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 T u c s o n

2006

Although fewer new gem finds debuted in 2006 than in previous Tucson shows, there were nevertheless a variety of items that appealed to those with an eye for the unusual. These materials originated from many parts of the world, rather than the strong emphasis on African countries seen in recent years. Nevertheless, Africa was the source of some spectacular gem discoveries over the past year, such as copper-bearing tourmalines from Mozambique (see

Winter 2005 Gem News International, pp. 360–361, and the article by A. Abduriyim et al. on copper-bearing tourmaline in this issue). There was a strong showing of this tourmaline in Tucson, including some large stones (see, e.g., figure 1). Another notable African gem seen at the shows was a 62.81 ct tsavorite from Merelani, Tanzania (figure 2). Although large tsavorites from Merelani have

Figure 1. Mozambique is the source of this 48.23 ct tourmaline, which has a bright blue color that is typical of the fine-quality copper-bearing elbaite mined from the Alto Ligonha region since mid-2005. Courtesy of Evan Caplan and Omi Gems, Los Angeles; photo © Harold & Erica Van Pelt.



Figure 2. This 62.81 ct tsavorite was cut from rough that was reportedly recovered in late 2005 from the “Karo” area, which lies just east of Block D at Merelani, Tanzania. The tsavorite was found at about 180 m depth, in an area that also produced some fine tanzanite and bright green-yellow diopside. Courtesy of New Era Gems; photo © Jeff Scovil.



been faceted previously (see, e.g., Spring 2004 Gem News International, pp. 72–73), this stone showed a particularly saturated green color. Additional Tucson items are described below, with more to be included in the Summer 2006 GNI section. *G&G* thanks our many friends who shared material with us this year.

COLORED STONES AND ORGANIC MATERIALS

Aquamarine from a new primary deposit in Sri Lanka. Except for moonstones that are mined from a weathered pegmatite in Meetiyaigoda and *in situ* chrysoberyl from Pattara, no other commercially viable primary gem deposit has been known from Sri Lanka. This changed in mid-2005, with the accidental discovery of gem-quality aquamarine at the Akkerella estate (owned by Kahawatta Plantations Ltd.), about 25 km southeast of Ratnapura. The aquamarine was found during mining of vein quartz for industrial silica, and the discovery led to a sudden gem rush, followed by clashes between police and gem miners (see J. Henricus-Prematilleke, “New aquamarine find sparks gem rush in Sri Lanka,” *Jewellery News Asia*, No. 254, 2005, pp. 56, 58). Previously, aquamarine from Sri Lanka was known from Ratnapura and Nawalapitiya, but only as water-worn pebbles.

The new aquamarine crystals range up to 10+ cm long, and vary from pale blue to a saturated dark blue resembling “Santa Maria” aquamarine from Minas Gerais, Brazil. They are embedded in quartz (figure 3), in association with mica and black tourmaline. The quartz-vein field at Akkerella measures about 2 km long. The nearby estate of Hunuwala, which is about 6 km northwest of Akkerella, shows evidence for the continuation of vein mineralization. Sri Lanka’s National Gem and Jewellery Authority recently auctioned mining claims on both estates, and they are being mined currently. The Hunuwala estate has produced large crystals of gem-quality colorless topaz, some weighing 2–10 kg. The total production of aquamarine since mining began is estimated by one of us (EGZ) to exceed 100 kg of rough, of which 20%–30% is facetable; at least



Figure 3. Aquamarine from a new primary deposit on the Akkerella estate in Sri Lanka is found embedded within quartz veins. Courtesy of E. G. Zoysa.

5,000 carats of the aquamarine have been faceted so far.

At the 2006 AGTA show in Tucson, Dudley Blauwet (Dudley Blauwet Gems, Louisville, Colorado) had a selection of faceted aquamarine from the new Sri Lankan deposit. The stones, which were reportedly unheated, showed a range of color from light blue to a saturated blue with little or no greenish overtones (figure 4). Most of the stones weighed 2–3 ct, and were cut from a parcel that he obtained in Sri Lanka in November 2005 that consisted of 29 clean pieces weighing a total of 68.88 carats.

Mr. Blauwet loaned three samples of the aquamarine (4.37, 5.28, 8.19 ct; again, see figure 4) to GIA for examination, and the following gemological properties were determined by one of us (EPQ): pleochroism—strong blue and near colorless; R.I.— $n_o = 1.584$ – 1.587 and $n_e = 1.577$ – 1.580 ; birefringence— 0.007 ; S.G.— 2.71 ; and fluorescence—inert to both long- and short-wave UV radiation. Vis-NIR spectroscopy displayed a 427 nm absorption peak typical of aquamarine. Microscopic examination revealed “finger-

Figure 4. These aquamarines (4.37–8.19 ct) are reportedly unheated and demonstrate the range of color seen in fine material from the new Sri Lankan deposit. Courtesy of Dudley Blauwet Gems; photo © Robert Weldon and GIA.



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. Dr. Mary L. Johnson of the GIA Laboratory in Carlsbad is thanked for her internal review of the Gem News International section.

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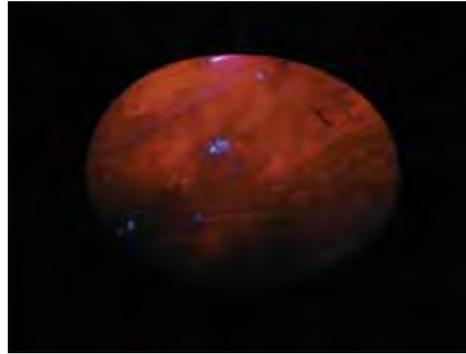


Figure 5. This attractive blue, 14.71 ct cabochon (sample no. FN-7692), reportedly from Mogok, appears to be a combination of massive haiüyne and sodalite. Note the strong zoned orange fluorescence to long-wave UV (right); the chalky blue spots correspond to the white areas seen in normal lighting. Photos by C. Grobon (left) and T. Hainschwang (right).

prints," doubly refractive crystals with reflective halos, minute crystals, stringers of particles, needles, and near-parallel reflective dendrites surrounded by clouds.

The recent discovery of *in situ* aquamarine in Sri Lanka has generated a renewed interest in the geology of gem deposits in that country. More discoveries are anticipated with further exploration in the region.

BML

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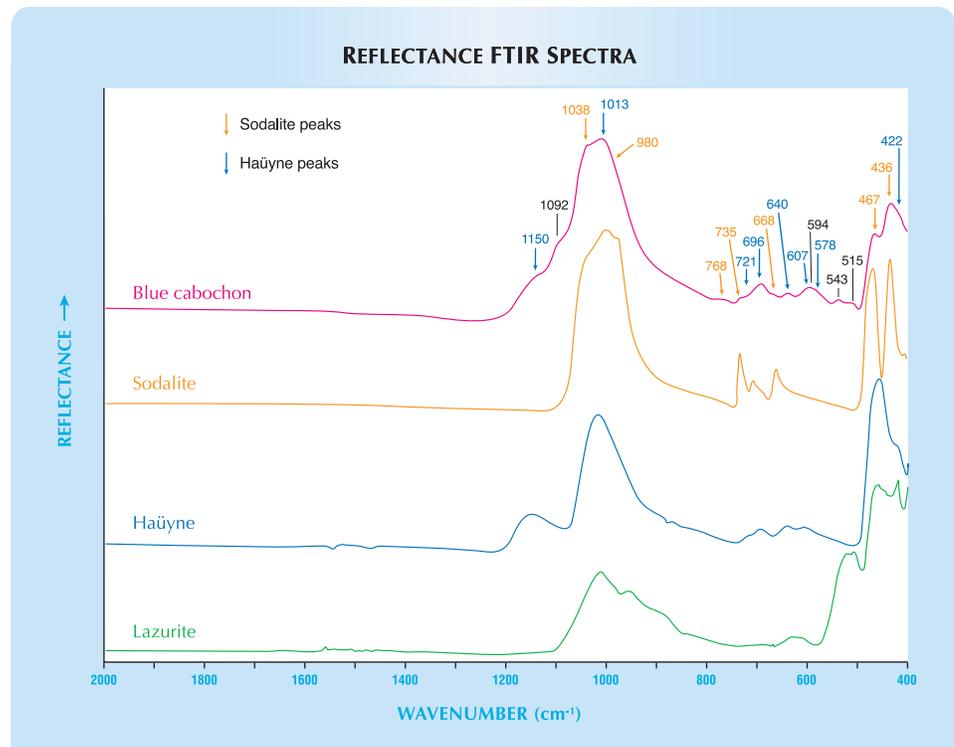
Elizabeth P. Quinn
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Massive haiüyne-sodalite from Myanmar. These contributors recently examined a 14.71 ct translucent blue cabochon (figure 5, left) acquired at the 2006 Tucson gem

shows, where it was represented as a mixture of haiüyne and sodalite. The seller, Mark Smith of Thai Lanka Trading Ltd., Bangkok, indicated that he had initially purchased such material several years ago. This sample was reportedly found in the Dattaw mining area, a few kilometers northeast of the center of Mogok. According to Mr. Smith, the material occurs as massive blue veins within a host rock of white calcite marble.

