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## 2011 TUCSON



Figure 1. Among the Vietnamese spinels seen at this year's Tucson shows was the 2.59 ct cobalt blue gem on the left (courtesy of Palagems.com, Fallbrook, California; photo by Robert Weldon). The rare väryrynenite from Pakistan on the right weighs 2.41 ct (photo and stone courtesy of The Gem Trader, Surprise, Arizona).

Many dealers at this year's Tucson gem and mineral shows were surprised by better-than-expected sales on the heels of the global economic downturn. The success was apparently due to the need to restock inventories after buying was curtailed during the past two years, as well as enthusiasm for an improved economic outlook. Some of the gem and mineral standouts included Vietnamese spinel (see figure 1 left and report on pp. 60–61 of this issue), rare stones that are also quite attractive (e.g., the väryrynenite in figure 1 right), and some large pieces of gem rough (e.g., the morganite in figure 2). Several additional notable items seen in Tucson are described in the following pages and will also be documented in future issues of *G&G*.

The theme of this year's Tucson Gem and Mineral Society show was "Minerals of California," which featured many displays of particular interest to gemologists such as pegmatite gems and benitoite. The theme of the 2012 TGMS show will be "Minerals of Arizona" in honor of Arizona's Centennial.

*G&G* appreciates the assistance of the many friends who shared material and information with us this year, and also thanks the American Gem Trade Association for

providing space to photograph these items during the AGTA show.

### COLORED STONES AND ORGANIC MATERIALS

**Faceted cavansite.** Cavansite is a rare calcium vanadium phyllosilicate that occurs primarily as fibrous ball-shaped aggregates. Most cavansite on the market is recovered from cavities in basaltic rocks near Pune, India, that are part of the famous Deccan Traps (see M. F. Makki, "Collecting cavansite in the Wagholi quarry complex,

*Editor's note: Interested contributors should send information and illustrations to Brendan Laurs at blaurs@gia.edu or GIA, The Robert Mouawad Campus, 5345 Armada Drive, Carlsbad, CA 92008. Original photos will be returned after consideration or publication.*

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Figure 2. This semi-transparent morganite from Brazil weighs an impressive ~22.4 kg, and was part of an even larger crystal. The stone's pleochroism is easily visible when viewed from different directions. Photos by Eric Welch; courtesy of BC Gemas do Brasil, Governador Valadares, Brazil.



Figure 3. These bright blue stones (1.45–2.45 ct) are faceted examples of the rare mineral cavansite. Photo by Robert Weldon.

Pune, Maharashtra, India," *Mineralogical Record*, Vol. 36, No. 6, 2005, pp. 507–512]. Though its bright saturated blue color has made it sought-after by mineral collectors, it has not seen use as a gemstone because of its low hardness (Mohs 3.5) and durability.

At the Gem & Jewelry Exchange (GJX) show, Mauro Panto of The Beauty in the Rocks, Perugia, Italy, offered numerous pieces of faceted cavansite (e.g., figure 3). Most stones weighed 1–5 ct, rarely up to 10 ct. He said that about 500 carats have been faceted so far, all showing the typical bright blue to greenish blue coloration of cavansite.

As would be expected, faceting cavansite is very difficult, since the fibrous crystals are prone to splitting. According to Mr. Panto, the material is faceted by a proprietary process that does not involve stabilization or treatment of any kind. Because of the aggregate nature of the material, the cut stones typically contain small cavities, and only top-quality pieces show no pits or nicks. It is always translucent.

Though it is intended as a collectors' stone, Mr. Panto reported that a few designers have set faceted cavansite in jewelry. Because production of cavansite is limited and good-quality pieces suitable for faceting are rare and expensive, only limited amounts of the cut material are expected to be available in the future.

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**New find of green grossular at Merelani, Tanzania.** While in Tucson for the gem and mineral shows, Bill Larson (Palagems.com, Fallbrook, California) and Steve Ulatowski (New Era Gems, Grass Valley, California) showed this contributor some newly mined green grossular from Tanzania that was impressive for its transparency and good color. They said it was produced in mid-December 2010 from Block D at the Merelani tanzanite mines. All the new production reportedly came from a single pocket that yielded ~0.5 kg of grossular crystals and did not contain any tanzanite. The crystals were lustrous and very well formed (e.g., figure 4); some had only a small attachment point with the graphite matrix. The presence of graphite on the base of some crystals gave them a dark appearance when viewed in some directions. Several gemstones have been cut from this grossular, reportedly up to nearly 100 ct, and they display a more intense color than typical "mint" green garnet from this deposit (e.g., figure 5).

Brendan M. Laurs

**Blue quartz colored by trolleite and lazulite inclusions.** At the Pueblo Gem & Mineral Show, Leonardo Silva Souto (Cosmos Gems, Teófilo Otoni, Brazil) displayed blue quartz colored by crystalline inclusions. He stated that the material was mined in the northern part of Minas Gerais

Figure 4. These grossular crystals (1.49–26.82 g) were recovered in mid-December 2010 from Merelani, Tanzania. Courtesy of Palagems.com; photo by Robert Weldon.







Figure 5. Compared to typical “mint” green garnet (center, 10.62 ct) from Tanzania, the new production shows a more intense color (left and right, 8.67 and 17.13 ct).  
Courtesy of New Era Gems; photo by Jeff Scovil.

State in Brazil. His company acquired a 70–80 kg rough parcel in Teófilo Otoni in August 2010, which was polished into approximately 3,500 carats of translucent to opaque cabochons weighing 10–30 ct (e.g., figure 6). The color was mostly homogeneous, though a few stones were zoned in blue to greenish blue.

Three opaque cabochons (~20 ct each) were donated to the Mineralogy Museum at the University of Rome “La Sapienza,” and examined for this report. They were characterized by standard gemological techniques, and also by a Cameca SX-50 electron microprobe at the Italian National Research Council’s Institute of Environmental Geology and Geoengineering (IGAG-CNR) in Rome. The gemological properties were consistent with quartz, and microscopic examination revealed diffuse and interconnected wispy blue areas. Microprobe analyses of the blue inclusions identified both trolleite and lazulite (see the *GeG* Data Depository at [gia.edu/gandg](http://gia.edu/gandg)), which are aluminum phosphates.

Colored by mineral inclusions rather than trace elements or color centers, natural blue quartz is always

Figure 6. These blue quartz cabochons (~10–30 ct) are colored by trolleite and lazulite inclusions. Photo by M. Campos Venuti.



either translucent or opaque. Quartz with blue inclusions of dumortierite, riebeckite, tourmaline, gilarite, lazulite, ajoite, and papagoite are well known in the literature. To the best of our knowledge, however, this is the first documented case of blue quartz colored by trolleite and lazulite.

According to Mr. Souto, additional production of this quartz is expected in the future. The trolleite and lazulite inclusions are not particularly attractive on their own, making this material an unlikely candidate for the inclusion collector’s market. Nevertheless, the homogeneous blue color and the availability in calibrated sizes give this quartz interesting potential for jewelry.

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**Spectral interference in quartz from India.** At the Pueblo Gem & Mineral Show, an interesting variety of quartz was being marketed under the name “Anandalite” by Nirvana Stone (Tokyo and Osaka, Japan). To the casual observer, this material appeared to be ordinary quartz crystal clusters, but closer inspection under direct lighting revealed a distinct phenomenon: spectral interference colors under minor rhombohedral faces. These clusters came in a wide

Figure 7. This quartz from India (46 g cluster and 0.29 ct faceted stone) shows spectral interference colors due to lamellar twinning. Photo by Robert Weldon.



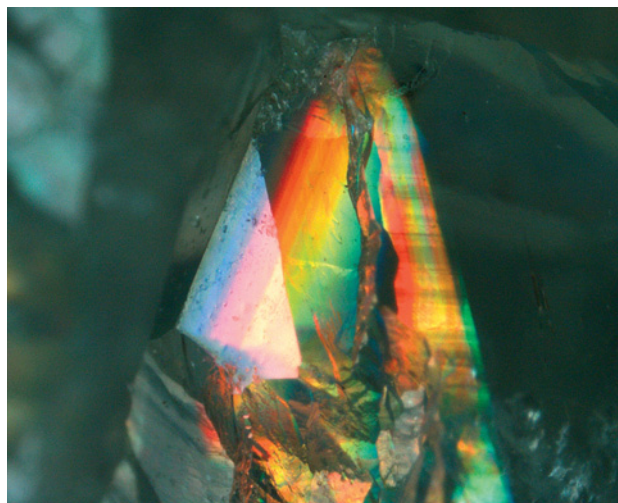


Figure 8. The subsurface location of the interference colors shows that the feature is a natural phenomenon in the quartz and not the result of a coating. Photomicrograph by N. Renfro; magnified 20 $\times$ .

variety of sizes, from a few grams to hundreds of grams (e.g., figure 7). Most of the individual quartz crystals were on the order of ~5 mm long, with some specimens featuring crystals up to ~15 mm long. The quartz ranged from colorless to very pale purple; faceted stones were also available in sizes up to several carats. The dealer stated that the source was India, but did not specify an exact locality.

