight, exhibits green transmission luminescence in dark-field illumination (right), as well as an unusual combination of absorption features. Photos by T. Hainschwang.

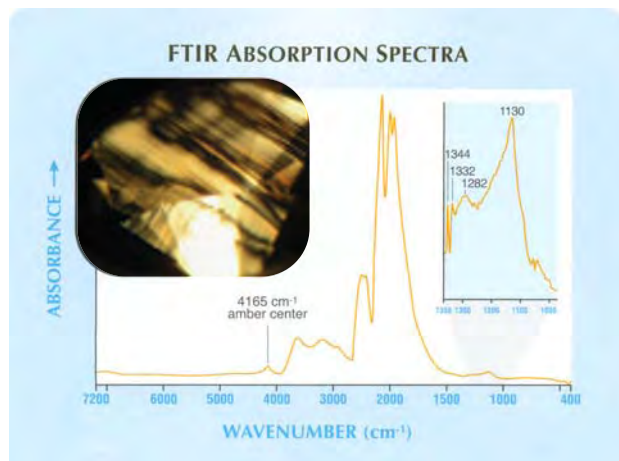


Figure 2. The FTIR spectrum of the diamond in figure 1 reveals that it is a type Ib/IaA, with isolated nitrogen clearly dominating the A-aggregates. The region between at least 5000 and 4165 cm^{-1} comprises the “amber center,” of which the 4165 cm^{-1} peak is the main feature. The amber center is deformation related; the deformation is apparent in the extinction patterns visible with crossed polarizers (see inset; photo by T. Hainschwang).

tion in two directions along octahedral growth planes, following “olive”-colored graining visible in the stone (figure 2, inset). This colored graining and extinction along the graining are very common features in “olive” diamonds. The order of extinction indicates that the stone is severely deformed and thus not optically isotropic. This is explained by the fact that the dislocations (broken bonds) caused by the deformation interfere with the direct passage of light that would be expected in truly isotropic materials. Even though strain associated with linear extinction and/or interference colors can be found to some degree in practically all diamonds, strong parallel extinction in a colored diamond provides a good indication for deformation-related coloration. Regardless of whether their green coloration is hydrogen- or radiation-related, “olive” diamonds seldom

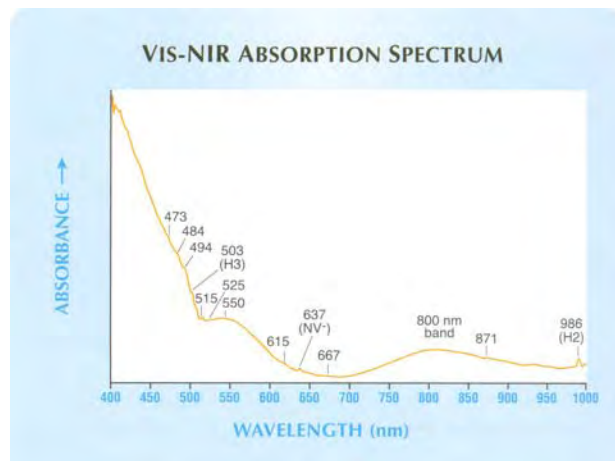


Figure 3. The low-temperature Vis-NIR spectrum of the diamond in figure 1 shows weak absorptions for the H3, NV⁻, and H2 centers, which is an unusual combination for an untreated natural diamond.

exhibit the strong strain pattern described here.

These observations prompted further analysis of the sample. A low-temperature spectrum was recorded in the visible/near-infrared range, which added to the unusual assemblage of absorption centers found in this diamond. The spectrum exhibited a combination of weak H3 (503 nm), NV⁻ (637 nm), and H2 (986 nm) absorptions with associated structures, plus moderate broad bands at about 550 and 800 nm (figure 3). The H3, NV⁻, and H2 absorption centers are typical of the visible-NIR spectra of HPHT-treated type Ia diamonds (A. T. Collins et al., “Colour changes produced in natural brown diamonds by high-pressure, high-temperature treatment,” *Diamond and Related Materials*, Vol. 9, 2000, pp. 113–122), and also can be created in type Ia or Ib diamonds through irradiation followed by annealing (A. M. Zaitsev, *Optical Properties of Diamond: A Data Handbook*, Springer-Verlag, Berlin, 2001, pp. 136–137), although these features typically are moderate to strong in treated-color diamonds.

Despite this correlation, other features indicated unambiguously that the diamond had not been treated by either method, and was indeed natural color. HPHT treatment of a brown-to-olive type Ib diamond, even at very moderate temperatures, would aggregate much of the single nitrogen and destroy the amber center (T. Hainschwang et al., “HPHT treatment of different classes of type I brown diamonds,” *Journal of Gemmology*, Vol. 29, 2004 [in press]; A. N. Katrusha et al., “Application of high-pressure high-temperature treatment to manipulate the defect-impurity content of natural diamond single crystals,” *Journal of Superhard Materials*, No. 3, 2004, pp. 47–54). Besides the temperature/pressure conditions, the aggregation is influenced by the total nitrogen content and the types of defects present. The combination of factors in

Editor's note: The initials at the end of each item identify the editor or contributing editor who provided it. Full names and affiliations are given for other contributors.

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this diamond would enhance nitrogen aggregation under commonly used HPHT conditions. In addition, irradiation of a type Ib diamond followed by annealing would create a very distinct NV⁻ absorption, resulting in pink to purple coloration (E. Bienemann-Küespert et al., *Gmelins Handbuch der Anorganischen Chemie*, Verlag Chemie, Weinheim, Germany, 1967, p. 237). Radiation treatment would also leave other traces, such as the 595 nm and the H1a and possibly H1b absorptions, which were not detected in this diamond.

The authors have recently seen the H2 center in a suite of very rare type Ib diamonds containing large concentrations of single-nitrogen that may exceed 400 ppm. These stones showed no deformation-related features and were distinctly different from the stone reported here. In contrast to these high-nitrogen type Ib diamonds, this is the first type Ib “H2 diamond” we have seen that shows a combination of H3, NV⁻, and H2 centers with classic strain patterns between crossed polarizers and a very low nitrogen concentration. The properties observed for this diamond are, at this point, difficult to explain. The deformation pattern and color distribution indicate octahedral growth and dynamic post-formation conditions. Besides the strong post-growth deformation and associated defects (dislocations, vacancies, and interstitials), the observed features suggest prolonged natural annealing at a low enough temperature to avoid aggregation of the single nitrogen, but nevertheless resulting in the combination of defects noted.

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COLORLED STONES AND ORGANIC MATERIALS

Gem amphiboles from Afghanistan, Pakistan, and Myanmar. The amphibole group consists of several common rock-forming minerals, as well as many unusual species. Examples that are best known to gemologists are tremolite and actinolite, which as fine-grained aggregates form nephrite. Like most amphiboles, these are opaque, or translucent at best. In the past few years, however, some unusual transparent amphiboles from three localities in Asia have been faceted. These include light yellow richterite from Afghanistan, green pargasite from Pakistan, and brown pargasite and near-colorless edenite from Myanmar. One of these contributors (DB) has obtained facet-quality examples of all these amphiboles from local dealers in Peshawar (Pakistan) and Mogok (Myanmar), and also recently visited one of the deposits.