The color was a relatively homogeneous intense blue, with some thin white veins and some irregular white patches. The hydrostatic S.G. was 2.51, and the spot R.I. was around 1.50. The material showed strongly zoned orange fluorescence, with some chalky blue spots to long-wave UV radiation (figure 5, right) and a very weak red glow to short-wave UV. Microscopic observation revealed tiny inclusions with the appearance of pyrite. For the most part, these properties are consistent with haiüyne.

Figure 6. The specular reflectance FTIR spectrum of the 14.71 ct blue cabochon mainly indicated the presence of haiüyne, with some sodalite and a third unidentified mineral phase.



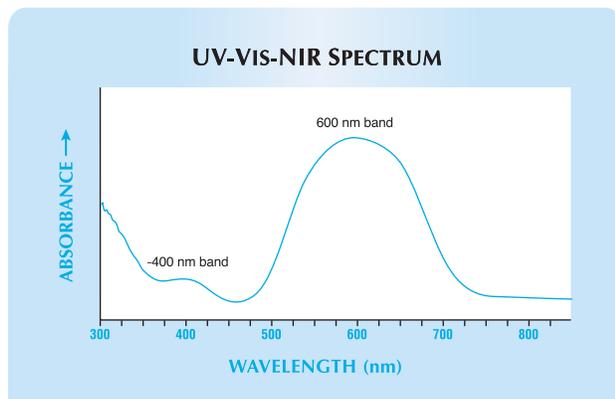


Figure 7. The UV-Vis-NIR spectrum of the *häüyne-sodalite cabochon* is characterized by a very strong and broad band centered at 600 nm and a weaker band at ~400 nm. This is quite similar to published spectra for *häüyne*. The spectrum was acquired by reflectance and converted to an absorption spectrum.

Häüyne is a cubic silicate with the general formula $(\text{Na}_6\text{Ca}_2\text{Al}_6\text{Si}_6\text{O}_{24}(\text{SO}_4)_2)$ that is related to *sodalite*—which has the general formula $\text{Na}_8\text{Al}_6\text{Si}_6\text{O}_{24}\text{Cl}_2$ —along with the species *lazurite* and *nosean*. To identify the mineral(s) present in this cabochon, we recorded a specular reflectance FTIR spectrum. The spectrum showed features for both *häüyne* and *sodalite*, plus some additional unidentified peaks, although *häüyne* appeared to be the dominant mineral (figure 6). Unfortunately, our reflectance database lacks *nosean*, so we could not determine whether it was responsible for the additional peaks.

The UV-Vis-NIR spectrum revealed absorption bands very similar to those described by L. Kiefert and H. A. Hänni (“Gem-quality *häüyne* from the Eifel District, Germany,” Fall 2000 *Gems & Gemology*, pp. 246–253), with the main feature being a very broad band centered at 600 nm and a second weaker band at ~400 nm (figure 7).

EDXRF chemical analysis detected major amounts of Si, Al, K, and Sr, and minor Ca, Na, Cl, and S. These are all part of the chemical formula of *häüyne* (and also *sodalite*), with the exception of K and Sr. Minor amounts of K are known to occur in *häüyne*. The origin of the relatively high Sr content may be due to the material’s formation within a *calcite* host rock, which often contains Sr impurities.

Our analyses indicate that this attractive blue material is mainly massive *häüyne* mixed with other related mineral phases, one of which is most likely *sodalite*. The materials appear to be intimately mixed with one another and no particular distribution could be observed, even according to color. Although these minerals are closely related, these contributors are not aware of substantial solid solution between them, and therefore assume that the individual mineral phases are present. The white spots were deter-

mined to be the same material as the blue host, but this is not surprising since *häüyne* and *sodalite* are both known in colorless (or white) forms. In some of these white spots, accumulations of inclusions could be seen. These are most likely *calcite*, which explains the chalky blue luminescence of these spots to long-wave UV radiation.

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Gem-quality massive pink muscovite from Brazil.

Minerals of the mica group are only rarely used as gem materials. *Lepidolite*, a lithium-bearing mica, is known mainly as lavender fine-grained aggregates containing opaque pink *tourmaline* crystals from the Stewart mine in Pala, California. These aggregates have been fashioned as cabochons and carvings, as has similar material from a *lepidolite* pegmatite at Rožná, Czech Republic. A cabochon of reddish purple mica (*lepidolite* or *muscovite*) from northern New Mexico was described in the Fall 1993 *Gem News* (pp. 210–211). *Lepidolite* also forms platy purple crystals from several pegmatites in Minas Gerais, Brazil, and elsewhere, but these are not cuttable due to the micaceous cleavage of the single-crystal material. While in Brazil in 2004, one of these contributors (JH) encountered an unusual mica (figure 8) that was sold as *rose quartz* and reportedly came from an undisclosed pegmatite in Minas Gerais State. In light of its attractive color and translucency, several stones were faceted (see, e.g., figure 9) and offered by this contributor at the Arizona Mineral & Fossil Show (Clarion Hotel) in Tucson.

Gemological properties were measured on five cut stones weighing 0.76–23.19 ct. The R.I. was very difficult to read because of the poor polish (as expected for a mica

Figure 8. This aggregate of fine-grained *muscovite* (about 7 cm wide) was represented as *rose quartz* in Minas Gerais, Brazil. Photo by J. Hyršl.





Figure 9. A few faceted stones (here, 23.19 ct) have been produced from the massive Brazilian muscovite. Photo by J. Hyršl.

aggregate due to the low hardness and perfect cleavage); only a weak shadow in the 1.53–1.58 region was visible. Specific gravity (measured hydrostatically) was 2.83–2.85, and the Mohs hardness was about 2.5 (determined by scratch testing with halite and calcite). The

TABLE 1. Chemical composition of a pink muscovite from Brazil.^a

| Oxide (wt.%) | | Ions per 12 anions | |
|--------------------------------|-------|--------------------|--------|
| SiO ₂ | 45.32 | Si ⁴⁺ | 3.055 |
| TiO ₂ | bdl | Ti ⁴⁺ | bdl |
| Al ₂ O ₃ | 36.93 | Al ³⁺ | 2.934 |
| FeO | bdl | Fe ²⁺ | bdl |
| MnO | 0.12 | Mn ²⁺ | 0.007 |
| ZnO | bdl | Zn ²⁺ | bdl |
| MgO | bdl | Mg ²⁺ | bdl |
| K ₂ O | 10.41 | K ⁺ | 0.895 |
| Na ₂ O | 0.40 | Na ⁺ | 0.052 |
| Rb ₂ O | 0.37 | Rb ⁺ | 0.016 |
| Cs ₂ O | 0.13 | Cs ⁺ | 0.004 |
| F | 0.33 | F ⁻ | 0.070 |
| Cl | bdl | Cl ⁻ | bdl |
| H ₂ O | 4.29 | H ⁺ | 1.930 |
| -O=F | -0.14 | O ²⁻ | 11.930 |
| -O=Cl | 0.00 | | |
| Total | 98.16 | | |

^a Average values for eight analyses of one sample, obtained with a Cameca SX 100 electron microprobe at Masaryk University. Abbreviation: bdl=below detection limit. Detection limits (wt.% oxide) at 2 σ : Ti=0.02, Fe = 0.05, Zn=0.06, Mg=0.02, and Cl=0.02. Also analyzed but not detected in any of the analyses were Cr, Ni, Ca, and Ba. The ions per formula unit and H₂O were calculated on the basis of 12 anions and F+OH = 2.

samples were inert to UV radiation and showed no features in the desk-model spectroscope. In the polariscope, they stayed bright during rotation, as would be expected for an anisotropic aggregate. These properties are consistent with both muscovite and lepidolite, except for the rather low R.I. values (which are probably due to the low quality of the readings).