This phenomenon in quartz is known as the "Lowell effect," after gem dealer Jack Lowell, who first observed it in amethyst from Artigas, Uruguay. The effect has also been seen in quartz and amethyst from Orissa, India, and Washington state (E. G. Gübelin and J. I. Koivula, *Phot atlas of Inclusions in Gemstones*, Vol. 2, Opinio Verlag, Basel, Switzerland, 2005, pp. 568 and 644). The cause appears to be lamellar twinning along the minor rhombohedral faces (figure 8). The twinning likely results from a modification in the growth environment during the late stages of formation, given the fact that so many of the crystals in a single cluster show the phenomenon at the same stage of growth.

While this is not the first time such material has been reported, this does appear to be the first time it has been mined in marketable quantity. Since this phenomenon resembles the much more common iridescence from air-filled cracks, it is possible that such phenomenal quartz has been overlooked in the past.

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**Scapolite from India.** At the AGTA show, Dudley Blauwet (Dudley Blauwet Gems, Louisville, Colorado) exhibited rough and cut yellow scapolite from a relatively new find in India (figure 9). According to his supplier, the crystals came from a pegmatite located ~10 km from Karur in the southern Indian state of Tamil Nadu. The scapolite reportedly was mined from seams between layers of feldspar.



Figure 9. This attractive yellow scapolite is reportedly from the southern Indian state of Tamil Nadu. Courtesy of John Taylor (27  $\times$  11 mm crystal) and Dudley Blauwet Gems (5.27 ct cut stone); photo by Robert Weldon.

Mr. Blauwet first encountered the rough material at the September 2009 Denver Gem and Mineral Show. Since then, one of his part-time employees (John Taylor of Bloomington, Illinois) purchased four lots of terminated crystals from the Indian supplier, and in September 2010 Mr. Blauwet obtained a parcel of gem rough (broken crystals) from the same supplier. Nineteen stones have been faceted, 76.14 carats in total, ranging from 3.11 to 5.27 ct. These consisted of matched sets, pairs, and suites of similar-sized stones, cut with the table oriented perpendicular to the c-axis for the best color. He reported that all of the stones except one had an RI range of 1.537–1.556. This corresponds to an intermediate composition between marialite and meionite (W. A. Deer et al., *Rock-Forming Minerals—Framework Silicates*, Vol. 4, Longman, London, 1963, pp. 321–337). The stones fluoresced intense pink-orange to short-wave UV radiation and (with one exception) lavender to long-wave UV.

Despite numerous buying trips to India over the past 30 years, Mr. Blauwet has never encountered gem-quality Indian scapolite. A review of the literature yielded only one reference to such material (U. Henn, "Scapolite cat's-eyes from India," *Gemmologie: Zeitschrift der Deutschen Gemmologischen Gesellschaft*, Vol. 54, No. 1, 2005, pp. 55–58), but the samples documented in that article were chatoyant and typically brownish orange to yellowish brown. Mr. Blauwet stated that the top-quality material from the new locality has a lighter but more consistent color than fine scapolite from Dodoma, Tanzania.

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Figure 10. At Lang Chap in northern Vietnam, miners dig through mud in search of spinel while local buyers observe the digging from above (photo by D. Blauwet). The Lang Chap spinels in the inset weigh 1.71–3.18 ct (photo by Robert Weldon).



**Spinel from northern Vietnam, including a new mine at Lang Chap.** The year 2010 saw impressive production of spinel from Yen Bai Province in northern Vietnam (see, e.g., Summer 2010 Gem News International [GNI], pp. 151–153). This material was widely available in Tucson, including at this contributor's booth at the AGTA show. In May, June, and October, this author visited all of the deposits reviewed here except for Bai Son and Trum Chan.

A new mine at **Lang Chap** (figure 10) was discovered in mid-April in a remote bamboo jungle about 20 km west-southwest of Luc Yen (Yen The) at 22°05'86"N, 104°34'83"E. By late May, some 350 people were working secondary deposits to a depth of ~2 m in a steep narrow valley. Waterworn pieces of "maroon" (dark purplish red) spinel up to 3 cm across were found, along with excellent red-pink to pinkish red-orange gem rough. By October,

though, the number of workers at Lang Chap had dwindled to about 30, and less rough material was available. For more information on this mine, see D. Blauwet, "La mine de spinelle de Lang Chap, au Nord du Vietnam," *Revue de Gemmologie A.F.G.*, No. 173, 2010, pp. 11–15.

The most important of Vietnam's spinel deposits, Cong Troi (Gateway to the Sun) at **An Phu**, has been mined since the mid-1990s and had another good year in 2010. In addition to well-formed crystals embedded in marble, the production included rough material from alluvial traps in the weathered marble. This locale is known for its variety of spinel colors (figure 11, left), consisting mainly of maroon to purple, pink, and padparadscha-like stones. In addition, the mine has produced dark blue to grayish blue, light bluish gray, and "lavender" to purple spinel, along with a rare variety that is lavender in daylight and pink under incandescent light.

Elsewhere in Yen Bai Province, "cobalt" blue spinel (figure 11, right) was still available from the **Bai Son** mine near An Phu. Some of this violetish blue spinel changes to violet-purple under incandescent light (see also J. B. Senoble, "Beauty and rarity—A quest for Vietnamese blue spinels," *InColor*, Summer 2010, Issue 14, pp. 18–23). Large pieces of rough (8–20 g) were seen in local markets in June, though clean material was very rare. Bai Son also yields a rare "sky" blue spinel, some of which turns lavender under incandescent light. Cobalt blue spinel was also obtained from mines located about 10 km from Luc Yen, at **Bai Gau** (dark blue) and **Trum Chan** (light to medium blue). Some of the lighter blue spinel from Trum Chan turns light lavender under incandescent light. A 370 g color-zoned (light "aqua" blue to a medium "sky" blue) specimen containing transparent areas was discovered at Trum Chan in June. Other colors include light pink, smoky pink, pink-red to red-orange (figure 12, center-right stone), and various shades of lavender and maroon.

**Bai Linh**, located 10 km northeast of Luc Yen near the corundum deposit of Lieu Do, produces orange-red spinel

Figure 11. The Cong Troi mine at An Phu produces a wide range of spinel colors (left, 0.97–6.07 ct). Other mines in the An Phu–Luc Yen area yield "cobalt" blue spinel (right, 1.83–7.78 ct). Photos by Robert Weldon.





Figure 12. These pink to red to red-orange spinels come from Tan Huong (three stones on left, 2.05–6.00 ct), Minh Tien (top right, 4.20 ct), Trum Chan (center right, 2.10 ct), and Bai Linh (bottom right, 0.62 ct). Composite photo by Robert Weldon.

(figure 12, bottom right). A limited amount of pink to purplish pink spinel (figure 12, top right) comes from alluvial workings between An Phu and the noted tourmaline locale of **Minh Tien** several kilometers to the north. Only a few pieces offered in local markets were identified as being from this area, but all of them were relatively large (3+ g).

In the Yen Bai area, pink to dark purplish red stones (figure 12, left group) have been produced from **Tan Huong**, a noted star ruby locality ~80 km south of Luc Yen. Cut spinels from this area range up to 6 ct.

Production of spinel from Yen Bai Province is expected to continue during the 2011 mining season.

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**Gem zektzerite.** Rare minerals occasionally find their way to the hands of a lapidary, where they are transformed into gems. This was the case with a small parcel of zektzerite recently loaned to GIA for examination by Brad Payne, who also offered this material at the 2011 Tucson Gem & Mineral Show.

Zektzerite,  $\text{LiNaZrSi}_6\text{O}_{15}$ , is an orthorhombic mineral in the tuhualite group. It was named in honor of geologist Jack Zektzer, who first initiated a study of this material at



Figure 13. These four samples (the tabular crystal weighs 0.6 g) are the rare mineral zektzerite. Photo by Brad Payne.

the Smithsonian Institution's Department of Mineral Sciences in 1975. His samples originated from the Golden Horn batholith in Okanogan County, Washington, the same source as the old stock that Mr. Payne recently acquired and faceted.