The Afghanistan richterite was first seen in the Peshawar mineral market in October 2001. The material was sold with sodalite and hackmanite crystals, often



Figure 4. Beginning in late 2001, facet-quality richterite has been recovered from the vicinity of Afghanistan's lapis lazuli deposits. The crystal shown here is 1.9 cm tall, and the oval brilliant weighs 1.72 ct. Courtesy of Dudley Blauwet Gems; photo © Jeff Scovil.

associated on the same specimen. The source was reported to be in the vicinity (i.e., an approximately six- to eight-hours' walk) of the Sar-e-Sang lapis lazuli deposits, which are located in the Kokcha Valley, Badakhshan Province. During 2002, DB saw at least 5 kg of rough material, including some attractive crystals (figure 4); about 20% was facet grade. However, due to the mineral's perfect cleavage, very few stones have been cut. The largest richterite cut by DB weighed 1.86 ct; attempts to cut larger stones have been unsuccessful.

The Pakistan pargasite appeared on the mineral market in the mid-1990s, typically as broken crystals embedded in a marble matrix. Similar material from China was described in the Spring 2002 Gem News International section (p. 97). Due to its attractive green color (figure 5), the Pakistan pargasite is sometimes referred to as “Hunza emerald” by local dealers. DB visited the mining area in November 2003. It is located about 3 km east of the Karakoram Highway bridge that crosses the Hunza River near Ganesh in the Hunza region. The pargasite is found within marble boulders that contain small seams of phlogopite. In addition to the green pargasite, the area has yielded translucent-to-opaque red, pink, and purple-blue corundum (to 7.5 cm) and “maroon,” blue, dark brown, and black spinel (to 2.5 cm). Pargasite crystals up to almost 3 cm have been found, sometimes associated with the

dark brown spinel, but transparent material is very rare, yielding faceted stones of less than 1 ct.

The two transparent amphibole species from Myanmar (figures 6 and 7) were purchased by DB in Mandalay in June 2002. The vendor, a geology student from a university in Yangon, reported that both the pargasite and edenite were mined from the well-known Mogok deposit of Ohn Bin. Only a few pieces were available, although several more samples of both minerals turned up in 2003. The largest pargasite and edenite cut by DB weighed 1.78 ct and 0.29 ct, respectively (again, see figures 6 and 7).

To positively identify the specific amphibole species present, one of us (FCH) analyzed the faceted stones pictured in figures 4–7 by electron microprobe. Also analyzed was one additional sample of brown pargasite from Myanmar. Approximately 10 point analyses were obtained from each sample, and their averages were used to calculate the formulas listed in table 1. The mineralogical classification within the amphibole group of each stone was then established using the conventions published by B. E. Leake et al. ("Nomenclature of amphiboles: Report of the subcommittee on amphiboles of the International Mineralogical Association, Commission on New Minerals and Mineral Names," *Canadian Mineralogist*, Vol. 35, 1997, pp. 219–246). All the amphiboles contained relatively high amounts of fluorine. The analyses also revealed that the green pargasite from Pakistan contains traces of vanadium; up to 1.3 wt.% V_2O_3 was reported in similar material by V. M. F. Hammer et al. ("Neu: Grüner Pargasit aus Pakistan," *Lapis*, Vol. 24, No. 10, 1999, p. 41).

Gemological properties were obtained on the same four samples (by SM and EPQ) using standard testing equipment and a gemological microscope; the data are summarized in table 1. The properties of each stone fell within the ranges reported for these amphibole varieties in mineralogical textbooks (see, e.g., W. D. Nesse, *Introduction to Mineralogy*, Oxford University Press, New York, 1991, pp. 277–290). The relatively low R.I. values of the richterite are consistent with its Mg-rich composition (i.e., lacking iron); its properties may overlap those of colorless tremolite. The properties of the pargasites and the edenite also are consistent with the literature—that is, with values reported for hornblende. Material referred to as "hornblende" also includes other closely related species of the amphibole group; because their physical properties may overlap, conclusive identification of these species requires quantitative chemical analysis.

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Figure 5. This vivid green pargasite from Pakistan is colored by vanadium. The specimen is 2.1 cm tall, and the oval brilliant weighs 0.59 ct. Courtesy of Dudley Blauwet Gems; photo © Jeff Scovil.

Figure 6. Transparent yellowish brown pargasite was recently found in Myanmar. The crystal is 1.5 cm tall, and the faceted stone weighs 1.78 ct. Courtesy of Dudley Blauwet Gems; photo © Jeff Scovil.





Figure 7. Myanmar is also the source of facetable edenite, as shown by this 1.4-cm-wide crystal and 0.29 ct round brilliant. Courtesy of Dudley Blauwet Gems; photo © Jeff Scovil.

Recent gem beryl production in Finland. In 1982, a shard of transparent colorless topaz was found at a road construction site near Luumäki in southern Finland. Subsequently, local mineral enthusiasts and gem cutters staked a claim to the source of this stone, a granitic pegmatite running parallel to the road, and initial mining resulted in the discovery of at least one gem beryl pocket.

This deposit subsequently produced some significant crystals and gem material (see S. I. Lahti and K. A. Kinnunen, "A new gem beryl locality: Luumäki, Finland,"

Spring 1993 *Gems & Gemology*, pp. 30–37). The pegmatite was mined until 1995, during the summer seasons. Although several pockets were found in areas adjacent to quartz core zones, none of them contained any beryl mineralization. Indeed, the distribution of the beryl in the pegmatite proved to be quite sporadic.

In the past three years, renewed work at this deposit (now known as the Karelia Beryl mine; figure 8) by a newly formed mining company has yielded some additional production, which recently included what many believe are some of the finest and largest green gem beryls ever found in western Europe (figure 9). This contributor had an opportunity to witness the removal of some of this material during a May 2004 visit to the deposit, which is situated on a small island in one of the 70,000 Finnish lakes. The exact location is Kännätsalo (Finnish for drunken forest), Kivijärvi (Stone Lake), Luumäki, Karelia, Finland.

The new gem beryl pocket had a vertical orientation and measured approximately 2 × 1.5 × 4 m. The location of this large cavity in the pegmatite was unusual, in that it was found only 20–40 cm from the hanging wall. The pocket contained two layers of large gem beryls, one near the top and the other about 30 cm from the bottom. Between these layers were found broken translucent beryl crystals (up to 10–15 cm in diameter) of cabochon and carving quality; some areas showed chatoyancy. The beryl in this pocket ranged from light yellow to deep "golden" yellow, and from green-yellow to green.

Most of the gem beryl was found within 10–25 cm of the cavity walls, together with crystals of mica (typically 5–15 cm) and albite (1–8 cm), as well as pocket rubble consisting of broken shards of microcline and, rarely, quartz. A total of more than 110 kg of beryl was produced, with about 30 kg being suitable for faceting. Most of the fac-

TABLE 1. Characteristics of gem amphiboles from Afghanistan, Pakistan, and Myanmar.^a

Name	Locality	Weight (ct)	Color	R.I.	Birefringence	S.G.	Fluorescence		Internal features ^b
							Long-wave UV	Short-wave UV	
Richterite	Afghanistan	1.72	Light brownish yellow	1.599–1.622	0.023	3.11	Weak orange	Weak yellowish orange	Cavities, fractures, two-phase inclusions
Pargasite	Pakistan	0.59	Yellowish green	1.625–1.640	0.015	3.03	Inert	Very weak yellowish green	Numerous fractures (some along cleavage directions), needles, two-phase inclusions
Pargasite	Myanmar	1.78	Yellowish brown	1.620–1.640	0.020	3.17	Inert	Weak yellow	Numerous three-phase inclusions (some with tension fractures), two-phase inclusions, needles, fractures
Edenite	Myanmar	0.29	Near colorless (very light yellow)	1.612–1.631	0.019	3.14	Inert	Weak yellow	Needles, fractures, three-phase inclusions (some with tension fractures), two-phase inclusions

^a None of the samples showed any phosphorescence or any absorption features with a desk-model spectroscope.