A powder X-ray diffraction analysis also suggested muscovite or lepidolite, and muscovite was confirmed by electron-microprobe analysis (see table 1). The chemical composition was very close to the ideal formula of KAl₂AlSi₃O₁₀(OH)₂, with traces of Mn, Na, Rb, Cs, and F. Observation with a scanning electron microscope in backscattered electron (BSE) mode revealed that the muscovite formed very fine-grained monomineralic aggregates of individual flakes about 100 μ m in size, with random orientation; no other minerals were observed in BSE mode. The very small grain size and compact nature of the aggregate accounts for its distinctive translucent appearance.

The presence of significant F, Rb, and Cs suggests that this muscovite formed as a late-stage mineral in the pegmatite, possibly by replacement of another mineral or from hydrothermal fluids within a mineralized cavity (see, e.g., M. Novák and P. Černý, "Abundance and compositional trends of Rb and Cs in micas from lepidolite- and elbaite-subtype pegmatites in the Moldanubicum, Czech Republic," *Acta Universitatis Carolinae Geologica*, Vol. 42, 1998, pp. 86–90). The slightly elevated Mn contents, a high Mn/Fe ratio, and the general absence of Ti and Fe are likely responsible for its deep "rose" pink color.

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Pyrope-spessartine from Tanzania. At the 2006 Pueblo Gem & Mineral show in Tucson, Steve Ulatowski (New Era Gems, Grass Valley, California) showed one of these contributors (BML) some new garnets from Tanzania. Marketed as "Imperial" garnets, they have been produced since late 2005 from Lindi Province, near the Mowemkulu River in the Namtamba village area of southeastern Madagascar. Similar stones have been mined from southern Madagascar for several years (see K. Schmetzer et al., "Pink to pinkish orange Malaya garnets from Bekily, Madagascar," *Winter 2001 Gems & Gemology*, pp. 296–308).

Mr. Ulatowski indicated that there is a fair production of small rough (weighing <0.1 g), averaging about 40 kg/month. Stones over 0.5 g are rare, with clean rough limited to only about 500 g/month. He reported that faceted material over 1 ct is quite rare, and the largest stone with good clarity he has seen weighed about 3 ct.



Figure 10. This 2.29 ct pyrope-spessartine is from a new deposit in the Lindi Province of southeastern Tanzania. Courtesy of New Era Gems; photo by Axel Respinger.

Mr. Ulatowski loaned a rough and cut sample of the garnet to GIA for examination, and the following gemological properties were determined by one of us (EPQ) on the cut stone (2.29 ct; figure 10): color—pink in both incandescent and daylight, but brownish pinkish orange in fluorescent (5,500 K) light; R.I.—1.756; S.G.—3.85; and fluorescence—inert to both long- and short-wave UV radiation. Microscopic examination revealed iridescent needles (possibly rutile), subhedral transparent birefringent crystals, and dust-like particles. The physical properties identified the garnet as pyrope-spessartine. This is consistent with an absorption spectrum taken with a handheld spectroscope, and also with EDXRF chemical analysis.

The properties of this garnet are quite similar to the

Madagascar garnets described by Schmetzer et al. (2001), and it is quite possible that the deposits share similar geologic conditions in light of their close proximity before Madagascar separated from Tanzania.

BML

Elizabeth P. Quinn

Transparent faceted sillimanite from India. At the AGTA show, Anil B. Dholakia Inc. (Franklin, North Carolina) had a large quantity of transparent sillimanite, reportedly from a new locality in the Vishakhapatnam region of Andhra Pradesh, India. Several colors were available (figure 11), but most notable were the large greenish yellow to yellow-green stones, which Mr. Dholakia first brought to GIA's attention in November 2005. He indicated that he had faceted about 20,000 carats of the sillimanite, all in checkerboard cuts, with most pieces weighing 1.5–10 ct (70% in calibrated sizes); a few larger stones ranged up to 25 ct (rarely, 50 ct). In addition to greenish yellow, the hues included near colorless, grayish green, green-brown, brownish orange-yellow, and violetish gray. Mr. Dholakia characterized the production as sporadic.

Similar material was obtained in mid-2004 during a buying trip to Jaipur, India, by Scott Davies of American-Thai Trading, Bangkok. In addition to the colors mentioned above, Mr. Davies noted very light to dark grays and grayish browns. In his experience, the best greenish yellow sillimanites have an appearance resembling fine chrysoberyls from India. Most of the 3,000+ carats of sillimanite that he obtained were loupe-clean, or contained only thin parallel needles. The largest clean stones he purchased weighed more than 80 ct. About half had been cut with normal "Portuguese" patterns, and the other half had checkerboard crowns. Some of the stones needed

Figure 11. Transparent sillimanite has been recovered in a variety of colors from a new deposit that is reportedly located in the Vishakhapatnam region of Andhra Pradesh, India. The sillimanites shown here range from 4.43 ct (brownish orange-yellow) to 10.77 ct (grayish green). Courtesy of Anil B. Dholakia Inc.; photo © Robert Weldon and GIA.





Figure 12. At 49.29, 25.05, and 21.12 ct, these greenish yellow to yellow-green sillimanites from India are impressive for their size and color. Courtesy of Anil B. Dholakia Inc.; photo by Axel Respinger.

recutting, and caution was required to avoid breaking the stones when the cleavage direction was oriented nearly parallel to the table facet.

Mr. Dholakia loaned several of the sillimanites to GIA for examination, and the three largest stones (49.29, 25.05, and 21.12 ct; see figure 12) were characterized by one of us (EPQ): color—yellow-green, greenish yellow, and yellow-green, respectively; pleochroism—moderate, in yellow and grayish green; diaphaneity—transparent; R.I.— $n_o = 1.584\text{--}1.587$ and $n_e = 1.577\text{--}1.580$; birefringence— $0.017\text{--}0.018$; S.G.—3.26; no Chelsea filter reaction; and inert to both long- and short-wave UV radiation. A strong absorption band at 460 nm was observed with a desk-model spectroscope. Microscopic examination revealed that the two yellow-green stones contained parallel iridescent needles and the greenish yellow stone contained groups of fine whitish parallel needles. The properties of these stones are generally consistent with those listed for sillimanite (fibrolite) by R. Webster (*Gems*, 5th

ed., revised by P. Read, Butterworth-Heinemann, Oxford, England, 1994, p. 337). The colors of these three stones are unusual for sillimanite. We found no indication of treatment, but additional research would be necessary to determine the origin of their color.

Although this greenish yellow to yellow-green sillimanite may resemble chrysoberyl, the two gem materials can be easily separated with standard gemological techniques.

BML

Elizabeth P. Quinn

Sphene from Pakistan. At the AGTA show, Dudley Blauwet had an impressive selection of sphene from Pakistan. The stones were notable for their range of color, strong dispersion, and availability in matched pairs and calibrated suites. Mr. Blauwet first obtained this material in mid-2004, and reported that it comes from a mining area that the locals refer to as Mullah Ghani Baba (after an Islamic saint, who was buried in the area), in the Mohmand Agency of Pakistan's Federally Administered Tribal Areas, within the North West Frontier Province. It takes about 5–6 hours to reach the deposits from Peshawar (or 2 hours from Warsak); they are located fairly close to Sapari village at an elevation of about 7,000 feet (2,130 m). The mines are worked by hand tools and explosives.