Six faceted samples (0.21–1.54 ct) and a 0.6 g tabular pseudohexagonal crystal were examined at the GIA Laboratory in Carlsbad. With the exception of one light purplish pink gem, the faceted stones had a light brownish yellowish orange color (figure 13). Standard gemological testing revealed RIs of 1.580–1.583. The average SG, determined optically using a Sarin device, was 2.81. All of the samples were inert to long-wave UV-radiation, and fluoresced weak to moderate yellow to short-wave UV. These characteristics are consistent with those reported for zektzerite in mineralogy textbooks. Raman analysis confirmed this identification.

Magnification revealed liquid “fingerprint” inclusions and cleavages throughout the stones (figure 14, left). One sample also contained numerous dark blue pleochroic elongated crystals (figure 14, right), but their depth precluded Raman analysis.

A review of the literature found no published reports of faceted zektzerite. Given the rarity of this material, it would seem to have a niche as a collector's stone.

*Nathan Renfro*

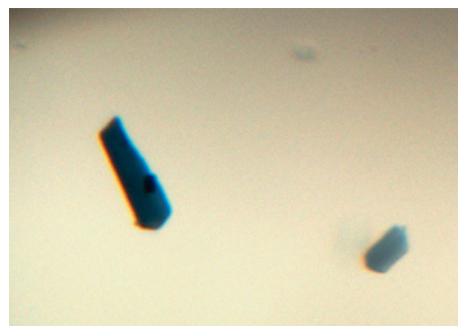
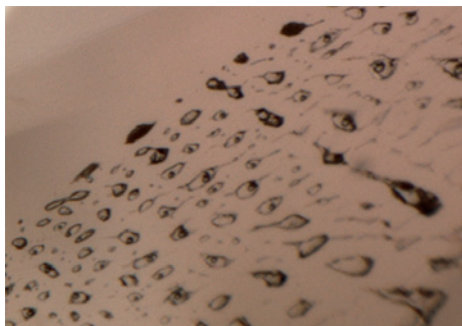


Figure 14. Inclusions in the zektzerite consisted of fluid fingerprints composed of numerous negative crystals with communication tubes (left), as well as dark blue pleochroic crystals (right). Photomicrographs by N. Renfro; magnified 110×.

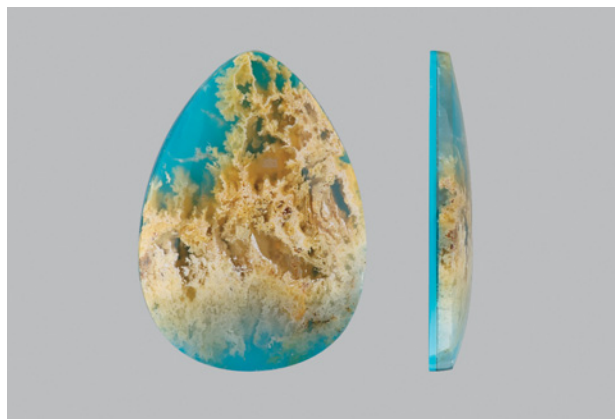


## SYNTHETICS AND SIMULANTS

**“Coral Sea” agate.** At the AGTA show, Bill Heher (Rare Earth Mining Co., Trumbull, Connecticut), had some new doublets that were marketed as Coral Sea agate (figure 15). Formed of natural lace agate from Oregon on a reconstituted turquoise backing, the polished slab had scenes resembling a coral reef. The concept was developed by lapidary Fred Graupp (Robeson, Pennsylvania).

Sizes ranged from 18 × 13 mm ovals up to free-form pieces of 70 mm or larger. Mr. Heher stated that he has sold over 200 pieces, but supplies are limited because the production process is very labor intensive.

*Thomas W. Overton*



*Figure 15. Doublets of lace agate and reconstituted turquoise, sold as Coral Sea agate, often resemble coral reef scenes. The piece shown here weighs 37.40 ct; its assembled structure is apparent when viewed along the edge. Composite photo by Robert Weldon.*

**Dendritic agate in doublets, inlays, and jewelry.** The Fall 2008 GNI section (pp. 262–263) reported on a large selection of dendritic agate from central India. The stones were fashioned by Indus Valley Commerce (Ghaziabad, India) to reveal an array of colors and patterns, in a clarity range of transparent to translucent. At the Arizona Mineral and Fossil Show, the company exhibited some attractive new applications of the material, in the form of doublets, inlays, and pendant jewelry.

The doublets are produced by bonding a cap of clear quartz to a typically thin layer of agate, giving it a beveled appearance (figure 16). According to company director Tarun Adlakha, the museum-grade epoxy and two-week curing process ensure strength and color stability, even under UV exposure. The inlays (figure 17) offer other interesting design possibilities, with dendritic agate discs framed inside of other gem materials such as rock crystal, jasper, chrysoprase, obsidian, tiger’s-eye, and banded agate. The agate pendants (e.g., figure 18) are made by hand and combine Mogul-inspired floral motifs with garnet, spinel, emerald, sapphire, and old-cut diamond accents. The agates



*Figure 16. The profile view of this 16 × 25 mm agate doublet reveals its quartz cap. Composite photo by Robert Weldon.*

in the inlay and jewelry pieces range from 6 to 50 mm.

The 2008 GNI report noted that Indus Valley Commerce had planted cucumbers and other deep-rooting vines to loosen the alluvium along the Narmada River and draw the agate nodules to the surface. While that method is still used to some extent, most of the mining is now done by conventional digging, in pits as deep as 50–60 feet (15–18 m). Current production totals 7,000–8,000 finished pieces annually.

*Stuart D. Overlin*

*Figure 17. This ensemble shows dendritic agate inlaid in chrysoprase (left, 22 × 35 mm), snowflake obsidian (center, 31 × 37 mm), and agate (right, 30 mm). Photo by Robert Weldon.*





Figure 18. This Mogul-style pendant features a 51 ct dendritic agate set in gold with flat-cut diamonds and a carved garnet drop. The adjustable cord is strung with garnet beads and shellac-filled 22K gold spacers. Photo by Jeff Scovil.

## GNI REGULAR FEATURES

### DIAMONDS

**Artisanal diamond mining in Liberia.** Since the early 1900s, northwest Africa has been an important source for diamonds, almost all of them alluvial. Sierra Leone, Guinea, Ivory Coast, and Liberia (figure 19) are the main diamond sources in this region. The deposits are mainly worked by artisanal miners, who continue to prospect new fields in the area.

Liberia's Mano River basin is located in Grand Cape Mount County and forms part of the border with Sierra Leone. It is underlain by the Mano Craton of West Africa. Small diggings in this field commonly produce 0.5–4 ct yellow diamonds (figure 20), as well as some gray and brown stones. Very rarely recovered are light green, blue, and pink diamonds in the ~0.5–1.5 ct range. Although it is impossible to know the exact production from the Mano River basin, the monthly yield (including industrial-quality stones) is likely a few hundred carats, with ~10% or less being gem quality.

A less significant source of Liberian diamonds is the



Figure 19. The Mano River basin and the Ganta field are sources of diamond in Liberia.

Ganta field in Nimba County, located near the border with Guinea. This area is less populated and has fewer miners, but it has an alluvial structure similar to that of the Mano River basin. This contributor saw many different qualities and colors of diamonds during a visit in November 2010 (figure 21). Most of the stones weighed 0.5–8 ct and were heavily included (industrial quality), showing macle and ballas (fibrous spherical) morphology.

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### COLORED STONES AND ORGANIC MATERIALS

**Update on emerald mining at Kagem, Zambia.** In January 2011, these contributors spent three days at the Kagem emerald mine in the Kafubu area of northern Zambia.

Figure 20. Miners dig for diamonds along the Mano River near the town of Lofa. The yellow Mano River diamonds in the inset weigh 4.38 and 0.68 ct. Photos by M. Douman.







*Figure 21. A wide range of quality is exhibited by diamonds (here, 0.4–6 ct) from the Ganta area of Liberia. Photo by M. Douman.*

Kagem, owned and managed by Gemfields (London), is located 35 km south of Kitwe, near the border with the Democratic Republic of Congo. Our visit was led by Gemfields geologist Robert Gessner.