^b Microscopy also revealed evidence of clarity enhancement in the 0.59, 1.72, and 1.78 ct samples.

^c Electron microprobe analysis of an additional sample (a grain mounted in epoxy) of yellowish greenish brown potassian fluorian pargasite from Mogok yielded the formula $(\text{Na}_{0.58}\text{K}_{0.39})\text{Ca}_{2.00}(\text{Mg}_{3.90}\text{Fe}_{0.05}\text{Cr}_{0.01}\text{Ti}_{0.13}\text{Al}_{0.80})(\text{Si}_{5.84}\text{Al}_{2.16})\text{O}_{22}(\text{OH})_{1.13}\text{F}_{0.87}$



Figure 8. Mining activities have resumed at the gem beryl pegmatite near Luumäki, Finland. Heavy machinery is used to reach the gem-bearing zones, which are then carefully mined by hand to avoid damaging the crystals. Photo by P. Lyckberg.

etable material was found as small (1–3 cm) fragments (figure 10), but some pieces reached 5–8 cm. About 10 kg comprised “flawless” material with no eye-visible inclusions, and in exceptional cases these crystals exceeded 1 kg each. These large stones are of a fine green to yellowish green color, and are rather distinct from the better-known Ukrainian material in terms of both color and morphology. The Finnish crystals are typically etched and striated (but have retained their hexagonal shape), and their terminations are rounded (as pictured by Lahti and Kinnunen,

Figure 9. In May 2004, several world-class crystals of green gem beryl—some exceeding 1 kg, as shown here—were recovered at the Luumäki pegmatite. Photo by P. Lyckberg.



Chemical composition ^a	Classification
$(\text{Na}_{0.60}\text{K}_{0.32})(\text{Ca}_{1.14}\text{Na}_{0.85}\text{Mg}_{0.01})(\text{Mg}_{4.90}\text{Al}_{0.10})$ $(\text{Si}_{7.83}\text{Al}_{0.17})\text{O}_{22}(\text{OH})_{1.59}\text{F}_{0.41}$	Potassian fluorian richterite
$(\text{Na}_{0.85}\text{K}_{0.07})(\text{Ca}_{2.00}\text{Mg}_{4.18}\text{V}_{0.21}\text{Al}_{0.61})(\text{Si}_{6.25}\text{Al}_{1.75})$ $\text{O}_{22}(\text{OH})_{1.57}\text{F}_{0.43}$	Fluorian vanadian pargasite
$(\text{Na}_{0.52}\text{K}_{0.43})(\text{Ca}_{1.95}\text{Na}_{0.03}\text{Fe}_{0.02})$ $(\text{Mg}_{3.97}\text{Fe}_{0.07}\text{Ti}_{0.08}\text{Al}_{0.88})(\text{Si}_{6.05}\text{Al}_{1.95})\text{O}_{22}$ $(\text{OH})_{1.29}\text{F}_{0.71}$	Potassian fluorian pargasite
$(\text{Na}_{0.87}\text{K}_{0.09})(\text{Ca}_{1.80}\text{Na}_{0.15}\text{Fe}_{0.03}\text{Mg}_{0.02})$ $(\text{Mg}_{4.45}\text{Ti}_{0.01}\text{Al}_{0.54})(\text{Si}_{6.62}\text{Al}_{1.38})\text{O}_{22}(\text{OH})_{1.54}\text{F}_{0.46}$	Fluorian edenite



Figure 10. Most of the Luumäki gem beryl from the May 2004 pocket consisted of relatively small fragments. The inset shows a green beryl weighing approximately 15 ct that was cut in Finland. Photos by P. Lyckberg.

1993). Although it would be possible to cut stones weighing several thousand carats from the largest fine gem crystals, these crystals have been sold as specimens to collectors to preserve their natural beauty.

When present, inclusions in the beryl are similar to

Figure 11. Afghanistan has produced attractive hessonite over the past few years. These stones, weighing 2.64, 7.39, and 3.51 ct (from left to right), show the range of color that is commonly encountered in this material. Courtesy of Intimate Gems; photo by Maha Tannous.



those described by Lahti and Kinnunen (1993). For example, a 3 cm golden yellow heliodor studied by this contributor had dozens of parallel channels/tubes along the c-axis, and these were filled by rust-colored clay minerals. None of the beryl was found to contain the clouds of minute inclusions that are typical of Ukrainian beryl.

Approximately 100 large stones (25–50 ct) from the recent production have been cut by Finnish master faceter Reimo Armas Römkkä. Most of them are light yellow and some are yellowish green. In addition, about 11,000 round brilliants (10 mm in diameter) have been cut in China. Most of the cut stones are sold into the domestic Finland market.

The 2004 mining season will continue until the severe winter halts activities for the following six months.

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Hessonite from Afghanistan. Over the past few years, Afghanistan has become a significant source of gem-quality hessonite (grossular garnet), and some of the material has been found mixed into parcels with other orange to red stones from this region (see Summer 2001 Gem News International, p. 144). To our knowledge, the gemological properties of the Afghan hessonite have not been published, so we were interested to examine several faceted samples and mineral specimens that were recently loaned (and, in some cases, donated) to GIA by Sir-Faraz ("Farooq") Hashmi of Intimate Gems, Jamaica, New York. In addition, Peter Lyckberg loaned six faceted examples for our examination. Mr. Hashmi reported that the hessonite comes from eastern Afghanistan; two known deposits are Munjagal in Kunar Province (producing roughly 1,500–2,000 kg/year of mixed grade) and Kantiwow, Nuristan Province (up to 5,000 kg/year). Most of the clean rough weighs 0.5–1 gram, in colors ranging from yellowish orange to red-orange. Although thousands of kilograms of this garnet have been produced, mining has waned in recent months due to lack of demand in the local market (i.e., in Peshawar, Pakistan) and the migration of miners to the kunzite deposits in the same region of Afghanistan.

The specimens we examined consisted of euhedral garnets that were commonly intergrown with anhedral massive quartz. This assemblage formed within massive garnet that was intergrown with quartz and, less commonly, a green mineral (probably epidote) and another white mineral (possibly wollastonite). This mineral association is typical of a skarn-type deposit formed by contact metamorphism of carbonate rocks by a granitic intrusion. The euhedral grossular crystals typically measured up to 1 cm in diameter, although some partial crystals of larger dimension (up to 4 cm) also were present. The crystals contained abundant fractures, but some had small areas that were transparent enough for faceting.

Three representative faceted stones (2.64–7.39 ct; figure 11) were selected for examination by one of us (EPQ), and the following properties were obtained: color—yellowish orange, orange, and red-orange; diaphaneity—transparent, R.I.—1.739 or 1.740; S.G.—3.63 or 3.64; weak to moderate ADR in the polariscope; and inert to both long- and short-wave UV radiation. Weak absorption bands at 430 and 490 nm were observed with a desk-model spectroscope. Microscopic examination revealed transparent near-colorless crystals (one of which was identified as apatite by Raman analysis), needles, “fingerprints,” stringers of particles, fractures, and straight and angular growth lines. One stone showed evidence of clarity enhancement. The R.I. values of these samples are slightly lower than those reported in the literature for hessonite (see R. Webster, *Gems*, 5th ed., rev. by P. G. Read, Butterworth-Heinemann, Oxford, 1994, pp. 201–202). Notably, the three Afghan samples did not show the roiled or oily appearance that is commonly seen in hessonite; nor was this feature noted upon further examination of several additional faceted stones.