The sphene is typically a saturated "golden" orange color with intense dispersion, especially "red flash." The material ranges from yellow to orange-brown, with greenish brown and greenish yellow seen less commonly. Much of the sphene is sold in Peshawar as broken crystal fragments, although some fine crystals are also encountered (see, e.g., figure 13). The rough is sometimes recovered in large pieces (up to several centimeters), but only small areas of such crystals are suitable for faceting. For example, Mr. Blauwet mentioned that a 40 kg parcel



Figure 13. Sphene from Pakistan has been faceted into a variety of shapes and shows a range of color. The cut examples (1.47–6.21 ct) are shown together with a crystal (2.8 cm wide). Courtesy of Dudley Blauwet Gems; photo © Jeff Scovil.



Figure 14. These samples of yellow to yellowish orange-brown sphenes from Pakistan were studied for this report (0.16–1.16 ct). Gift of Dudley Blauwet; GIA Collection no. 32497. Photo by Maha Calderon.

mined in June 2005 contained only a limited amount of clean material with a small cutting yield. Nevertheless, stones as large as 18 ct have been faceted, according to Scott Davies. He indicated that the strong red component of the brown material makes the stones quite salable, even without the green coloration that is so highly prized in gem sphenes.

Mr. Blauwet loaned and donated several samples of this sphenes to GIA for examination, and gemological properties were collected on five faceted samples (0.16–1.16 ct; figure 14) by one of us (EPQ): color—yellow, brownish yellowish orange, and yellowish orange-brown; pleochroism—strong yellow and red-orange for the orange and brown sphenes, moderate yellow and brownish orange for the two yellow sphenes; diaphaneity—transparent; dispersion—strong; R.I.—above the limits of a standard refractometer; S.G.—3.51–3.54; and fluorescence—inert to both long- and short-wave UV radiation. A 580 nm doublet was visible with the desk-model spectroscopy for the orange and brown stones, but no features were observed for the two yellow stones. These properties are comparable to those reported for sphenes by R. Webster (*Gems*, 5th ed., revised by P. Read, Butterworth Heinemann, Oxford, UK, 1994, pp. 375–376). Microscopic examination of the five samples revealed strong doubling, “fingerprint” inclusions, two-phase inclusions, straight and angular transparent growth lines, twinning, and (in one of the brown stones) yellow and brownish orange-yellow color zoning.

EDXRF spectroscopy of three samples indicated Si, Ca, and Ti as expected, along with varying amounts of Fe, Nb, Y, Zr, and Sr. In addition, Vis-NIR spectroscopy of the three sphenes showed a typical rare-earth spectrum. No rare-earth elements (REEs) besides Y were detected by EDXRF spectroscopy, even though the Vis-NIR spectra indicated the presence of other REE(s). The other(s) may not have been detected by EDXRF due to overlapping peaks from the other elements in the samples.

Unfortunately, Mr. Blauwet reports, the supply of sphenes from this locality has tightened in recent months due to disputes over the ownership of the mining area, which have resulted in instability and occasional gun battles. Meanwhile, demand for the sphenes remains strong, particularly from lapidaries in Bangkok and Hong Kong.

BML

Elizabeth P. Quinn

New spinel from Mahenge, Tanzania. At the GJX show, Advanced Quality A.C.C. Ltd. (Ramat Gan, Israel) had some faceted spinels in a variety of colors that were from new mining locations in the Mahenge area, near the villages of Kibangili and Ipanko, according to company president Menahem Sevdermish. The spinels, which have been produced since mid-2005, ranged from blue to violet and violetish purple to purple (figure 15), in low saturation and light to very dark tones. Typical colors were described by Mr. Sevdermish as medium dark grayish violetish purple to very dark slightly grayish bluish violet, corresponding to Gemwizard colors vP(26)7/2 and bV(24)8/2, respectively (see the Spring 2003 GNI section, pp. 57–58, for an introduction to Gemwizard software).

Mr. Sevdermish reported that the spinels are recovered as waterworn pebbles from alluvial deposits. In general, only 1–2 kg/month of good-quality facetable rough is recovered. The clean rough typically weighs up to 3–4 g. The faceted stones range from melee to 2–3 ct, but the larger sizes are rare and tend to appear very dark.

The color appearance of these spinels is significantly different from the pink and more saturated blue-to-purple colors that are more typical of the material from elsewhere in the Mahenge area, or from Umba. Mr. Sevdermish noted that strong sales of this material, as well as other gems displaying nontraditional colors, reflect a greater openness to alternative colors in the gem trade.

BML

Figure 15. These spinels (0.40–0.70 ct) are from mining areas in the Mahenge area of Tanzania. Courtesy of Advanced Quality A.C.C. Ltd.; photo by Kobi Sevdermish.





Figure 16. Framed by a thin ovoid tension fracture, this unusually large 2.1 mm skeletal ilmenite dendrite looks like a rather curious form of ancient cuneiform writing. Photomicrograph by J. I. Koivula for *microWorld of Gems*.

INCLUSIONS IN GEMS

Cuneiform aquamarine inclusion. One of the microscopically interesting gems this contributor saw during the February Tucson gem shows was a relatively large (19.27 ct) faceted greenish blue aquamarine from India that looked like it had been sprinkled internally with black pepper. Gemologists Kiran and Kusam Malhotra of K&K International, Falls Church, Virginia, subsequently loaned this gem for a more detailed examination of the inclusions.

As with all such examinations, the first step was to confirm the identification as a natural aquamarine; this was accomplished through standard gemological testing. Microscopic examination of the inclusions showed them to be relatively typical, skeletal-looking opaque black to deep translucent red dendrites. Previous experience with aquamarines containing similar inclusions has shown that the opaque black dendrites are usually ilmenite, while the red ones are hematite.

Because the inclusions in this stone were all oriented in the basal plane of the host aquamarine, they produced a silvery gray reflective aventurescence when examined with oblique fiber-optic illumination. One inclusion was particularly noteworthy because of its size, position in the host, and a general appearance of some type of ancient cuneiform-like writing (figure 16). While most inclusions of this type are microscopic, this one was eye-visible and measured more than 2 mm in longest dimension. It was also framed by an iridescent oval fracture, which is very unusual for such dendritic inclusions. And, as can be seen in figure 16, its position in the aquamarine made it very photogenic.

Regardless of their appearance, such inclusions offer a message from nature if one is schooled in their interpretation: They indicate that the color of the host is natural and has not been altered by heat treatment.

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“Blood trail” in copal. In the Spring 2000 Gem News section (pp. 67–68), this contributor reported on a polished specimen of light yellow copal from Madagascar that contained brownish red fluid inclusions. The unusual appearance of this fluid and its visible absorption spectrum led to speculation that the inclusions might contain blood. However, because of the unusual nature of the inclusions and the rarity of the sample itself, no further testing was performed to identify them, since a more complete analysis would have required destructive opening of the voids.

At the 2006 Tucson gem shows, this contributor discovered a second specimen of copal containing red-brown liquid, but from an entirely different locality—Colombia—which is also known to produce copal with interesting inclusions (see, e.g., Spring 2004 Lab Notes, pp. 58–59).

Even to the unaided eye, this Colombian sample exhibited numerous tiny bright brownish red bubbles. Microscopic examination revealed that the red drops were contained within spherical to somewhat distorted cavities in their copal host. Most of these inclusions appeared to be randomly scattered in the fossil resin, but in one instance (figure 17), they were arranged in a linear “blood trail.” Some of these inclusions also contained free-floating gas bubbles, confirming that the red substance was indeed a liquid.

Although no analytical equipment was available to identify the fluid, this Colombian specimen was also examined with a small diffraction grating spectroscope. The absorption spectrum was similar to that obtained from a human finger when illuminated by a strong fiber-optic light source. As with the first sample from Madagascar, this spectrum suggested that iron was present, at least as a coloring agent, in fluid inclusions from the Colombian copal.

John I. Koivula

Figure 17. Strongly resembling a trail of blood, this row of brownish red fluid droplets was discovered in a polished specimen of copal resin from Colombia. Similar fluid inclusions in the sample contained movable gas bubbles. Photomicrograph by J. I. Koivula for *microWorld of Gems*; magnified 15 \times .