The Kagem mine (figure 22) is located on the eastern 2 km of the Fwaya-Fwaya belt, which runs east to west over 8 km and is one of the world's richest emerald deposits. Production takes place year-round, though it slows during the rainy season. The gems are found in a biotite-phlogopite schist reaction zone (10 cm to 1 m thick) that mainly formed between subvertical quartz-tourmaline veins and the host ultramafic talc-magnetite-schist. The emeralds are recovered by "chisellers" using hand tools. (For more on the geology and mining of Zambian emeralds, see J. C. Zwaan et

al., "Emeralds from the Kafubu area, Zambia," Summer 2005 *G&G*, pp. 116–148; and Winter 2009 *GNI*, pp. 298–299.) The mineralized material surrounding the hand-mined areas is transported to a washing plant and separated into low- and high-grade piles for processing. After the material has been crushed and washed, the emeralds are hand-picked from conveyor belts. Automated optical sorting is not feasible, as the emeralds are often still embedded in the schist. After trimming/cobbing, the emeralds are soaked in mineral oil and sorted by color, clarity, and size (e.g., figure 23). The stones range up to 5–6 cm long, and good-quality emeralds measuring 4–5 cm are not uncommon.

Kagem has traditionally been an open-pit mine. The huge excavation we witnessed during our visit (again, see figure 22) was dug since 2007 (and Gemfields' arrival in 2008), and resulted from merging three pits (Chama, Fwaya-Fwaya, and F10). Most of the current production is coming from that excavation. However, because the emerald-bearing zone dips 16° south-southeast, large amounts of waste material must be removed to reach it. In February 2009, Gemfields began a feasibility study for underground exploitation. At the time of our visit, a mining project located in the former F10 pit area had reached a depth of 135 m, with 43 m comprised by an inclined tunnel. Along the tunnel there were 70 m of exploratory workings. The company plans to extend the tunnel 130 m deeper.

The authors also visited a new open pit that is being explored by Gemfields at Lushingwa, located 1.5 km southeast of the Fwaya-Fwaya pit. Since the geology varies considerably over the area, core drilling is being done to gain a better understanding of the emerald mineralization.

Gemfields has an efficient, well-run operation in place. The biggest challenges are profitably producing good-quality

*Figure 22. Gemfields' Chama/Fwaya-Fwaya/F10 pit at the Kagem mine is one of the largest colored stone excavations in the world. Photo by V. Pardieu.*





Figure 23. A small amount of the production from Kagem consists of top-grade emeralds such as those shown here (up to 2 cm long). Some of the crystals are partially covered by a thin layer of biotite-phlogopite from the host schist. Photo by V. Pardieu.

ty rough while preventing theft and illegal mining from such a large (46 km<sup>2</sup>), thickly forested area. The company is concerned about the safety and living conditions of its workers and supports social projects in the area, particularly education.

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**Pargasite from Tanzania.** G. Scott Davies (American-Thai Trading, Bangkok) recently donated eight specimens of transparent yellowish brown pargasite to GIA (figure 24). The five rough stones ranged from 0.3 to 1.67 g, and the three faceted samples weighed 1.23, 1.25, and 1.39 ct. All are reportedly from the Dodoma region in central Tanzania. Mr. Davies said that he obtained 700 grams of rough in

Figure 24. These five rough and three faceted pargasite samples from Tanzania range from 1.23 to 8.36 ct. Gift of American-Thai Trading, GIA Collection nos. 38317–38324. Photo by G. Scott Davies.



Bangkok in late 2007, but has not encountered any additional rough material since then. The stones faceted from this material were medium-to-dark slightly yellowish brown, and the largest stone he cut weighed just over 3 ct; perfect cleavage makes cutting larger stones a challenge.

The rough and cut samples were examined at the GIA Laboratory in Bangkok. All of the crystals exhibited perfect cleavage in one direction parallel to the prism. Three had cleaved surfaces on two parallel sides, while two others showed one cleaved surface, with the opposite parallel surface appearing natural in form; one of those faces possessed distinct etch marks. Standard gemological testing of the rough and faceted samples gave the following properties: color—orangy brown to yellowish brown, with pronounced pleochroism (greenish yellow and brown); RI (from the faceted stones)— $n_\alpha = 1.628$ ,  $n_\beta = 1.633$ , and  $n_\gamma = 1.648$ ; optic sign—positive; birefringence—0.020; hydrostatic SG—3.09 (with two of the rough pieces registering 3.07 and 3.08); Chelsea filter reaction—none; fluorescence—inert to long-wave UV radiation, and moderate to strong chalky yellow to short-wave UV; and no diagnostic absorption features visible with a handheld spectroscope. Microscopic examination revealed numerous fine oriented tubes and pinpoints throughout the stones, as well as some planar fluid inclusions (related to incipient cleavage). Some of the rough samples exhibited distinct two-phase inclusions containing an unidentified metallic crystal. Other than the SG, these properties are close to those of a pargasite sample from Myanmar described in the Fall 2004 GNI section (pp. 254–256). However, the SG still falls within the range reported for pargasite in mineralogy textbooks.

Pargasite is a member of the amphibole group and has the chemical formula  $\text{NaCa}_2[(\text{Mg}, \text{Fe}^{2+})_4\text{Al}](\text{Si}_6\text{Al}_2)\text{O}_{22}(\text{OH})_2$ . Energy-dispersive X-ray fluorescence (EDXRF) spectroscopy of the samples detected major Si, Ca, Al, Mg, and Fe—as would be expected from pargasite's formula (Na is not detectable by this method)—as well as traces of Ti and K. Raman analysis produced a match to the pargasite reference spectra in GIA's Raman database. To the best of our knowledge, this is the first report of gem-quality pargasite from Tanzania.

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**Scapolite from Afghanistan.** In February 2010, GIA received some colorless scapolite from Dudley Blauwet that was notable for its fluorescence and inclusions. According to his supplier, it came from the Chilmak mine, which is located above Kiran village ~10 km from the historic lapis lazuli mines (Lajuar Madan) in the Kokcha Valley, Sar-e-Sang District of Afghanistan. Mr. Blauwet first saw matrix specimens of this material in 2005. In mid-December 2009, he purchased a 1.3 kg rough parcel in Peshawar, Pakistan, which consisted of broken fragments and some complete crystals. The majority of the material was semitranslucent; less than 100 g was translucent to transparent, and some of this contained small but conspic-



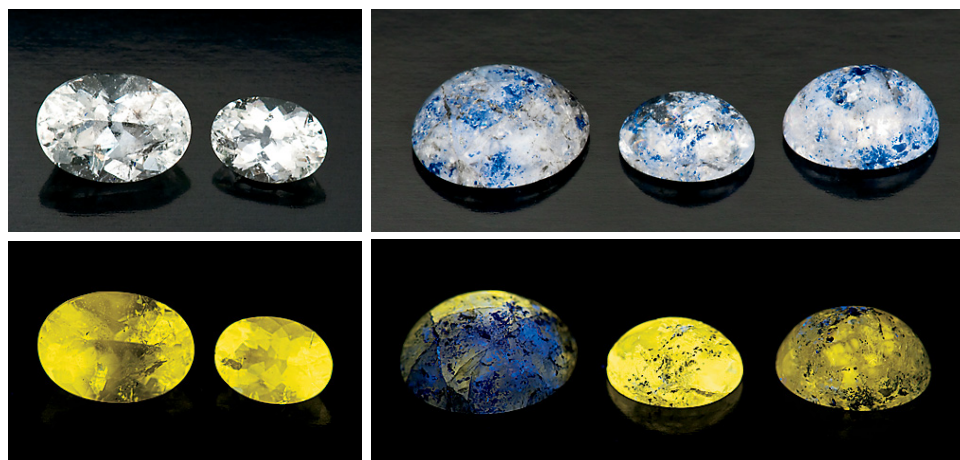


Figure 25. These faceted (0.66 and 1.59 ct) and cabochon-cut (1.48–3.06 ct) scapolites are from Afghanistan. They fluoresced yellow when exposed to UV radiation (bottom, long-wave UV). Photos by Robert Weldon.

uous inclusions of a bright blue mineral. He offered a few faceted stones for the first time at the 2010 Tucson gem show. In November 2010, he purchased 1.7 kg of similar material in Peshawar, with 5–10% being transparent enough to facet into clean stones or translucent cabs with the blue inclusions. As of April 2011, he had cut 19 stones that ranged up to 3.98 ct (most weighed ~1.5 ct); he predicted a total of 120 carats when the cutting is complete.