BML

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Interesting abalone pearls. In the Winter 2003 Gem News International section (pp. 332–334), this contributor reported on some interesting pearls that had been loaned by Jeremy Norris of Oasis Pearl in Albion, California. Two of those were unusual specimens from the green abalone *Haliotis fulgens* and the red abalone *H. rufescens*. Mr. Norris recently loaned GIA two additional abalone pearls from the waters off Baja California, Mexico.

One of these pearls was an exceptional example of a

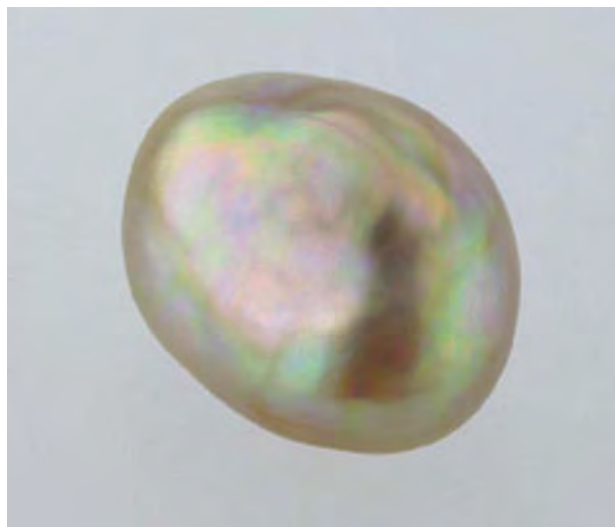
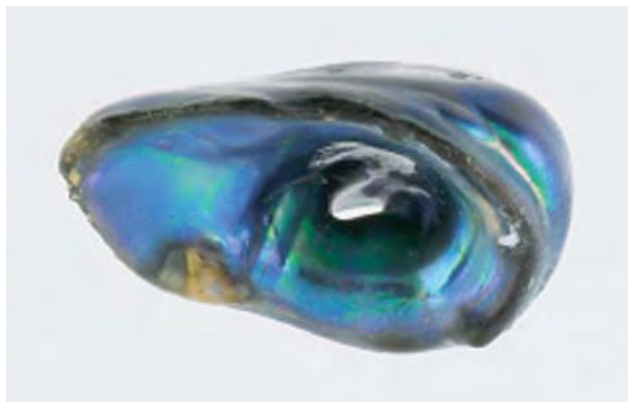
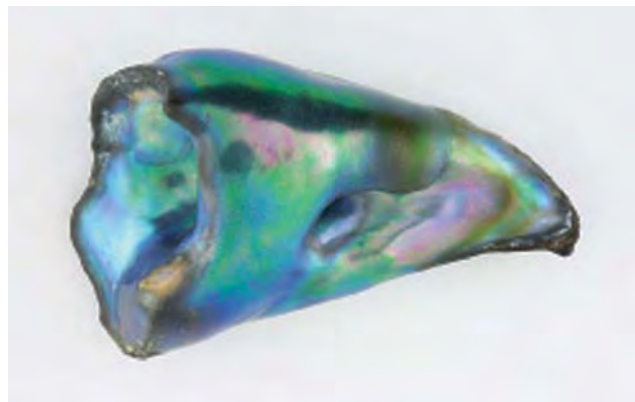


Figure 12. Showing a beautiful array of colors, this 4.90 ct abalone pearl is an exceptional example from the pink abalone *H. corrugata*. Courtesy of Jeremy Norris; photo by C. D. Mengason.

pearl from the pink abalone *H. corrugata*. This 4.90 ct light-toned pearl (11.4 × 8.9 × 6.9 mm) displayed a stunning array of colors (figure 12).

The other pearl was a 41.03 ct horn-shaped specimen (36.6 × 23.0 × 14.5 mm) from *H. fulgens*. What was so unusual about this particular pearl was its remarkable resemblance to an eagle's head, complete with eye, brow, and beak structures (figure 13). Such horn shapes—a form typically exhibited by abalone pearls—may be solid, but often they are hollow. This particular specimen was funnel shaped, with the narrow end of the hole forming the apparent “eye.” The nacre displayed vibrant hues of blue,

Figure 13. This unusual 41.03 ct pearl from the green abalone *H. fulgens* has a remarkable resemblance to an eagle's head (left). The funnel-shaped hole, which starts at the wide opening at the back of the “head,” and exits out the eagle's “eye,” exhibits the same smooth vibrant nacre as the outside of the pearl (right, looking down the wide opening). Courtesy of Jeremy Norris; photos by C. D. Mengason.



green, and purple-pink, even in the interior (again, see figure 13). For the nacre to have formed so evenly on the inside surfaces of the pearl, Mr. Norris stated that the abalone's nacre-secreting tissue must have passed all the way through the pearl, so that the pearl completely encircled part of the gastropod's anatomy, and in essence entrapped its host. This pearl has wonderful potential for a jewelry designer who could incorporate the bird-like image into a one-of-a-kind creation.

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Rhodonite of facet and cabochon quality from Brazil. Rhodonite typically occurs as a translucent-to-opaque ornamental stone with an attractive pink color. Trans-

Figure 14. A new find of rhodonite from Minas Gerais, Brazil, has yielded facet- and cabochon-quality material. The faceted stones weigh 1.84 and 8.22 ct, and the cabochons are 9.98 and 32.0 ct. Courtesy of Alan Freidman, Beverly Hills, California; photo © Harold & Erica Van Pelt.



Figure 15. The Brazilian rhodonite samples examined for this study consisted of an oval modified brilliant (1.77 ct) and an oval cabochon (8.55 ct). Courtesy of Joseph Rott; photo by Maha Tannous.

parent facetable material has so far been very rare and has been reported only from Broken Hill, New South Wales, Australia, where it is frequently associated with the closely related mineral pyroxmangite (see H. Bank et al., "Durchsichtiger rötlicher Pyroxmangit aus Broken Hill/Australien und die Möglichkeiten seiner Unterscheidung von Rhodonit [Transparent reddish pyroxmangite from Broken Hill/Australia and the criteria for distinguishing it from rhodonite]," *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, Vol. 22, No. 3, 1973, pp. 104-110). Recently, however, transparent-to-semi-transparent rhodonite also has been found in Minas Gerais, Brazil.

During the February 2004 Tucson gem shows, Joseph Rott (of Tropical Imports, formerly based in New York and now located in Grand Island, Nebraska) showed one of these contributors (BML) some attractive rough and cut examples of Brazilian rhodonite. He said that the material comes from the same region in Minas Gerais that historically has been mined for manganese (see, e.g., F. R. M. Pires, "Manganese mineral paragenesis at the Lafaiete District, Minas Gerais," *Anais da Academia Brasileira de Ciencias*, Vol. 54, No. 2, 1982, p. 463). He also indicated that the deposit contains both rhodonite and pyroxmangite. Although these minerals can be visually indistinguishable and may be intergrown within the same piece, he reported that only minor amounts (if any) of pyroxmangite are known to be present in the gem material from this deposit. Most of the faceted rhodonites are between 1 and 5 ct, although larger gems have been cut; cabochons typically range from 5 to 10 ct (figure 14).