Figure 18. The unusual two-phase orange fluid inclusions in this quartz from Bahia, Brazil, are situated in two different growth zones, suggesting that they are primary inclusions and not the result of healed fractures. Photomicrograph by J. I. Koivula for *microWorld of Gems*; magnified 10 \times .

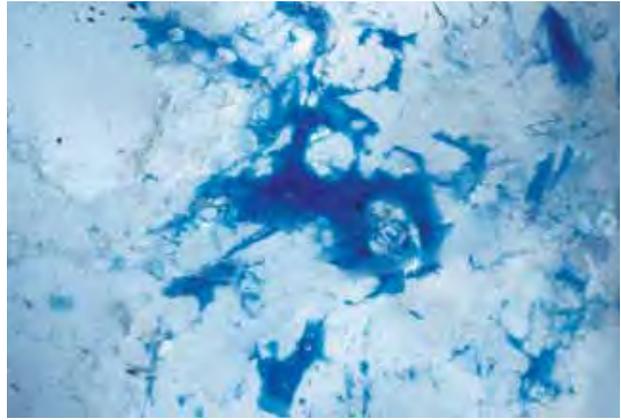


Figure 19. This relatively large, bright blue fluid inclusion in quartz from Bahia, Brazil, has a color reminiscent of a saturated copper sulfate solution. Photomicrograph by J. I. Koivula for *microWorld of Gems*; magnified 2 \times .

Colored fluid inclusions in quartz. Luciana Barbosa of the Gemological Center, Belo Horizonte, Brazil, always has a number of interesting inclusion specimens on display in Tucson, as both cut gems and as rough and polished crystals. This year, at the GJX show, she had some samples of rock crystal quartz with unusual fluid inclusions.

One of these was a small faceted step-cut rectangular gem containing numerous two-phase fluid inclusions, with a liquid phase having a distinctive slightly pinkish orange color. According to Ms. Barbosa, this sample was from Bahia, Brazil. As seen in figure 18, the color of this fluid was somewhat different from what would be expected from a solution stained with iron oxide or hydroxide. These fluid inclusions were inert to UV radiation, and were situated in two growth zones at different depths in the quartz. Their general appearance along growth planes, and their widely differing size, suggested that they were primary fluid inclusions and not the result of fracture repair or regrowth. No daughter crystals were observed, and none of the gas bubbles moved when the specimen was tilted and examined with the microscope. Completing the picture were a number of very fine fibrous inclusions.

Ms. Barbosa also had a selection of interesting faceted colorless quartzes that hosted bright blue fluid inclusions, the largest of which is shown in figure 19. The color of the fluid was reminiscent of a saturated copper sulfate solution. The source of this quartz was also reported as Bahia.

Because of the bright blue color of the fluid, even very small inclusions were visible to the unaided eye. With magnification, it was noted that most of the fluid inclusions were two-phase, each containing a single gas bubble. Some of them, however, also appeared to have

minute solid phases along the inner walls of the inclusion chambers. The blue fluid fluoresced a weak to moderate chalky bluish white (light blue) to long-wave UV radiation.

These inclusions seemed to be randomly arranged and of widely varying sizes. Most of the largest ones possessed ragged-to-rough-looking outlines, but some of the smaller ones had a well-developed negative crystal form (figure 20), and a few had movable gas bubbles. Also present were occasional micaceous crystals (figure 21) and numerous jumbled ultra-thin fibrous inclusions, which were very similar in appearance to those observed in the specimen with the pinkish orange fluid.

John I. Koivula

Figure 20. A few of the smaller blue fluid inclusions in the Brazilian quartz had a well-developed negative crystal form. Photomicrograph by J. I. Koivula for *microWorld of Gems*; magnified 30 \times .





Figure 21. An occasional light brown micaceous crystal and numerous fibrous inclusions were also present in the quartz containing the blue fluid inclusions. Photomicrograph by J. I. Koivula for *microWorld of Gems*; magnified 15 \times .

“Platinum quartz” with star. In the Winter 2003 GNI section (pp. 334–335), this contributor reported on a material from Brazil sold as “platinum quartz.” Initial examination proved that it was formed by a combination of two titanium oxide minerals, rutile and brookite, included in rock crystal and light brown smoky quartz from Curvelo in Minas Gerais State.

Over the past few years, this researcher has studied several hundred “platinum quartz” samples, as both fashioned gems and crystals. Through micro-observation,

it appears that the silvery fibers of rutile grew epigenetically in relation to the elongated blades of brookite (i.e., as epitaxial overgrowths). Both the rutile and brookite are protogenetic to (i.e., grew before) the quartz containing them.

At the recent Tucson gem shows, Kevin Lane Smith, a lapidary and jewelry designer based in Tucson, displayed a most remarkable example of “platinum quartz” in his show room. This 94.75 ct shield-shaped colorless plate was polished on all sides. Unlike other “platinum quartz” examples this contributor has seen, this particular gem contained a superb, silvery, six-rayed star (figure 22) formed by the growth of numerous rutile fibers on a substrate that appeared to be three individual brookite blades arranged at angles of approximately 60° to one other. While four-rayed stars have been seen previously in this type of Brazilian quartz, this is the first six-rayed rutile star that this contributor has observed in this type of quartz.

As an added optical bonus, the star was positioned so that the central brookite blades were parallel to the optic axis of the quartz host. And, since this particular quartz was twinned on the Brazil law, when observed between crossed polarizers the background of the rutile star was quite colorful (again, see figure 22). One always hesitates to apply the word *unique* to anything, since that implies it is the only one to exist. However, if this stone is not unique, then the circumstances that created it have at least resulted in a most unusual gem.

John I. Koivula



Figure 22. This polished “platinum quartz” from Curvelo, Minas Gerais, Brazil, displays a most unusual six-rayed star (approximately 2.5 cm across) of silvery rutile needles. The colorful appearance of the background is created by Brazil-law twinning of the host quartz, as viewed between crossed polarizers. Photomicrograph by J. I. Koivula for *microWorld of Gems*.

CONFERENCE REPORTS

New Madagascar mining laws. Madagascar has adopted a series of new laws to reduce restrictions on the trade and export of gems mined in that country. Under the new regulations, which went into effect in December 2005, foreign dealers and companies no longer need to go through a local business to buy and export rough and cut gems. Details of the new system were presented at a press conference during the AGTA show by Tom Cushman, a gem dealer who is also a consultant to the country's government, and Pamphile Rakotoarimanana, director of Mines and Geology at the Ministry of Energy and Mines in Antananarivo.

Interested dealers need to secure a business visa that will permit buyers to obtain a license from the Department of Mines and Geology for the purchase of gems. Buyers must keep a detailed record of their purchases, both rough and polished, which must be taken to the mines department for sealing before export. There, the buyer must pay an export duty of 2% on the stated value of gem rough; there is no duty for polished stones. The government maintains a reference guide listing wholesale price ranges for gems found in the country, and values stated in an invoice must be consistent with those in the guide.

Under the former system, foreign traders were not allowed to export gems at all, which resulted in widespread smuggling and cost the government millions of dollars in lost revenues. The country's new presidential administration has embarked on a campaign to reform and liberalize the country's economy in partnership with the World Bank. In addition, the government, in cooperation with various industry organizations including GIA, has established the Institute of Gemmology of Madagascar to train locals in identifying, evaluating, and polishing gemstones.

Also announced at the press conference was the availability of organized gem buying trips to Madagascar that are guided by Jim Fiebig of Fiebig Jewelers, Sturgis, Michigan. Mr. Fiebig conducts trips lasting from 7 to 13 days that include visits to local markets, excursions to the country's main gem-producing areas, and meetings with gem producers and miners (see www.gemstonetrips.com).

Madagascar produces significant quantities of corundum, aquamarine, tourmaline, spinel, and spessartine and rhodolite garnets.