Five polished scapolite samples from Mr. Blauwet (figure 25, top) were examined at GIA: two faceted stones (0.66 and 1.59 ct) and three cabochons (1.48, 2.36, and 3.06 ct). All were colorless with varying degrees of transparency; the cabochons had numerous eye-visible blue inclusions. Standard gemological testing yielded the following properties: RI—1.539–1.549; birefringence—0.005–0.009; and hydrostatic SG—2.55 and 2.59 for the faceted stones and 2.49–2.59 for the cabochons. These properties are consistent with published values for scapolite-group minerals. In addition, scapolite is known to have strong UV fluorescence. The faceted stones fluoresced very strong yellow to long-wave UV radiation (figure 25, bottom) and moderate yellow to short-wave UV. The heavily included cabochons showed weaker reactions.

Scapolite is a solid-solution series with marialite ( $\text{Na}_4\text{Al}_3\text{Si}_9\text{O}_{24}\text{Cl}$ ), meionite ( $\text{Ca}_4\text{Al}_6\text{Si}_6\text{O}_{24}\text{CO}_3$ ), and silvialite ( $\text{Ca}_4\text{Al}_6\text{Si}_6\text{O}_{24}\text{SO}_4$ ) end members (M. Superchi et al., “Yellow scapolite from Ihosy, Madagascar,” Winter 2010 *G&G*, pp. 274–279). EDXRF spectroscopy indicated that all the samples contained Na, Al, Si, S, K, Ca, Cl, Br, and

Sr. Laser ablation–inductively coupled plasma–mass spectrometry analysis confirmed most of these elements except Cl and Br; additionally, it also identified the presence of Li, Be, and B, as well as Rb, Ba, and Pb. Quantitative data reduction for one sample indicated it was mainly marialite with a very small silvialite component. This result was consistent with the RI and SG measurements, which indicated a nearly pure marialite composition.

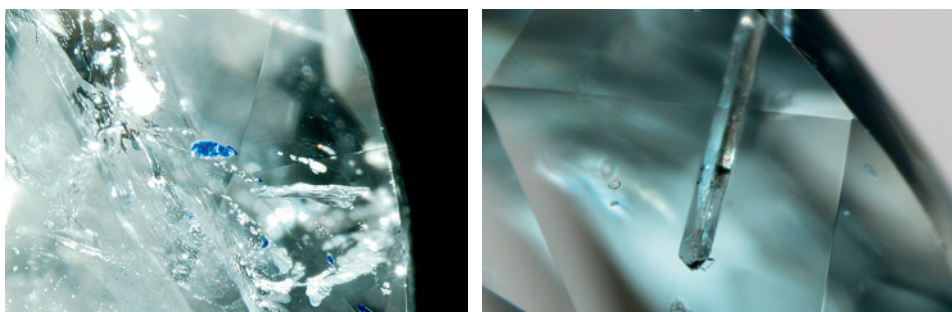
Typical inclusions in the faceted stones were feathers and numerous tiny crystals, some of which had a blue color similar to that seen in the cabochons (figure 26, left). These blue crystals were identified as lazurite by Raman microspectroscopy. One of the faceted stones contained two elongated euhedral crystals, one of which had a sharp termination. Raman spectroscopy identified them as apatite (figure 26, right).

Although similar yellow fluorescence has been reported in scapolite from Tanzania (J. E. Arem, *Color Encyclopedia of Gemstones*, 2nd ed., Van Nostrand Reinhold, New York, pp. 166–167), the inclusions in this Afghan material are distinctive.

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**Tourmaline finds at Mt. Marie, Paris, Maine.** Some notably bright colors of tourmaline have recently been produced from the Mt. Marie quarry in Oxford County, Maine. The site is located 7 km east of South Paris and 6.5 km southeast of the famous Mount Mica pegmatite (see

Figure 26. Inclusions of blue lazurite (left) and prismatic apatite (right) were seen in the scapolites. Photomicrographs by A. H. Shen; image widths 3.7 mm (left) and 2.1 mm (right).



W. B. Simmons et al., "Mt. Mica: A renaissance in Maine's gem tourmaline production," Summer 2005 *G&G*, pp. 150–163). The quarry was originally opened in 1901 by the Mt. Marie Mineral Company in the search for feldspar for industrial use (J. C. Perham, *Maine's Treasure Chest: Gems and Minerals of Oxford Co.*, 2nd ed., Quicksilver Publications, West Paris, Maine, 1987). Mining continued sporadically at Mt. Marie throughout the last century and resulted in numerous quarries and small exploratory pits in the large granite pegmatite. This dike is part of the Oxford pegmatite field of western Maine and is geochemically classified as an LCT-type pegmatite (i.e., relatively enriched in lithium-cesium-tantalum). The portion of the pegmatite that most frequently bears miarolitic cavities ("pockets") is 3–5 m thick, ~30 m wide on an approximate east-west strike, and dips south at ~16°.

The quarry is currently owned by Mt. Marie LLC, and is under lease to Mt. Marie Mining LLC; one of these authors [DD] has mined the site since 1993. Between 1993 and the end of the 2008 field season, the mine produced several sub-meter-sized pockets that contained ~4,000 carats of facet-grade gem tourmaline in a broad range of colors, including pink, reddish orange, green to greenish blue, and blue (e.g., figure 27). There were also uncommon finds of facetable black tourmaline (schorl), colorless to light pink cesium beryl, and smoky quartz.

In May and June of 2009, two pockets (e.g., figure 28) produced 2,000 carats of bluish green to blue facet-grade tourmaline. About 500 carats of this material, including a 13.4 g crystal section (figure 29, left), was blue when viewed perpendicular to the c-axis and intense blue when viewed down the c-axis. About 60 carats of faceted stones weighing 1.0–5.5 ct have been cut from this material to date. Most of the remaining 1,500 carats is a more typical bluish green (darker when viewed down the c-axis). A few bicolored crystal sections were produced that exhibit both bluish green and greenish blue to blue colors.

From mid-2009 through October 2010, efforts were primarily directed at improving mine access and removing additional hanging wall from the productive zone. Mining resumed in November 2010—yielding an attractive yellowish green crystal (figure 29, right)—and will continue in the 2011 field season.

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#### The origin of color in tourmaline from Mt. Marie, Maine.

In September and December 2010, Dennis Durgin sent this author two fragments of recently mined Mt. Marie tourmaline for color-origin investigation. The samples were yellowish green (GRR 2016, 19 × 12 × 9 mm) and dark blue (GRR 2924, 15 × 15 × 6 mm). The green piece displayed a prism face and was polished into a 6.06-mm-thick wafer. The blue fragment was sliced parallel to the c-



Figure 27. These tourmalines (1.05–4.10 ct) are representative of material produced from Mt. Marie in Oxford County, Maine, since 1993. Photo by Jeff Scovil.

axis and polished into a 1.25-mm-thick wafer. Absorption spectra were collected in the 350–1100 nm range using a silicon diode-array microspectrometer with a calcite polarizer, and in the 1000–2000 nm region with a Nicolet Magna 860 FTIR spectrometer with a CaF<sub>2</sub> beam splitter, a deuterated triglycine sulfate detector, a tungsten-halogen lamp, and a LiIO<sub>3</sub> crystal polarizer.

When viewed down the c-axis of the samples, the absorption behavior was governed by the light polarized perpendicular to the c-axis (i.e., E<sub>⊥c</sub>). Both the blue and green colors of Mt. Marie tourmaline showed strong absorption below 350 nm in the UV region and a transmission window in the violet-to-yellow wavelengths (400–600 nm; figure 30). Both also had a broad Fe<sup>2+</sup>

Figure 28. The Mt. Marie quarry has recently produced some exceptional blue to greenish blue tourmaline. Mine owner Dennis Durgin is shown here with one of the pockets opened in 2009. Photo by Hugh Durgin.