Mr. Rott loaned several rough and cut samples to GIA for examination. Two polished stones were examined by one of us (EPQ), a transparent oval modified brilliant (1.77 ct) and a semi-transparent oval double cabochon (8.55 ct), as illustrated in figure 15. The following properties were recorded: color—orangy red, with moderate pinkish orange and purplish pink pleochroism; R.I.—1.720–1.733 (faceted stone) and 1.73 (spot reading on the cabochon); birefringence—0.013; S.G.—3.69 and 3.66, respectively; and fluo-



Figure 16. The 2.67 ct Brazilian rhodonite in this pendant is set with 111 yellow and 25 pink diamonds (with a total weight of 0.48 and 0.12 carats, respectively). Courtesy of Alan Freidman; photo © Harold and Erica Van Pelt.

rescence—inert to very weak red to both long- and short-wave UV radiation. The following absorption bands were observed with the desk-model spectroscope: a strong band at 410 nm, weak lines at 430 and 460 nm, a moderate line at 500 nm, and a wide band at 520–560 nm. Microscopic examination revealed numerous randomly oriented curved needles, cleavage cracks, “fingerprints,” and two-phase inclusions in both samples, as well as some transparent brown-yellow euhedral crystals in the cabochon.

The gemological properties are comparable to those reported for rhodonite in the literature (see e.g., R. Webster, *Gems*, 5th ed., rev. by P. G. Read, Butterworth-Heinemann, Oxford, 1994, p. 365). Although some of the properties of rhodonite and pyroxmangite overlap, the relatively low R.I.’s and birefringence of the two samples we examined are indicative of rhodonite. Also, Raman analysis of two spots on the cabochon and one spot on the faceted stone yielded spectra that more closely matched rhodonite than pyroxmangite. EDXRF analyses of the two samples by GIA Gem Laboratory senior research associate Sam Muhlmeister showed major amounts of Si and Mn, as well as traces of Fe and Ca (and possibly Zn in the faceted stone).

As with the Australian material, the main challenge with cutting the Brazilian rhodonite is its perfect cleavage in two directions. This, combined with a Mohs hardness of $5\frac{1}{2}$ – $6\frac{1}{2}$ and the fact that limited transparent material is available for faceting, means that it will remain a collector’s stone. Nevertheless, the availability of even a small amount of faceting-quality rhodonite from the Brazilian source has created interesting opportunities for setting the material into jewelry (figure 16).

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BML

Spessartine and almandine-spessartine from Afghanistan.

Beginning in mid-2002, these contributors received occasional reports of new spessartine discoveries in Afghanistan, and a few faceted stones stated to be from this production were seen at the Tucson gem shows in 2003 and 2004. Recently, a multitude of rough and cut samples of this material were loaned (and, in some cases, donated) to GIA by Sir-Faraz (“Farooq”) Hashmi of Intimate Gems. Most of these samples were purchased in late 2003, in the mineral bazaar at Peshawar, Pakistan. The dealers reported the garnets were mined from pegmatites in the Darre Pech area of Kunar Province, where they were apparently recovered as a byproduct of mining for kunzite and tourmaline.

The rough material we examined (see, e.g., figure 17) consisted of a 385-gram parcel of loose pieces and two

Figure 17. Since mid-2002, increasing amounts of spessartine (and some almandine-spessartine) have emerged from Afghanistan. The spessartine in matrix measures at least 3 cm in diameter, and the loose crystals weigh 3.59–15.47 ct. Courtesy of Intimate Gems; photo by Maha Tannous.





Figure 18. This group of yellow-orange to orange spessartines from Afghanistan ranges from 0.78 to 1.68 ct. Courtesy of Intimate Gems; photo by Maha Tannous.

matrix specimens. One of the specimens was a small crystal of kunzite (2.6 cm long) associated with spessartine and feldspar, while the other consisted of spessartine in a matrix of albite (cleavelandite variety) and K-feldspar that was covered by a thin layer of a porcelainous clay-like material (again, see figure 17). The spessartine crystal in the latter specimen measured at least 3 cm in diameter, with some areas suitable for faceting. The rough parcel consisted of broken fragments and a few well-formed crystals, as well as pieces that were moderately to heavily corroded (as is typical of spessartine from some pegmatites).

Figure 20. At 12.58 ct, this oval brilliant provides a fine example of a relatively large spessartine from Afghanistan. Courtesy of Mark Kaufman of Kaufman Enterprises, San Diego, California; photo by Maha Tannous.

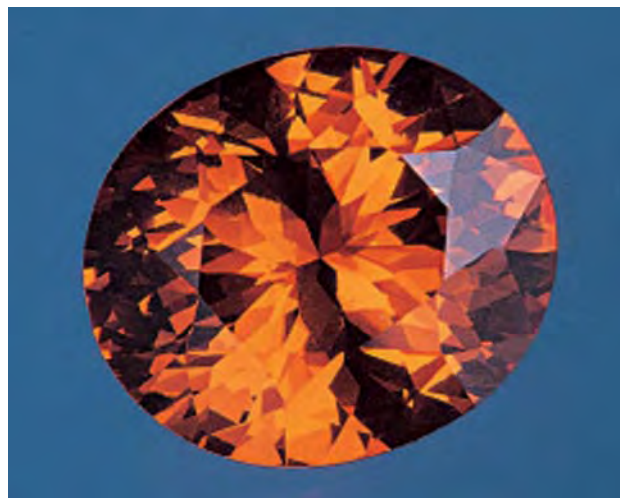


Figure 19. This group of orange-red to dark red almandine-spessartines (0.41–1.28 ct) is reportedly from the same mining area as the orange spessartines in figure 18. Courtesy of Intimate Gems; photo by Maha Tannous.

The faceted examples we examined comprised two distinct color groups. Each group was cut from rough purchased at different times, but represented as being from the same mining area. One group ranged from yellow-orange to orange (figure 18), and the other ranged from orange-red to dark red (figure 19). Two stones from each color group were chosen by one of us (EPQ) for examination. The following properties were obtained: R.I.—1.799 (yellow-orange), 1.802 (orange), and both red stones were above the limits of a standard refractometer; S.G.—4.26 (yellow-orange), 4.28 (orange), and 4.22 (orange-red), and 4.24 (red); fluorescence—all were inert to both long- and short-wave UV radiation; and all had similar absorption spectra when viewed with a desk-model spectroscope. The absorption features consisted of strong bands at 410 and 430 (although these two bands converged in the red stones, creating a cutoff at 440 nm), with weaker bands at 460, 480, 505, 520, and 570 nm. In the two red stones, the 505 and 570 nm bands were more pronounced than they were in the orange stones. This is consistent with their greater inferred iron content, as indicated by their darker and redder color. Based on these properties, the orange-red to dark red garnets are probably a mixture of spessartine and almandine.

Microscopic examination revealed “fingerprints,” two-phase inclusions, and needles in all four of the samples. The properties of the yellow-orange to orange stones are comparable to those reported for spessartine from other deposits (see compilation in B. M. Laurs and K. Knox, “Spessartine garnet from Ramona, San Diego County, California,” *Winter 2001 Gems & Gemology*, pp. 278–295), except for the higher S.G. values obtained for the Afghan samples in this study.

According to Mr. Hashmi, most of the facetable rough seen thus far in the Peshawar market has weighed less than 2 g, although some 3–5 g pieces were available and the largest clean rough known to him weighed 15 g (a

well-formed crystal). The faceted material has typically ranged up to 2 ct, although a 12.58 ct oval brilliant reportedly from this locality was seen at the 2003 Tucson gem shows (figure 20).

Curiously, faceted examples of this spessartine look very similar to the hessonite that also has come from eastern Afghanistan in recent years (see entry on pp. 258–259 of this section). In fact, Mr. Hashmi cautioned that some rough parcels he has examined contained both types of garnets.

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BML

Gem tourmaline from Congo. Africa has long been an important source of gem tourmaline; of particular interest are the countries of Nigeria, Namibia, Zambia, and Mozambique. In recent years, however, the Democratic Republic of the Congo (DRC, formerly known as Zaire) has occasionally yielded attractive gem rough and collector-quality crystals. While information on the exact sources in the DRC was not available to these contributors, the appearance and composition of these tourmalines indicates they are derived from granitic pegmatites.