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GNI Regular Features

DIAMONDS

Black diamond with unusual growth structures. The Dubai Gemstone Laboratory received a large black round brilliant mounted in a ring for identification (figure 23, left). As measured in the mounting, the stone was approximately 20 mm in diameter and 12 mm deep. It was identified as diamond with standard gemological testing and the presence of the 1332 cm^{-1} diamond Raman peak. It was inert to both long- and short-wave UV radiation. With very strong fiber-optic illumination, the stone appeared dark

brown (figure 23, right). Due to the size of the stone and the nature of the mounting, it was not possible to perform a detailed investigation of the color origin using FTIR spectroscopy. Nevertheless, there was no indication that the color was the result of treatment.

Closer examination with fiber-optic illumination revealed some unusual growth features in this diamond (figure 24). Near the center of the table were dark bands that defined a roughly four-sided curvilinear structure. The shape of this feature is fairly typical of cuboid growth in

Figure 23. This large (20 mm) apparently black diamond (left) had a dark brown bodycolor with intense fiber-optic illumination (right). Photos by S. Singbamroong, © Dubai Gemstone Laboratory.





Figure 24. Curvilinear growth layers, which are fairly typical of cuboid growth, are visible near the center of the “black” diamond’s table facet. A more puzzling, aggregate growth structure appears to radiate from the curvilinear core. Photomicrograph by S. Singbamroong, © Dubai Gemstone Laboratory; magnified 16x.

diamond. Surrounding these dark bands were faint concentric bands and a radiating structure, which are suggestive of fibrous growth.

Both of these growth types can be found in brown diamond. Cuboid growth is always curvilinear, never straight, with a mean orientation corresponding to cube faces (hence the name). Moreover, because the table apparently intersected this growth pattern in a random orientation, the near-cubic orientation of the growth in the core was not immediately evident. Although the structure observed in the outer portion was strongly suggestive of fibrous growth, such diamond is typically opaque (relative to cuboid growth), and when it is brown, it is usually not as saturated as seen in the present stone. Therefore, the fibrous structure seen in this dark brown diamond was rather puzzling. An alternate explanation for this diamond’s growth would be that the entire stone formed via spherulitic (fibrous) growth; however, a diamond spherulite of this size would be quite unusual. Only X-ray topography could unambiguously confirm the growth sequence, but this technique was not available to study this sample.

If our interpretation is correct, this growth succession of a cuboid core followed by a fibrous overgrowth is quite unusual. Theoretically, there is no reason why there could not be a progression of cuboid to fibrous growth; the sequence from octahedral to fibrous growth in “coated” diamonds is well-known. It is therefore surprising that a cuboid-fibrous growth combination has not yet been previously noted. The reason for the apparent rarity of this sequence of growth conditions is unknown at this time.

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EF

COLORED STONES AND ORGANIC MATERIALS

Sapphire with unusual color zoning. Recently, the Gem Testing Laboratory, Jaipur, India, encountered an 11.29 ct blue oval stone with unusual color zoning. The refractive index was measured at 1.760–1.770 and the hydrostatic specific gravity at 3.98, which identified the sample as corundum.

The stone had been faceted with a large flat area on the pavilion, and the reasons for this were quickly apparent. When the sapphire was viewed table up, it appeared uniformly blue (figure 25). From the side, however, it appeared almost colorless, with a strong blue color zone concentrated on the large pavilion surface (figure 26). Although the stone was inert to long-wave UV radiation, with short-wave UV the blue area displayed strong chalky greenish blue fluorescence. A visible spectrum taken with a desk-model spectroscope showed a moderate absorption band at 450 nm and a weak band at 470 nm. The optic axis of the stone was oriented parallel to the color plane.

With magnification, clouds of minute globular inclusions were observed around a sugary crystal, along with some cloudy whitish healed “fingerprints.” Such inclusions are typically associated with high-temperature heat treatment of corundum. In addition, when the stone was immersed in methylene iodide and observed using diffuse illumination, straight parallel color zones were seen across the blue color plane (figure 27). There were additional blue zones present in the pavilion, though weaker in intensity, also parallel to the color plane.

Although strong color zoning evoked suspicions of diffusion treatment, the absence of color concentrations along facet or girdle edges, the thickness and pattern of the color zones, and their location along only one side of the

Figure 25. Although this 11.29 ct sapphire appears an attractive, uniform blue when viewed face up, its color is actually restricted to a narrow zone on the pavilion. Photo by G. Choudhary.





Figure 26. When viewed from the side, the colorless body and strong blue color plane of the sapphire in figure 25 are apparent. Photo by G. Choudhary.

sample eliminated this possibility. Therefore, we concluded that the stone had been cut from a piece of strongly color-zoned sapphire rough in which the blue color was restricted to narrow zones parallel to the prism faces. Strong blue/colorless zoning has been noted previously in sapphires from Songea, Tanzania, and Sri Lanka (as cited in the Winter 2004 GNI, pp. 354–355), as well as in some greenish blue sapphires from India.

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Väyrynenite from Pakistan. For years, gem dealer Dudley Blauwet has sourced unusual gems and minerals from northern Pakistan, including an unusually transparent and brightly colored example of triplite, $Mn_2(PO_4)_F$ (see GNI: Winter 2004, pp. 346–347, and Fall 2005, p. 277). Recently, Mr. Blauwet obtained another gem-quality phosphate mineral from this region, called väyrynenite (vuh-REN-i-nite), $MnBe(PO_4)(OH,F)$. He obtained a few gem-quality crystals and fragments in June 2005, while on a buying trip to the Shigar and Braldu valleys of Pakistan. The stones reportedly came from a granitic pegmatite near the village of Apaligun (Apo Ali Gun), in the Braldu Valley. This locality is only about 10 km upriver (east) of Dasso, which was the source of the triplite. Mr. Blauwet first encountered väyrynenite from the Braldu Valley in 2004, and the identity of the material was confirmed by a mineralogical laboratory.

Mr. Blauwet loaned one rough and one cut (2.02 ct) sample of the väyrynenite to GIA for examination (figure 28), and the following gemological properties were determined by one of us (EAF) on the faceted gem: color—orangy pink, with orange and pink pleochroism; R.I.—1.640–1.663; birefringence—0.023; S.G.—3.22; and fluorescence—inert to both long- and short-wave UV radiation. Vis-NIR spectroscopy showed a line at 413 nm and weak bands at approximately 435, 465, and 545 nm. Microscopic examination revealed numerous fractures and interconnected growth tubes; some of the smaller tubes contained



Figure 27. With immersion in methylene iodide and diffuse illumination, straight and parallel blue color zones are clearly visible across the color plane in the sapphire. Photomicrograph by G. Choudhary; magnified 35x.

two-phase inclusions. The properties of this sample are comparable to those published in a Summer 1994 Lab Note on another faceted väyrynenite (p. 121). According to *Minerals and Their Localities* (J. H. Bernard and J. Hyršl, Granit, Prague, Czech Republic, 2004, p. 640), väyrynenite has a Mohs hardness of 5 and has also been found in gem quality from a locality near Sassu (actually Sassi), about 40 km east of Gilgit in northern Pakistan.

It is remarkable that two unusual gem-quality phosphate minerals showing similar colors have come from northern Pakistan's pegmatites. In Mr. Blauwet's experience, the crystals and fragments of both minerals are commonly stained with a black material (probably manganese oxides; again, see figure 28). He noted that the Pakistani triplite is commonly reddish orange to orangy brown in comparison to the pinkish orange väyrynenite, which typically has a flatter and more prismatic crystal morphology than the triplite.

BML

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Figure 28. Northern Pakistan is the source of this crystal and 2.02 ct step-cut väyrynenite. Courtesy of Dudley Blauwet Gems; photo by C. D. Mengason.



SYNTHETICS AND SIMULANTS

A convincing moonstone doublet. The GIA GemTechLab recently encountered a 19.40 ct transparent slightly brownish gray cabochon that appeared to show intense blue adularescence (figure 29). It was represented as natural moonstone, but microscopic observation immediately revealed a very distinct separation plane (figure 30), indicating that the specimen was assembled. The intense blue sheen was restricted to the approximately 0.5-mm-thick bottom portion of the assemblage (figure 31); this section also contained inclusions and apparent cleavage cracks in two directions that clearly suggested it was natural feldspar. The top portion, representing more than 95% of the sample volume, appeared to be glass, since gas bubbles were quite evident (again, see figure 30). These identifications were confirmed by specular reflectance FTIR spectroscopy.