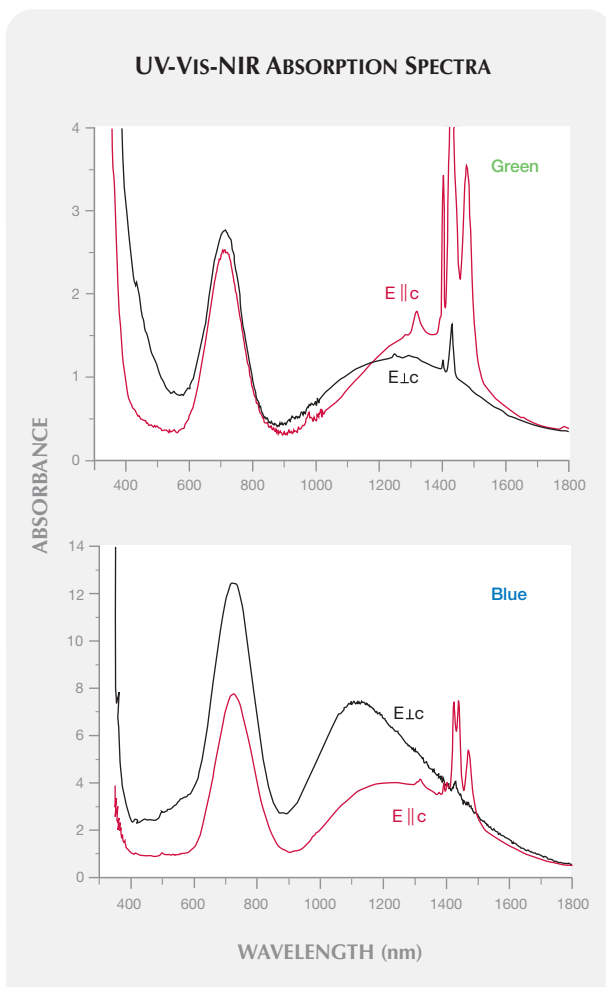




Figure 29. Both pleochroic colors can be seen in the blue 13.4 g Mt. Marie tourmaline on the left. The 27.8 g yellowish green crystal on the right was recovered in November 2010. Photos by Jeff Glover (left) and Hugh Durgin (right).

absorption centered near 710 nm in the deep red region and an additional  $\text{Fe}^{2+}$  absorption in the near-infrared from 1000 to 1500 nm. Sharp absorption from hydroxyl groups occurred in the 1400–1500 nm range, predominantly parallel to the c-axis.

Figure 30. These UV-Vis-NIR absorption spectra of green (top) and blue (bottom) tourmaline from Mt. Marie (plotted for 1.0 cm thickness) illustrate the features that are responsible for their respective colors.



The green material (figure 30, top) had the maximum transmission in the yellow-green portion of the spectrum (~572 nm) and significant transmission in the green region, but with increasing absorption toward the blue and violet (400–500 nm); the combined effect of these produced the yellowish green color. The blue material lacked absorption in the blue-violet region and therefore transmitted a greater proportion of that light, resulting in the blue color. The higher overall absorption of the blue sample in the  $E \perp c$  direction was due to a small amount of titanium interacting with iron in what is known as  $\text{Fe}^{2+}\text{-Ti}^{4+}$  intervalence charge transfer (S. M. Mattson and G. R. Rossman, " $\text{Fe}^{2+}\text{-Ti}^{4+}$  charge transfer in stoichiometric  $\text{Fe}^{2+}\text{-Ti}^{4+}$ -minerals," *Physics and Chemistry of Minerals*, Vol. 16, 1988, pp. 78–82).

Compared to the green sample, the greater intensity of the 710 nm band in the blue tourmaline (figure 30, bottom) in the spectrum taken with  $E \parallel c$  polarization indicates that it had a higher concentration of iron. The intensity of this absorption in the  $E \perp c$  polarization was noticeably higher. This occurs when there is  $\text{Fe}^{3+}$  interacting with the  $\text{Fe}^{2+}$  (S. M. Mattson and G. R. Rossman, " $\text{Fe}^{2+}\text{-Fe}^{3+}$  interactions in tourmaline," *Physics and Chemistry of Minerals*, Vol. 14, 1987, pp. 163–171). Therefore, an "open" (not overly dark) appearance when looking down the c-axis occurs when there is only a limited amount of  $\text{Fe}^{2+}\text{-Fe}^{3+}$  interaction.

In summary, the blue color resulted from the presence of  $\text{Fe}^{2+}$  and the absence of  $\text{Ti}^{4+}$ , coupled with a small amount of  $\text{Fe}^{3+}$ . The green color resulted from  $\text{Fe}^{2+}$  (with little or no  $\text{Fe}^{3+}$ ) interacting with a small amount of  $\text{Ti}^{4+}$ . These color mechanisms are typical of blue and green gem tourmaline.

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## SYNTHETICS AND SIMULANTS

**Trapiche emerald imitation.** Two interesting samples resembling trapiche emerald were recently brought to our attention by gem dealer Farooq Hashmi (Intimate Gems, Jamaica, New York). They had been cut from the same "crystal," which closely resembled a natural trapiche emerald. The "crystal" was obtained on a mid-2010 trip to Colombia from a seller who was not initially aware he had acquired an imitation. To better expose the assembled



Figure 31. These two “trapiche emeralds” (5.17 and 3.53 ct) are actually clever assemblages. They were sliced from the same piece of rough by gem cutter Lain Murphy (Clifton, Colorado). Photo by Robert Weldon.

nature of the item, Mr. Hashmi had it sliced and polished into the pieces shown in figure 31.

The samples weighed 5.17 and 3.53 ct, and measured ~10–11 mm in diameter. Magnification revealed an unevenly distributed dark substance on the original surface of the rough. The pieces of the assemblage were joined with adhesive that was colorless in some areas and black in others, to better mimic natural trapiche structure. Raman spectroscopy identified the assembled pieces as beryl and the substance holding them together as a polymer. Raman analysis of inclusions in the beryl confirmed the presence of dolomite, calcite, and pyrite. A cylindrical core of slightly darker green beryl was located in the center of the assemblage. The continuity of the inclusions throughout the assembled pieces (except in the core) suggests that the original crystal had been drilled through the middle and then cut into six equal sections (figure 32).

A cabochon cut from a similar “trapiche” assemblage was reported in the Fall 1998 Lab Notes (p. 212). It consisted of a clear core surrounded by a black rim from which black arms extended in six directions (for comparison, see E. J. Gübelin and J. I. Koivula, *Photoatlas of Inclusions in Gemstones*, ABC Edition, Zurich, 1986, p. 253). The present example shows that such assemblages continue to be found in the marketplace, even mimicking rough material.

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**A new rough nephrite imitation.** Nephrite jade has a rich 7,000-year history in Chinese culture. However, imitations made from marble and serpentine are often seen in the Chinese market. In early 2010, a new type of artificial rough nephrite appeared. This material is difficult to identify with the unaided eye, and its market presence continues to grow. To characterize this new imitation, we purchased two samples (3 and 15 kg) from a market in Hetian (Xinjiang Uygur Autonomous Region) in the summer of 2010, and studied their gemological properties using

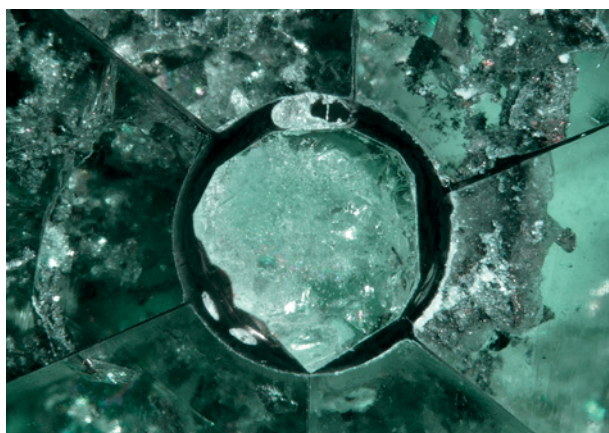


Figure 32. The continuity of inclusions across the separation planes in the green beryl assemblage suggest that the original crystal was drilled through the center and then sawn into six equal sections. Photomicrograph by R. Befi; magnified 15x.

microscopic and spectroscopic techniques at the National Gemstone Testing Center (NGTC) laboratory in Beijing.

The material was white with unevenly distributed orangy brown areas (figure 33). In some areas the color appeared to be applied with a brush, with traces of brushstrokes visible. To imitate the appearance of natural nephrite, pits and cavities had been etched into some areas of the surface. These were larger than those typically seen in natural nephrite, and had a lower luster than the surrounding areas. In addition, polish lines were visible with magnification. Unlike natural nephrite, which can show deep cracks, these samples had few fractures and they rarely extended into the interior. We noted a consistent

Figure 33. When broken open, this imitation nephrite sample (originally 12 x 9 x 6 cm and weighing 3 kg) was found to contain steel disks embedded within the surrounding material. Photo by Y. Zhang.