The Central African pegmatite province includes numerous pegmatite fields in a broad region encompassing Uganda, Rwanda, Burundi, the eastern DRC, northern Zambia, western Kenya, and western Tanzania. Most of these pegmatites are categorized in the rare-metal class and are associated with Early Proterozoic granites (800–1,000 million years old; V. Ye. Zagorsky et al., *Miarolitic Pegmatites*, in Vol. 3 of B. M. Shmakin and V. M. Makagon, Eds., *Granitic Pegmatites*, Nauka, Siberian Publishing Firm RAS, Novosibirsk, Russia, 1999 [in Russian]). In the eastern DRC, the pegmatites are located in the Nord-Kivu, Sud-Kivu, and Katanga provinces (N. Varalamoff, "Central and West African rare-metal granitic pegmatites, related aplites, quartz veins and mineral deposits," *Mineralium Deposita*, Vol. 7, 1972, pp. 202–216). These deposits have been mined for decades for cassiterite (Sn) and industrial beryl (Be), but miarolitic pegmatites that host gem-quality tourmaline, beryl, and other minerals are apparently uncommon in the DRC.

In mid-2000, gem dealer John Patrick (El Sobrante, California) obtained about 200 g of variously colored DRC tourmaline through an African supplier. The supplier indicated the material came from the Virunga region north of Goma (Nord-Kivu Province). Mr. Patrick donated three green/pink crystals (2.5–4.0 cm long) and five multicolored slabs (1.5–2.9 cm wide) to GIA for research purposes. The slabs had irregular outlines and were concentrically zoned around the c-axis in pink and green; one sample had a blue core. All of these samples were semitransparent due to fluid inclusions and fissures, as are typically seen in tourmaline.



Figure 21. Transparent tourmalines, for the most part green to blue, recently have been recovered from the Democratic Republic of the Congo. These crystals, up to 4 cm long, are courtesy of New Era Gems; photo by Maha Tannous.

More recently, an undisclosed locality in the DRC has yielded transparent prisms of mostly green-to-blue tourmaline (figure 21). Steve Ulatowski (New Era Gems, Grass Valley, California) first obtained this material in mid-2003, and he estimates that about 20–30 kg/month were produced in early 2004. Since then, however, production appears to have diminished. Mr. Ulatowski purchased about 3 kg of the rough, of which 30% was facetable (see, e.g., figure 22), 60% was cabochon grade, and 10% was bead quality. The largest clean piece of gem rough he acquired weighed approximately 30 grams, although stones faceted from the

Figure 22. These tourmalines (5.78 and 15.94 ct) were cut from material similar to that in figure 21. These stones were faceted by Thomas Trozzo (Culpeper, Virginia). Photo by C. D. Mengason.





Figure 23. Heating experiments were conducted on the bottom portions of these four crystals of DRC tourmaline, while the top untreated portions were retained for comparison. All samples were heated in air as follows (from left to right, with weight of original crystal in parentheses): 427°C over a period of 5 hours (31.61 ct), 482°C over 6 hours (34.84 ct), 566°C over 8 hours (19.11 ct), and 621°C over 9 hours (19.89 ct). No appreciable change in the green-to-blue colors was seen in any of the heated portions, but abundant microcracks significantly reduced their transparency. Donated to GIA collection (nos. 30834–30837) by New Era Gems; photo by Maha Tannous.



Figure 25. The attractive color zoning shown by these DRC tourmalines (up to 3.6 cm long) ranges from pink to greenish yellow to yellowish green at the pyramidal terminations. Courtesy of William Larson; photo by Maha Tannous.

prismatic crystals typically weighed 3–5 ct. A small proportion of the crystals had a slightly waterworn appearance, but most showed no evidence of alluvial transport. Most of the tourmaline was green, although some blue-green, yellow-green, and rare bright pink material also was produced.

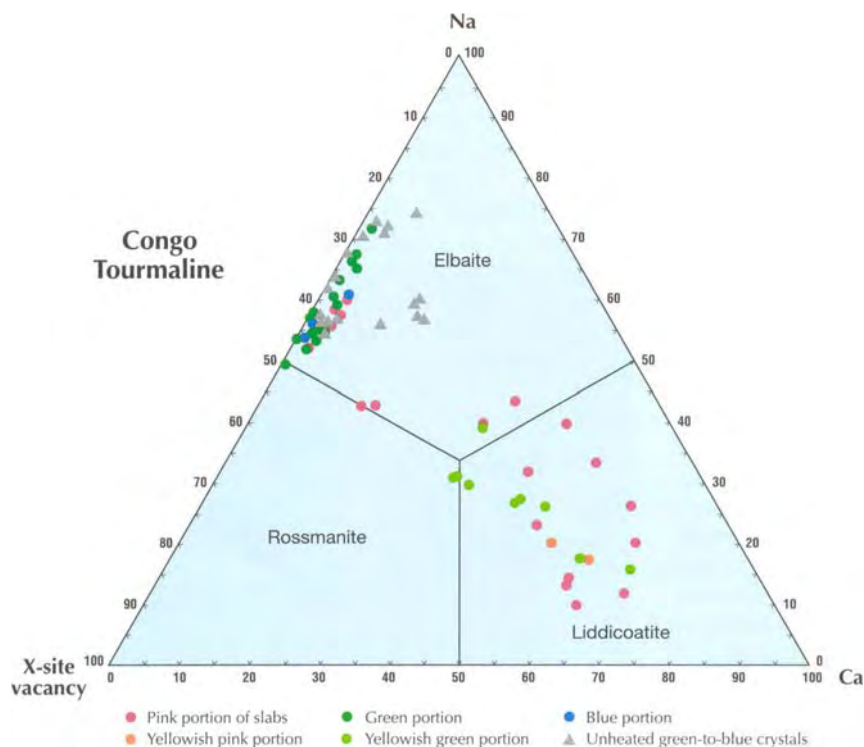


Figure 24. Electron-microprobe analyses of five multicolored slabs and the four green-to-blue tourmalines (before heating) from the DRC showed that they were predominantly elbaite and liddicoatite. In addition, rossmanite was found in two analyses (overlapping) of a yellowish green area, and one each of a pink and a green area of the slabs. These points fall very close to the boundaries with elbaite and liddicoatite and only barely cross into the rossmanite field. The color of each data point roughly approximates the color of the area analyzed. There is no correlation between X-site occupancy and color.

Mr. Ulatowski reported that the overdark gem rough does not respond well to heat treatment. To demonstrate this, he heated portions of four green-to-blue crystals in air at temperatures ranging from 427 to 621°C for 5–9 hours. A comparison to the unheated portions of these crystals revealed no appreciable change in color, as well as diminished transparency of all samples due to abundant microcracks (figure 23).

To investigate the composition of the DRC tourmaline, the five multicolored slabs and eight green-to-blue samples (i.e., the four clipped crystals in figure 23, before and after heating) described above were analyzed by electron microprobe at the University of New Orleans. The slabs were analyzed in core-to-rim traverses of 9–13 points each, and the green-to-blue samples had either core-to-rim or along-rim traverses of 5 points each. Figure 24 shows that most compositions ranged from elbaite to liddicoatite. Of note, however, are four analyses (from green, yellowish green (2), and pink portions of the slabs) that fell just slightly into the rossmanite field. All of the green-to-blue samples consisted of elbaite, whereas the slabs were elbaite ± liddicoatite (with the latter found in two of the five slabs). As expected from our previous analyses of gem tourmaline (see, e.g., Winter 2002 Gem News International, pp. 356–357), there was no relationship between the color and the tourmaline species.