The base was apparently cut from gray labradorite exhibiting a blue sheen; the black needles and particles were identical to the inclusions typically seen in such material. The convex form of the glass top acted to focus and magnify the blue iridescence from the flat base. This gave rise to a very convincing blue-sheen effect, and gave the sample the appearance of an unusually transparent moonstone of very high quality.

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A rutilated quartz doublet. Rutilated quartz has grown in popularity in recent years and occupies a distinct niche of the gem market. This, combined with its limited avail-

Figure 30. The separation plane between the two halves of the doublet (feldspar base; glass top) is clearly apparent when viewed with magnification. A large gas bubble is visible in the upper part of the glass portion. Photomicrograph by T. Hainschwang; magnified 7×.



Figure 29. This 19.40 ct cabochon appears to show strong adularescence, but it proved to be a doublet imitating a high-quality moonstone. Photo by T. Hainschwang.

ability (nearly all material is found only in Bahia, Brazil), has led to a significant increase in price during the last two years. However, as with other gem materials, the elevated value has encouraged experimentation by enterprising entrepreneurs.

During a September 2005 trip to Teófilo Otoni, Minas Gerais, these contributors were offered the seven-stone parcel shown in figure 32. The low price and a preliminary visual inspection raised questions about the authenticity of the stones, prompting us to perform a more detailed examination. The refractive indices were 1.544–1.553, typical for quartz. However, when viewed from the side, it

Figure 31. The feldspar base of the doublet exhibited a strong blue iridescence, which created the illusion of adularescence when viewed through the glass top. Photo by T. Hainschwang.





Figure 32. The rutilated quartz cabochons (12–20 mm in longest dimension) in this parcel proved to be doublets. Photo by M. Macri.

was evident that they were doublets, with a thin layer of semitransparent rutilated quartz joined by a transparent adhesive to a backing of transparent quartz that contained little or no rutile. The assembled nature of the samples was even more obvious when the samples were immersed in water, as shown in figure 33.

Although a trained observer would easily detect this falsification in a loose stone, the same observer might fail to identify the doublets after they were mounted, since there were no gas bubbles or other evidence of the glue layer when they were viewed face-up with a loupe.

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An unusual triplet. For decades, a wide variety of assembled gems have been seen in the trade, incorporating both natural and synthetic materials. Occasionally some rather inventive and unusual combinations are used to create



Figure 33. When this cabochon (20 mm in diameter) was viewed from the side in immersion, its assembled nature was readily apparent. This doublet consists of a layer of rutilated quartz with a backing of transparent quartz that contains little or no rutile. Photo by M. Macri.

the desired optical effect. Such was the case with a triplet that was designed to simulate cat's-eye chrysoberyl.

The 8.85 ct oval triplet (figure 34) formed part of a collection of rough and cut gems that was recently donated to GIA by H. Obodda, Short Hills, New Jersey. According to Herb Obodda, the triplet was manufactured in about 1960 by C. Stastny, a New York City lapidary. He indicated that Mr. Stastny enclosed a piece of ulexite within a dome and base consisting of yellow synthetic corundum. The dome and base were confirmed as corundum in the GIA Laboratory, but a natural or synthetic origin was not determined due to the nature of the sample. The dome had been carefully hollowed out to accommodate the core that was responsible for the chatoyancy. Although the identity



Figure 34. In this 8.85 ct triplet, gas bubbles can be seen in the glue layer between the ulexite core and the synthetic sapphire dome (left). The profile view on the right shows the boundary between the dome and base of synthetic corundum. Gift of Herb & Monika Obodda; GIA Collection no. 32391. Photos by C. D. Mengason.

of the chatoyant core could not be confirmed, its visual appearance was consistent with ulexite. The bright yellow color of the synthetic corundum is quite unlike that seen in typical cat's-eye chrysoberyl. Nevertheless, the well-executed assembly of the triplet resulted in an attractive, even if artificial, appearance.

BML

MISCELLANEOUS

New CRJP Code of Practices released. The Council for Responsible Jewellery Practices (CRJP) has produced a draft of its Code of Practices, which seeks to establish a worldwide standard of corporate conduct for the gem and jewelry industry. The CRJP is a foundation formed by a number of large mining and retailing firms and industry organizations to harmonize various corporate governance codes. Currently, the London-based organization is only seeking new members in the gold and diamond sectors.

Released on February 10, 2006, the proposed code sets forth a series of guides that cover three basic areas:

- *Business ethics:* Forbids member companies from engaging in bribery and corruption, requires full and accurate disclosure of all of the products sold by members, and stipulates full adherence to all laws regarding money laundering and Kimberley Process participation.
- *Social:* Requires adherence to all fair labor standards, to workplace health and safety regulations, and to nondiscriminatory hiring and pay; also forbids the use of child labor with the exceptions noted by the International Labor Organization.
- *Environmental:* Requires conducting business in an environmentally responsible manner and assessment of possible adverse effects arising from business activities.

The code also provides for appointment of independent monitors to review member firms' compliance with its provisions.

The full proposal can be found at the Council's website, www.responsiblejewellery.com.

Russell Shor

Update on the use of biological remains in gem materials. The Spring 2003 GNI section (p. 62) reported on LifeGem synthetic diamonds, which the company claims are produced from carbon recovered from cremated human or animal remains. At the time, the process was described as "patent pending," though no other information was available. Since then, a number of patent applications covering this and similar processes have been published, and these applications are summarized here.

The founders of LifeGem have submitted two patent applications for the methods LifeGem uses to recover and purify carbon from the cremation process for diamond synthesis (R. P. VandenBiesen et al., *Method for Making*

Synthetic Gems Comprising Elements Recovered from Complete or Partial Human or Animal Remains and the Product Thereof, U.S. patent application publication 2003/0017932 A1, filed March 18, 2002, published January 23, 2003; and R. P. VandenBiesen et al., *Method of Making Synthetic Gems Comprising Elements Recovered from Remains of a Species of the Kingdom Animalia*, U.S. patent application publication 2004/0031434 A1, filed August 19, 2003, published Feb. 19, 2004). These patent applications do not cover the method of synthesizing diamond using high-pressure and high-temperature growth conditions, since such processes were patented long ago by other parties (see, e.g., H. M. Strong, *Novel Diamond Products and the Manufacture Thereof*, U.S. patent 4,042,673, issued August 16, 1977).

A more recent Japanese patent application expands on the methods described by VandenBiesen et al. to include additional techniques for preparing the remains for cremation (E. Fukasawa, *Artificial Gem and Its Producing Method*, International [PCT] patent application WO 2004/105540 A1, filed May 29, 2003, published December 9, 2004). This application also covers the process of adding carbon when insufficient amounts have been recovered from cremation to produce a synthetic diamond of the desired size (with conventional cremation, most of the carbon in the human body is lost when it is converted to carbon dioxide).

A similar but more extensive process is covered by a patent application submitted by R. E. Page of Streamwood, Illinois (*Method for Making Synthetic Gems Comprising Elements Recovered from Humans or Animals and the Product Thereof*, U.S. patent application publication 2004/0154528 A1, filed Feb. 11, 2003, published Aug. 12, 2004). This method covers not just diamonds but many other gem materials that are composed of elements found in the human body. These elements can be recovered and used for the growth of gem materials such as synthetic garnet, spinel, quartz, and moissanite. Interestingly, the application also mentions a number of gems (such as tourmaline, pearls, and ivory) that are not currently synthesized; this was probably done to ensure that the patent covers these materials should synthetic varieties come on the market at a later date.

Another team of inventors, from Edmonton, Alberta, Canada, has developed a method of incorporating human or animal remains into a glass filling material for diamonds (M. Weisbrot and V. Galon, *Method of Encapsulating Material from Humans or Animals in a Natural Gemstone and Its Product*, International (PCT) patent application WO 2004/076058 A1, filed Feb. 25, 2004, published Sept. 10, 2004). The patent application describes a method of creating a high-refractive index glass from a mixture of calcium phosphate recovered from cremated remains, lead oxide, a chloride compound (such as NaCl or KCl), and a bromide or bismuth compound. The resulting glass is then injected in molten form into laser drill holes in natural

diamonds. This glass filling process is currently being employed by Memorial Gem Inc. of Edmonton; the diamonds are sold through associated funeral homes.