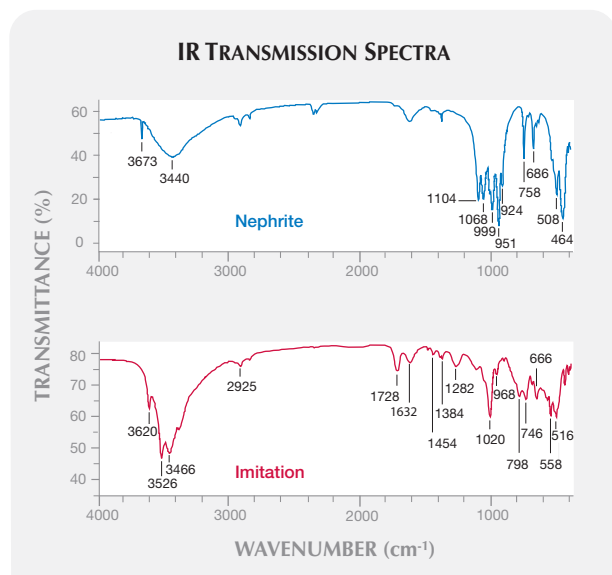


Figure 34. Infrared spectra of the imitation nephrite showed clear differences from natural material, and identified it as aromatic polyester resin.

depth of color in and around the fractures, which would also be unusual in natural material. The hardness was very low (approximately Mohs 2.5), and the material was easily scored with a knife.

We broke apart the two imitations to observe their internal structures, and both revealed foreign material that was apparently added to increase their heft. One sample contained steel disks (again, see figure 35), while the other held chunks of concrete and stone. Though both of our samples had a lower density than nephrite jade, their heft was close enough to confuse buyers. However, because their internal contents varied and were not tightly held by the surrounding material, different areas produced different sounds when struck. Not surprisingly, the imitation that contained steel disks was attracted to a magnet. As natural nephrite is not magnetic, this is a useful identification criterion when present.

FTIR spectroscopy (KBr pellet method) of the imitations using a Nicolet 6700 infrared spectrometer gave very



Figure 35. This shell specimen (~20.0 mm long) was apparently fashioned to resemble a non-nacreous natural pearl. Photo by T. Hainschwang.

different results from natural nephrite: a series of bands at 3620, 3526, 3467, 3395, 1728, 1632, and 1020  $\text{cm}^{-1}$  that are associated with aromatic polyester resin (figure 34).

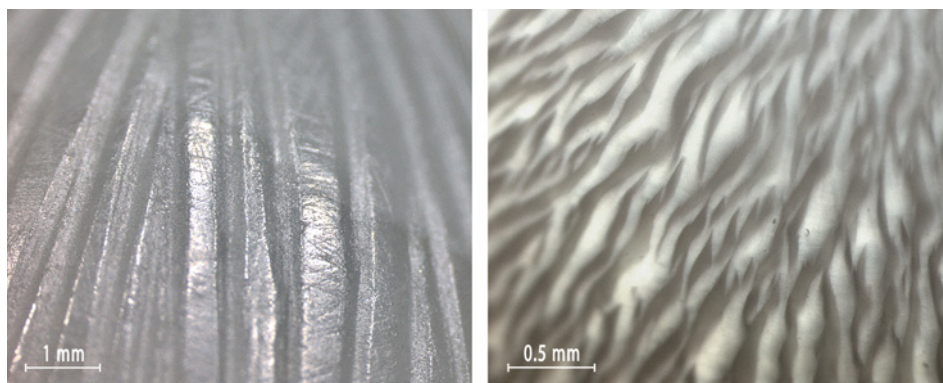
As the price of nephrite jade rises and manufacturing technology continues to advance, such imitations are likely to become even more prevalent in the gem market.

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**A skillfully crafted non-nacreous pearl imitation.** The current popularity of non-nacreous natural pearls has led to many types of imitations, from sculpted coral and shell to glass and plastic. Non-nacreous white pearls are the most commonly imitated, since the shell of the giant clam (*Tridacna* sp.) is thick enough to allow the creation of large fakes. These are usually easy to identify, since they show a distinctive layered structure when viewed with strong transmitted light.

Figure 36. The engraved pattern and polish lines on the surface of the imitation pearl (left) are distinct from the appearance of non-nacreous natural pearls showing a flame structure (right).

Photos by T. Hainschwang.



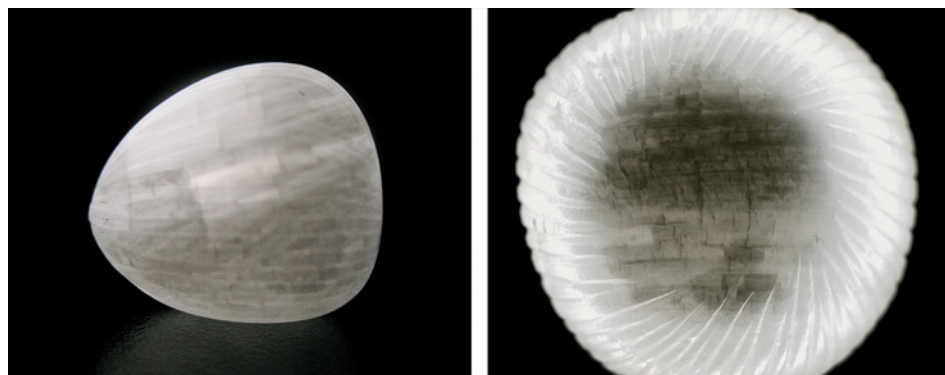


Figure 37. With strong transmitted light, the imitation pearl exhibited the distinct internal banding typical of carved shell.

Photos by T. Hainschwang.

This contributor recently received a parcel represented as non-nacreous pearls. At first sight, one 24.64 ct specimen (figure 35) looked like a drop-shaped non-nacreous white pearl with a surface pattern that in some directions might be mistaken for a flame structure. Some white non-nacreous natural pearls display spectacular flame structures due to their fibrous nature. On closer examination, however, it quickly became evident that something was amiss: The “structure” consisted of engraved lines running from top to bottom. When viewed with a microscope, the surface showed obvious polish lines (figure 36, left), and the specimen’s appearance bore little resemblance to the flame structure seen in natural non-nacreous pearls (figure 36, right).

Strong transmitted light showed obvious internal parallel banding, oriented in a different direction from the engraved pattern (figure 37). This banding corresponded to the growth layers that are characteristic of shell but never seen in natural pearls. Some natural non-nacreous pearls can show weak diffuse banding, but it appears quite different from that of carved shell material.

This sample was identified as a marine calcareous substance by its chemical composition, which consisted of calcium (plus oxygen) with traces of strontium. The size ( $\sim 20.0 \times 16.5 \times 16.3$  mm) suggested an imaginatively sculpted piece of *Tridacna* shell. This interesting case offers yet another example of an inventive pearl imitation using inexpensive material.

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**Plastic-coated quartz, imitating emerald.** There are numerous natural, artificial, and treated materials that can imitate emerald quite convincingly. Recently, the Gem Testing Laboratory in Jaipur received for identification a green 73.58 ct drilled briolette measuring  $34.10 \times 23.14 \times 15.68$  mm (figure 38). The owner of the stone was certain it was an emerald of Colombian origin.

Although the characteristic green color suggested emerald, the specimen’s duller luster gave us some hesitation. We examined it initially with a microscope, as the presence of certain inclusions would have been enough to indicate a natural emerald. Instead we observed elongated

two-phase inclusions and reflective liquid films, an inclusion scene not typically associated with Colombian emerald. In addition, gas bubbles (figure 39, left) were present, mainly at or near the surface of the sample. On careful examination, a thick coating was visible; all the gas bubbles were restricted to this layer.

Examining the edges of the drill hole, we observed colorless areas under the thick green coating (figure 39, right). Such areas were also evident on a few facet edges where the coating had chipped off. Hot point testing on an inconspicuous area showed signs of melting. This suggested plastic, which would also explain the sample’s dull luster. RI testing revealed a vague shadow edge around 1.54, and the hydrostatic SG was 2.60. The specimen gave a chalky yellow reaction to long-wave UV radiation, and a weak red reaction with the Chelsea filter. With a handheld spectroscope, it displayed a strong band in the red region at around 650 nm, a feature typically associated with green dye. These properties could not reliably identify the colorless base material, but infrared spectroscopy proved it was quartz (rock crystal). The IR spectra also showed an absorption band at  $3060\text{--}2810\text{ cm}^{-1}$  that may be associated with polymers/plastics, but additional bands expected for the plastic coating could not be resolved due to interfer-

Figure 38. This 73.58 ct briolette, submitted as emerald, was identified as plastic-coated quartz. Photo by G. Choudhary.