However, significant variations were seen among the chromophoric elements Fe and Mn in the multicolored slabs (see the *G&G* Data Depository at www.gia.edu/gemsandgemology). Traces of vanadium (up to 0.10 wt.% V₂O₃) also were commonly found in the slabs, but Ti was rarely found (up to 0.06 wt.% TiO₂) and no Cr or Bi was detected. The green-to-blue samples likewise had appreciable Fe and Mn, but they had slightly higher traces of Ti and no detectable V, Cr, or Bi.

Another example of attractive Congolese tourmaline, but with much different coloration, is shown in figure 25. These gem-quality prisms are mostly pink, grading into greenish yellow and then yellowish green at their pyramidal terminations. According to William Larson (Pala International, Fallbrook, California), these crystals also were produced in recent years from the DRC. Clearly, they show the potential for the DRC to become a more important source of gem tourmaline in the future.

BML

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SYNTHETICS AND SIMULANTS

Dyed horn as an amber imitation. A necklace with 46 rounded beads of a translucent yellow-brown material was sent to the SSEF Swiss Gemmological Institute for identification (figure 26). The 50-cm-long necklace was purchased in Africa, where it was represented as amber.



Figure 26. This necklace of dyed horn beads (20–22 mm in diameter) was sold as amber in Africa. Photo by H. A. Hänni, © SSEF.

However, despite its general resemblance to amber, some of its details were suspicious. A closer look at the surface revealed a peculiar structure and yellow color concentrations (figure 27). Due to the number of beads on the strand and their rough surfaces, it was not possible initially to obtain S.G. or R.I. values. An infrared spectrum taken from a small powder sample was consistent with horn, although our reference spectrum did not indicate the

Figure 27. A closer look at one of the beads in figure 26 shows features inconsistent with amber, although the rough surface made gemological testing difficult. Width of view is approximately 15 mm; photomicrograph by H. A. Hänni, © SSEF.



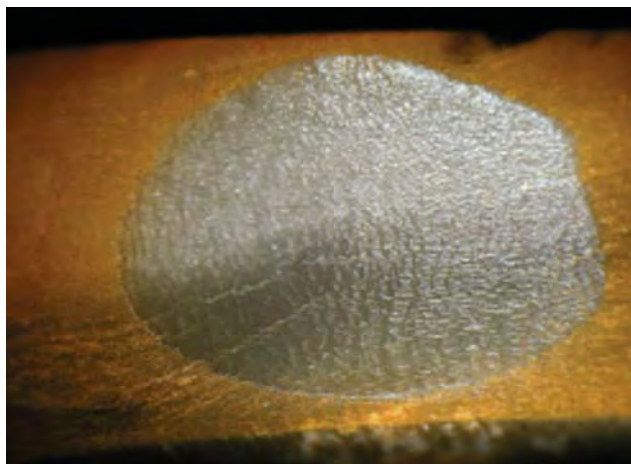


Figure 28. Polished areas of this imitation amber bead show that the structure (both parallel and perpendicular to the “grain”) is consistent with horn. The yellow color is clearly restricted to a thin surface layer. In each, width of view is approximately 1 cm; photomicrographs by H. A. Hänni, © SSEF.

species origin (e.g., cow, deer, etc.). The spectrum also provided evidence of a yellow dye.

With the client’s permission, we removed one of the beads and polished several areas on the surface to study the growth structure. The S.G. of this bead was measured hydrostatically as 1.27, which is consistent with horn but not amber. R.I. measurements on the polished areas were not possible because of the porosity of the material. A Raman spectrum of the original surface showed clear peaks related to the yellow dye (at 1402, 1434, 1144, 1188, 1609 cm^{-1} , in order of decreasing intensity). The most prominent FTIR peaks were at 1660 and 1540 cm^{-1} . The polished areas showed that the structure of the material was characteristic of horn and the yellow pigmentation was restricted to a thin outer layer (figure 28).

Amber imitations such as this have been described in the past. R. Webster reported that dyed bull horn beads have been marketed as “red amber” in various parts of Africa (*Gems*, 5th ed., rev. by P. G. Read, 1994, p. 597).

HAH

Fake inclusions in quartz, “Made in Brazil.” Quartz is well known for its attractive and varied inclusions, and specimens with distinctive inclusions can fetch high prices from collectors. However, this demand also encourages the manufacture of fakes and imitations. Brazil is one of the largest producers of quartz specimens with unusual inclusions, and it is also where this contributor encountered some interesting new faked “inclusions” in July 2004.

Figure 29. These quartz cabochons contained unusual “inclusions” that proved to be manufactured fakes. The largest cabochon is 6 cm long. Photo by J. Hyrsl.





Figure 30. The faked inclusions form interesting patterns, and appear to emanate from areas of naturally occurring mica or chlorite within the quartz. Photo by J. Hyrsl.

The first examples were seen in Gobernador Valadares, where a local dealer had a parcel of 19 specimens that he had bought for a high price in Teófilo Otoni. All of the specimens were cut as cabochons and contained naturally occurring inclusions of mica or chlorite near their base (figure 29). These cabochons also contained very unusual coral-like features, which appeared to grow from the micaceous inclusions (figure 30). The branches were up to ~30 mm long and 3 mm thick, occurring both singly and in groups. Their color varied, with green, brown, pink, and yellow examples seen; a few even showed multiple colors. In two specimens, it was apparent that small portions of the “branches” were not completely filled by the colored material.

Figure 31. On the base of the cabochon in figure 30, the filled holes were seen to be covered with pieces of feldspar. The glue used to attach the feldspar could be indented by a needle; it fluoresced yellowish green when exposed to UV radiation. Photo by J. Hyrsl.



Two days later, when this contributor visited Teófilo Otoni, the mystery surrounding these cabochons was solved. Several colleagues had numerous examples of this material. They were familiar with the person who was fabricating them, and reported that the “branches” were drilled into the cabochons and then filled with a mineral powder, probably mixed with glue, via a syringe. The filled holes were then covered with small pieces of feldspar and quartz mixed with glue, and sometimes “sealed” with a larger piece of feldspar (figure 31).

The glue was soft when poked with a sharp needle, and showed weak yellowish green luminescence to UV radiation (stronger with long-wave UV). The unique shape of the inclusions, sometimes incomplete filling, and especially the presence of glue on the base of the cabochons provide evidence for the artificial origin of these inclusions.

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TREATMENTS

Dyed cultured pearls fading on exposure to heat. Due to the popularity (and expense) of natural-color dark cultured pearls, dyed-color cultured pearls (figure 32) are quite common in the marketplace. Although the risks of dam-

Figure 32. After the pendant in this suite of cultured pearl jewelry was accidentally left on the dashboard of a car during several days of hot weather, it showed noticeable fading when compared to its original color (as represented by the earrings here). The fading of the treated color was likely due to dehydration of the conchiolin and possibly delamination of the nacre. Natural-color black pearls may also fade on exposure to prolonged heat. Photo by Maha Tannous.



aging pearls through harsh cleaning methods are fairly well known (see, e.g., D. D. Martin, "Gemstone durability: Design to display," Summer 1987 *Gems & Gemology*, pp. 63–77), excessive heat can also cause fading.

The cultured pearl jewelry suite in figure 32 was acquired by a GIA staff member during the 2003 Tucson gem shows ("Cultured pearls with diamond insets," Spring 2003 *Gem News International*, p. 56). During a recent stretch of hot weather in southern California, the pendant was accidentally left on the dashboard of a car for several days. When recovered, the cultured pearl's color displayed noticeable fading.