It should be emphasized that these patents are still in the examination stage, and none have been issued yet.

This contributor thanks Dr. Karl Schmetzer, Petershausen, Germany, for bringing these patents to our attention, and Dr. Taijin Lu of GIA Research for translating the Japanese patent application.

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ANNOUNCEMENTS

AGTA Spectrum Awards competition. The 2007 AGTA Spectrum Awards will recognize outstanding colored gemstone and cultured pearl jewelry designs from North America, as well as achievements in the lapidary arts. Winning entries will be displayed and award recipients honored at the 2007 AGTA GemFairs in Tucson and Las Vegas. The entry deadline is September 22; the competition will be held in New York City during October. For entry forms and more information, visit www.agta.org or call 800-972-1162.

Conferences

SEG 2006. The annual meeting of the Society of Economic Geologists will take place May 14–16 in Keystone, Colorado. The program will include two sessions on Canadian diamonds. Visit www.seg2006.org, call 720-981-7882, or e-mail seg2006@segweb.org.

GAC-MAC 2006. The 2006 joint meeting of the Geological Association of Canada and the Mineralogical Association of Canada will take place May 14–17, in Montreal. Diamonds will be covered in some of the sessions. Visit www.er.uqam.ca/nobel/gacmac/welcome.html.

ICNDST-11. The 11th International Conference of New Diamond Science and Technology will be held in Raleigh-Durham, North Carolina, May 15–18, 2006. Among the topics covered will be HPHT synthesis and processing and the growth of CVD synthetic diamond. Visit <http://lucy.mrs.org/meetings/workshops/2006/icndst>.

Bead Expo. The 2006 International Bead Expo will be held in Charleston, South Carolina, May 17–21. Over 60 workshops and educational lectures on bead jewelry design and manufacture are scheduled. E-mail info@beadexpo.com or visit www.beadexpo.com.

GAA-NSW conference. The 2006 conference of the New South Wales Division of the Gemmological Association of Australia will be held May 19–21 in Sydney. The event will also include a jewelry design competition and a post-

conference tour that will visit corundum and opal mines at Barrington Tops, Inverell–Glen Innes, and Lightning Ridge. Visit www.gem.org.au/conference.htm or e-mail nsw@gem.org.au.

2006 Joint Assembly. Several mineralogical and geological societies are sponsoring this conference, which will be held May 23–26 in Baltimore, Maryland. Diamonds will be covered in a session titled “Earth’s Carbon Cycle,” and granitic pegmatites will be included in a “Crustal Melts at Low Temperatures” session. Visit www.agu.org/meetings/ja06, call 202-777-7330, or e-mail ja-help@agu.org.

Maine Pegmatite Workshop. Taking place May 27–June 3, 2006, in Poland, Maine, this educational event will feature seminars and daily field trips to gem-bearing pegmatite quarries in Maine and New Hampshire. Visit <http://homepage.mac.com/rasprague/PegShop> or e-mail rasprague@mac.com.

JCK Show—Las Vegas 2006. Held at the Sands Expo and Convention Center and the Venetian Hotel on June 3–7, 2006, this gem and jewelry trade show will also host a comprehensive educational program beginning June 1. Scheduled seminars will cover industry trends, diamond cut, sales and marketing strategies, legal issues for retailers and manufacturers, and developments in gemology. The AGTA will also be offering seminars focusing on color and fashion on June 2 at the AGTA Pavilion. To register, call 203-840-5684 or visit jckvegas2006.expoplanner.com.

Diamonds at CIMTEC 2006. This large materials science convention will take place June 4–9, in Acireale, Sicily, Italy. Presentations on the growth and characterization of diamond will be included in “Diamond and Other New Carbon Materials,” which will form part of the 4th Forum on New Materials. Visit www.cimtec-congress.org.

Bangkok Gems & Jewelry Manufacturers Fair. Held June 14–18, 2006, this trade fair in Bangkok will include a silver-jewelry design contest and a colored gemstone cutting contest, in addition to educational seminars on developments in jewelry design technology. Visit www.jewelmgf.com.

18th European Workshop on Laser Ablation. Held July 19–21, 2006, in Zurich, Switzerland, this biennial event focuses on material analysis using laser ablation-based methods such as LA-ICP-MS and LIBS. Visit www.laser2006.evento.ethz.ch.

IMA 2006. The 19th General Meeting of the International Mineralogical Association will be held in Kobe, Japan, July 23–28. The conference will include special sessions on “Natural and Artificial Gem Materials” and “Kimberlites, Diamonds and Mineral Inclusions from the Mantle”; other sessions will cover crystal growth, fluid inclusions, and



Figure 35. This inlaid pectoral ornament is a rebus for the throne name of Tutankhamun-Nebkheprure—which can be translated as “Re is the lord of manifestations.” A carnelian sun disk, symbol of the sun god Re, is clasped between the scarab beetle’s front legs, while its wings are fashioned from carnelian, lapis, and turquoise. Photo © Andreas F. Voegelin; courtesy of the Field Museum, Chicago.

mineralogical museums. Post-conference field trips will include visits to Japanese jadeite deposits. Visit www.congre.co.jp/ima2006 or e-mail 2006ima@congre.co.jp.

JA New York Summer Show. Running July 30–August 2 at the Jacob K. Javits Convention Center in New York City, this show will also feature a range of educational programs and seminars. Topics to be covered include diamond cut, diamond treatments, store management, internet marketing, anti-money laundering compliance, and bench jewelry techniques. Visit www.ja-newyork.com or call 800-650-1591.

Goldschmidt 2006. The 16th Annual V.M. Goldschmidt Conference will take place August 27–September 1 in Melbourne, Australia. This important geochemistry confer-

ence will feature a session titled “The deepest lithosphere and beyond: Diamonds and related research, a session in honour of Jeff Harris.” Visit www.goldschmidt2006.org or e-mail goldschmidt2006@tourhosts.com.au.

Diamond 2006. The 17th European Conference on Diamond, Diamond-like Materials, Carbon Nanotubes, and Nitrides will be held September 3–8 in Estoril, Portugal. Presentations on the growth, processing, and characterization of diamond will be given at this meeting. Visit www.diamond-conference.elsevier.com or e-mail Nina Woods at n.woods@elsevier.com.

Santa Fe Symposium changes venue in 2006. The 20th annual Santa Fe Symposium on jewelry manufacturing technology will be held in Nashville, Tennessee, on September 10–13. Visit www.santafesymposium.org.

Exhibits

Arctic jewelry. “Arctic Transformations: The Jewelry of Denise and Samuel Wallace” is on exhibit at the George Gustav Heye Center in New York City through July 23, 2006. Visit www.nmai.si.edu/subpage.cfm?subpage=exhibitions&second=ny.

King Tut Returns. “Tutankhamun and the Golden Age of the Pharaohs,” an exhibition of more than 130 artifacts from the tomb of King Tut and other royal tombs in Egypt’s Valley of the Kings, will be on display until April 23, 2006, at the Museum of Art in Fort Lauderdale, Florida. Among the items included are a gem-studded gold diadem and a jeweled pectoral ornament (figure 35). Only a few of the artifacts in this exhibit were part of the famed 1977 exhibition, and many have never traveled outside Egypt. The exhibit will move to the Field Museum in Chicago May 26, 2006 through January 1, 2007. Visit www.kingtut.org.

Charles Loloma Retrospective. “Loloma: Beauty in Hopi Jewelry,” an exhibit of works by renowned Hopi jewelry artist Charles Loloma will be displayed through May 28, 2006, at the Heard Museum in Phoenix, Arizona. An array of pieces incorporating unusual materials such as gold-set lapis lazuli, fossilized ivory, and ironwood will be on exhibit. Visit www.heard.org/show-exhibit.php?id=35 or call 602-252-8848.