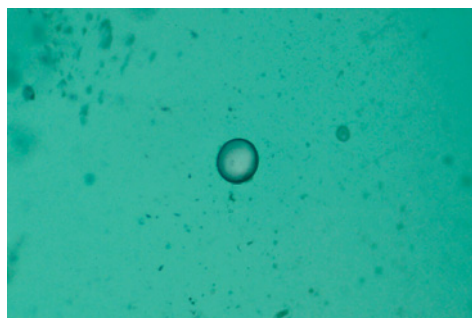


Figure 39. Gas bubbles were common at or near the surface of the briolette, suggesting a coating (left, magnified 60×). Chipped areas of coating around the drill hole revealed the colorless quartz underneath (right, magnified 45×). Photomicrographs by G. Choudhary.

ence with other spectral features.

We concluded that this specimen was plastic-coated quartz. In the absence of gemological testing, correct identification would have been problematic, especially for a trader or dealer equipped only with a loupe.

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## TREATMENTS

**Lead glass-filled trapiche ruby.** Since 2004, the treatment of corundum (particularly ruby) by filling fractures with a lead-based glass has become widespread. There have been several developments since the treatment first appeared, such as glass compositions that do not show the orange/blue “flash effect” and new geographic origins and varieties of filled material (e.g., faceted rubies from Mozambique and star rubies from Madagascar). These contributors recently encountered yet another permutation: lead glass-filled trapiche ruby.

In August 2010, one of us (OS) purchased a 20.37 ct translucent cabochon represented as trapiche ruby at the Chanthaburi gem market in Thailand. The seller indicated the gem came from Mozambique and had been treated

Figure 40. This 20.37 ct trapiche ruby, reportedly from Mozambique, is filled with a lead-based glass. Photo by O. Segura.



with lead glass. To our knowledge, trapiche rubies from Mozambique are rarer but larger than those from Mong Hsu, Myanmar. The sample displayed the classic trapiche pattern with six clearly delineated sectors and the hexagonal growth zones often seen in corundum also were obvious (figure 40).

The gemological properties were typical for ruby, with RIs of 1.755–1.770, a hydrostatic SG of ~3.95, and a standard ruby spectrum with the handheld spectroscope. The material fluoresced strong red to long-wave UV radiation and was inert to short-wave UV.

Viewed with the microscope, the stone showed areas of slightly duller luster in reflected light (figure 41), as is typical of lead glass-filled gems. An abundance of flattened and spherical bubbles of various sizes (e.g., figure 42) indicated widespread filling, possibly in preexisting cavities. This raised the question of whether the gem was a single piece of ruby or a composite. Close examination of the trapiche pattern and orientation of the “silk” in the cabochon demonstrated that it was indeed fashioned from a single crystal, despite the high glass content. Also visible were numerous crystal inclusions with a morphology and relief that suggested apatite (again, see figure 42).

Other traders in Chanthaburi later showed us large (up to 181 ct) untreated trapiche rubies that reportedly came from the Nzérékoré area of southeastern Guinea, an undocumented source for this kind of ruby. Unfortunately, we could not acquire any samples for analysis.

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## MISCELLANEOUS

**Myanmar Gem Emporium.** The mid-year session of the 2010 Myanmar Gem Emporium took place November 17–29. For the first time, the government-run tender was held in the new capital city of Naypyidaw. An estimated 6,750 merchants attended, with more than half of them from mainland China, Hong Kong, and Taipei. The emporium saw record-breaking sales of its jade, pearl, and assorted gem lots, including 7,784 of the 9,157 jade lots offered. In a story published February 14, 2011, China’s Xinhua News Agency reported total sales of \$1.4 billion.

The emporium’s first session for 2011 was held March

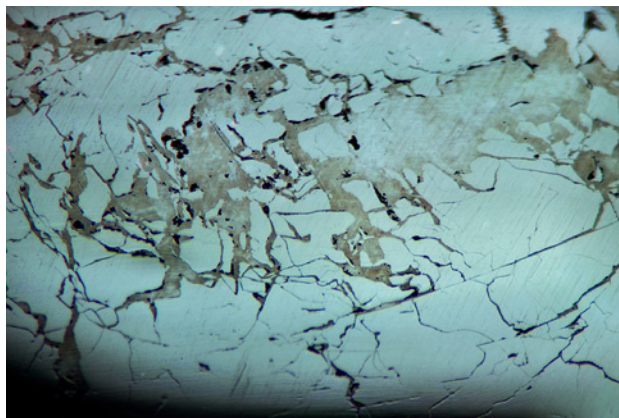


Figure 41. Reflected illumination shows areas filled with a glass-like material of only slightly lower luster than the host ruby. Photomicrograph by O. Segura; magnified 10×.

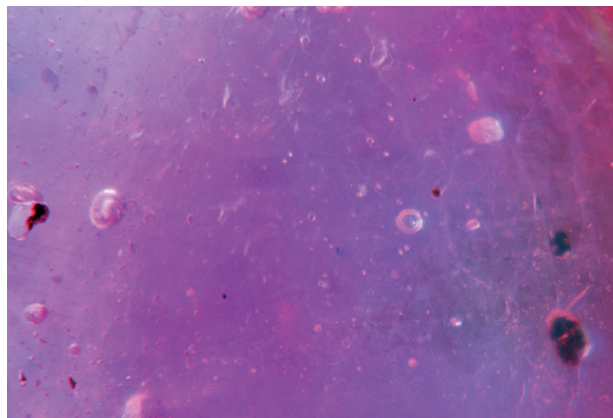


Figure 42. Trapped bubbles of various sizes demonstrate the extent of lead-glass filling in the trapiche ruby. Dark-colored inclusions, presumably apatite, are visible on the right. Photomicrograph by O. Segura; magnified 20×.

10–22, again in Naypyidaw, with nearly twice as many jade lots offered. According to the *Democratic Voice of Burma*, jade prices were 10 times higher than the previous year, fueled by Chinese demand. Nevertheless, Xinhua reported on March 23 that 13,608 of the 16,939 lots were sold. That same article noted Myanmar's latest production figures. From April through November 2010, the country yielded 27,251 tons of jade and 9.6 billion carats of other gems (including ruby, sapphire, spinel, and peridot), as well as 300 kg of cultured pearls.

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## ERRATUM

The Fall 2010 gem treatments retrospective article by S. F. McClure et al. (pp. 218–240) stated that Schmetzer (2008) had concluded that certain topaz treatment methods were “not diffusion.” In fact, Dr. Schmetzer's article reviews the published U.S. patent application by W. B. Yelon et al. (2007/0110924 A1, *Process for Improving the Color of Gemstones and Gemstone Minerals Obtained Thereby*, filed November 14, 2005, published May 17, 2007), which describes the existence of a diffusion layer between topaz and the coating. We thank Dr. Schmetzer for bringing this to our attention.

## IN MEMORIAM: KURT NASSAU (1927–2010)

World-renowned scientist Dr. Kurt Nassau, a longtime contributor and review board member for *Gems & Gemology*, died December 18, 2010, at his home in Lebanon, New Jersey. He was 83.

Born in Austria in 1927, Dr. Nassau fled the country with his family in the late 1930s. They settled in England, where he attended school and university before immigrating to the United States after World War II.

Dr. Nassau served as a medical researcher at the Walter Reed Army Medical Center in Washington, DC, before earning a doctorate in chemistry from the University of Pittsburgh. He joined Bell Laboratories (now Lucent Technologies) in 1959 and became known for his research in crystal chemistry and growth.

As a leading expert on the causes of color, especially in minerals and gems, Dr. Nassau began assisting GIA's New York laboratory in the 1960s and served on the GIA Board

of Governors from 1975 until 1994. While a member of the Board, he played a key role in facilitating the 1988 purchase of the Sinkankas Library for GIA.

Dr. Nassau was the author of eight books, including the landmark *Gems Made by Man* (1980), *The Physics and Chemistry of Color* (1983), and *Gemstone Enhancement* (1984). He published more than 470 articles and held 17 patents. He was also a major donor of books and crystal specimens to the GIA Collection and the Richard T. Liddicoat Library and Information Center.

Dr. Nassau was a frequent contributor to *G&G* from the 1960s through the 1990s, and served on the journal's Editorial Review Board for more than 20 years, from 1981 until his retirement in 2002. He won the Dr. Edward J. Gübelin Most Valuable Article Award three times, most recently for his Winter 1997 article, “Synthetic Moissanite: A New Diamond Substitute.”