The pendant was examined by one of these contributors (SE) using EDXRF spectroscopy, which detected the presence of silver in the cultured pearl. This indicates that it had been treated with silver nitrate to create the dark color.

Although K. Nassau (*Gemstone Enhancement*, 2nd ed., Butterworth-Heinemann, London, 1994, pp. 171–172) reported that the color induced through silver nitrate dyeing is "non-fading," exposing any pearl—whether natural or treated color—to prolonged heat (such as that generated inside a closed car) is likely to be detrimental to the color. It would not be surprising for the color to fade due to dehydration of the conchiolin and possibly delamination of the nacre.

This example serves to underscore the fact that all pearls must be treated with care.

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MISCELLANEOUS

Masterpieces of American Jewelry Exhibition. "Jewelry, like all true art, can be a remarkable expression of an entire culture," said Judith Price, president of the National Jewelry Institute (NJI). Her words are beautifully reflected in the NJI's inaugural exhibition, "Masterpieces of American Jewelry," which will be hosted by the American Folk Art Museum in New York City from August 20, 2004 to January 23, 2005. During a tour of the exhibition, this contributor was impressed by the artful displays and overall presentation of the show.

This exhibit, the first museum show to focus exclusively on the jewelry history of the U.S., emphasizes the creativity and artistry of American jewelry from the late 1700s to the 1980s. More than 120 dazzling pieces are displayed, most of which were selected by Ralph Esmerian, curator of this exhibit, vice-chairman of NJI, and chairman of the Folk Art Museum. Included are unique creations that were crafted by American designers, manufactured in American workshops, or retailed by American firms such as Tiffany & Co. and Harry Winston. Also on display are pieces from foreign jewelers such as Cartier,

Van Cleef, and Bulgari, that were designed, manufactured, and distributed in the United States.

The show focuses on five major themes common throughout America's jewelry history: Americana, nature, humor, pastimes, and high style. The Americana section pays tribute to the American spirit, with pieces that depict victories in the War of 1812 or a single American flag. The Nature section showcases 19th-century nature-inspired pieces such as the exotic Tiffany orchid brooches. Disney charm bracelets designed by Cartier, a New York Yankees watch by Hamilton, a sailing ship pin by Marcus & Co., and ballerina brooches by Van Cleef & Arpels (figure 33) are featured in the Humor and Pastimes sections. The High-style exhibit includes photographs of women who distinguished themselves by their personal styles.

Figure 33. Among the highlights of the "Masterpieces of American Jewelry" exhibition is this miniature ballerina brooch (7 × 4 cm) designed in 1940 by Maurice Duvalet for Van Cleef & Arpels, New York. It is set with rubies, emeralds, and diamonds in platinum. Courtesy of Masterpieces of American Jewelry (by J. Price, Running Press, Philadelphia, 2004).



On display are Jacqueline Kennedy Onassis' gold cuffs by Van Cleef & Arpels and Joan Crawford's diamond bracelet by Raymond C. Yard.

"Masterpieces of American Jewelry" is truly a masterpiece worth seeing, and the companion book by Judith Price will enthrall readers. For more information, visit www.folkartmuseum.org or e-mail info@folkartmuseum.org.

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ANNOUNCEMENTS

G&G beryllium diffusion article wins AGS Liddicoat journalism award. "Beryllium diffusion of ruby and sapphire," published by John Emmett and co-authors in the Summer 2003 *Gems & Gemology*, has received the American Gem Society's Richard T. Liddicoat Journalism Award in the Jewelry Industry/Trade Reporting class. This award was developed in remembrance of GIA Chairman Richard T. Liddicoat to honor journalists who have made exceptional contributions to the understanding of gemology, as well as the ideals of ethics, education, and consumer protection. *Gems & Gemology* previously won the inaugural 2003 Liddicoat Journalism Award in the same category for "Photomicrography for Gemologists" by John I. Koivula in the Spring 2003 issue (see Fall 2003 Gem News International, p. 248).

Visit *Gems & Gemology* in Tucson. Meet the editors and take advantage of special offers on subscriptions and back issues at the G&G booth in the Galleria section (middle floor) of the Tucson Convention Center during the AGTA show, February 2–7, 2005.

GIA Education's traveling Extension classes will offer hands-on training in Tucson with "Gem Identification" (January 31–February 4) and "Advanced Gemology" (February 5). To enroll, call 800-421-7250, ext. 4001. Outside the U.S. and Canada, call 760-603-4001.

The GIA Alumni Association will host a Dance Party in Tucson on February 4, featuring a silent auction, an industry awards presentation, and a live auction. To reserve tickets, call 760-603-4204 or e-mail events@gia.edu.

Exhibits

Pearls at the Royal Ontario Museum. "Pearls: A Natural History," a traveling exhibition tracing the natural and cultural history of pearls organized by the American Museum of Natural History (New York) in collaboration with the Field Museum (Chicago), will be on display at the Royal Ontario Museum in Toronto from September 18, 2004 to January 9, 2005. Among the many exhibits will be displays on pearl formation and culturing, as well as historical pearl jewelry that once belonged to Great Britain's Queen Victoria and Marie Antoinette of France. Visit www.rom.on.ca.

Carnegie Gem & Mineral Show. Held November 19–21, 2004, at the Carnegie Museum of Natural History, Pittsburgh, Pennsylvania, this show will feature sapphires in special exhibits and invited museum displays. Visit www.carnegiemuseums.org/cmnh/minerals/gemshow.

Mineralien Hamburg. The International Show for Minerals, Fossils, Precious Stones, and Jewellery will take place in Hamburg, Germany, on December 3–5, 2004. Special exhibitions will feature pearls and carved mineral and gem materials from China. Visit www.hamburg-messe.de/mineralien.

Conferences

Rapaport International Diamond Conference 2004. Held October 12, this conference will take place in New York and feature an insider's look at the international diamond and jewelry industry. Visit www.diamonds.net/conference.

CGA Gemmology Conference 2004. The Canadian Gemmological Association is holding its annual conference at the Terminal City Club in Vancouver on October 22–24. Contact Donna Hawrelko at 604-926-2599 or dona-hawrelko@hotmail.com.

Pegmatites at GSA. A topical session titled "Granitic Pegmatites: Recent Advances in Mineralogy, Petrology, and Understanding" will be held at the annual meeting of the Geological Society of America in Denver, Colorado, November 7–10, 2004. The meeting will also feature a session covering advanced mineral characterization techniques. Visit www.geosociety.org/meetings/2004.

Antwerp Diamond Conference. The 3rd Antwerp Diamond Conference, presented by the Antwerp Diamond High Council (HRD), will take place in Antwerp on November 15–16, 2004. The conference will focus on synthetic diamonds as well as on strategies to promote consumer confidence in natural diamond. Visit www.hrd.be.

Diamond Synthesis and History. To commemorate the 50th anniversary of the successful repeatable synthesis of diamond, the H. Tracy Hall Foundation is organizing a one-day symposium on "Diamond Synthesis and History" on December 16, 2004, in Provo, Utah. The conference will focus on high-pressure research and equipment development. Visit www.htracyhall.org/Symposium.htm.

GemmoBasel 2005. The first open gemological conference in Switzerland will be presented by the SSEF Swiss Gemmological Institute at the University of Basel April 29–May 2. Among the events scheduled is a field trip to a Swiss manufacturer of synthetic corundum and cubic zirconia. Visit <http://www.gemmobasel2005.org> or contact gemplab@ssef.ch.