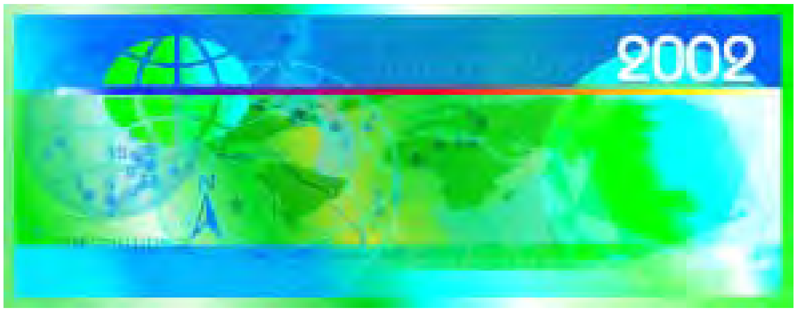
GEM NEWS International



CONFERENCE REPORTS

AGU meeting examines diamond provenance. A session on "Determining Diamond Provenance" was held at the American Geophysical Union's Spring 2002 semiannual meeting, which took place May 28–31 in Washington, D.C. The session was prompted by concerns over identifying "conflict" diamonds after they have been removed from their source area. **Dr. Stephen Haggerty** of the University of Massachusetts, Amherst, began with an overview of the problems associated with determining the geographic origin of gem diamonds. The contributor of this entry, director of research for GIA, discussed technical challenges for determining "country of origin" by analytical methods—for example, the lack of a representative collection of diamonds from known primary and secondary deposits to establish if there are characteristics unique to each deposit. Since determining country of origin by analytical means appears to be impossible at this time, the jewelry industry has recommended procedures to track diamonds from legitimate sources so as to exclude illegitimate diamonds from conflict countries. **Dr. Larry Taylor** of the University of Tennessee, Knoxville, also described the need for a more thorough scientific study of larger collections of diamonds from major deposits to establish if certain features (such as inclusions and isotopic data) provide evidence of geographic source.

Dr. Peter Deines of Pennsylvania State University, University Park, presented carbon isotope and inclusion chemical data on diamonds from kimberlite pipes in Botswana and South Africa, and demonstrated that while diamonds from different kimberlites can be geochemically distinct, they may show complex variability within single samples or among different ones. He concluded that there was no simple diagnostic pattern of geochemical features that could link his diamond samples unambiguously to a particular kimberlite. **Dr. Pierre Cartigny** of the Laboratoire de Geochimie des Isotopes Stables, Paris, studied diamonds from the Panda kimberlite in Canada, and concluded that nitrogen and carbon isotopic data could not be used to distinguish them from other sources. **Dr. Erik Hauri** of the Carnegie Institution of Washington (D.C.) demonstrated how variations in nitrogen and carbon isotopes—as well as a complex cathodoluminescence zoning pattern—in a diamond crystal from the Mir kimberlite in Russia provided evidence of a complicated growth history. Such variations within a single crystal illustrate the difficulties of using geochemical data to establish diamond provenance.

Dr. Nikolai Sobolev of the Institute of Mineralogy and Petrography, Russian Academy of Sciences, Novosibirsk, illustrated how the prevalence of chromite as mineral

Figure 1. The sulfur isotope compositions of sulfide inclusions—such as the one shown here in a rough diamond—may help determine the geographic source of diamonds, when combined with other information. Photomicrograph by John I. Koivula; magnified 10↔.

inclusions in Yakutian diamonds can provide evidence of their geographic origin. **Dr. Jeffrey Harris** of the University of Glasgow, U.K., showed how variations in shape, color, and surface features also offer a potential means of establishing geographic source. However, the absence of similar data on conflict diamonds is a major drawback to validating this approach. **Dr. Steven Shirey**, also of the Carnegie Institution of Washington, described how establishing the ages of diamonds using radiometric methods does not appear to hold potential for establishing provenance due to overlap in diamond ages from various deposits. **Dr. James Farquhar** of the University of Maryland, College Park, studied sulfur isotope compositions of sulfide inclusions (see figure 1) in diamonds from Orapa, Botswana, as an alternate means of elucidating their geologic history. When combined with other information, this might help determine the source of diamonds. **Dr. Eva Anckar** of the University of Cape Town, South Africa, presented results of a multivariate analysis of diamonds—incorporating nitrogen content and aggregation, hydrogen content, infrared spectra, color, shape, size, surface features, and cathodoluminescence patterns—to show that this statistical approach has the potential to differentiate among diamond sources.

Overall, these presentations demonstrated that some analytical techniques hold promise for distinguishing diamonds from particular deposits, but further work is needed on a more complete collection of diamonds from all major sources to fully establish the validity of these techniques.

JES

GSA meeting reports on Western U.S. gem occurrences. The 54th Annual Meeting of the Rocky Mountain Section of the Geological Society of America took place May 7–9 at Southern Utah University in Cedar City, Utah. The meeting included a session on "Gemstone and Semiprecious Minerals and Host Rocks in the Western United States." **Peter Modreski** of the U.S. Geological Survey, Denver, Colorado, outlined the gem occurrences in Colorado, which include deposits of pegmatite minerals (aquamarine [figure 2], smoky quartz, topaz, and amazonite feldspar), as well as diamond, peridot, turquoise, lapis lazuli, and rhodochrosite. **W. Dan Hausel** of the Wyoming State Geological Survey, Laramie, summarized gem and mineral localities in that state. Historically, nephrite jade and various agates and jaspers have been the most important gem materials, but sapphires and iolite were found recently. In a separate presentation, he described new kimberlite discoveries in the Iron Mountain district in southeastern Wyoming.

Richard Berg of the Montana Bureau of Mines and Geology, Butte, discussed probable sources of Montana's large alluvial sapphire deposits. Preservation of delicate surface features that formed during magmatic transport, and the absence of internal conchoidal fracturing, indicate that the sapphires were transported only a short distance from their original host rock. The lack of rock fragments on the sapphires, and the fact that more than 100 years of sapphire mining has failed to reveal the primary host rock, suggest that the original bedrock was friable and easily eroded, so it would not leave surface outcrops. **Dr. Jeffrey Keith** of Brigham Young University (BYU), Provo, Utah, described a rare occurrence of emeralds (not of gem quality) in a black, organic-rich shale in the Uinta Mountains in northern Utah, and pointed out the geologic similarities to the famous emerald deposits in Colombia. In the same area is an extensive occurrence of massive, fibrous, translucent brownish yellow calcite that is carved for ornamental purposes. Presentations on the deposits and genesis of red beryl in the Wah Wah and Thomas Mountains in Utah were

Figure 2. Colorado is the source of several gem materials, including this aquamarine from Mt. Antero in the Sawatch Range. The faceted stones range from 3.50 to 18.95 ct. Courtesy of the Denver Museum of Nature and Science; photo by Jack Thompson.

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given by **Timothy Thompson** and **Jean Baker**, also from BYU. At both localities, red beryl is a post-magmatic mineral that occurs in fractures within rhyolite host rock. Crystallization of red beryl probably resulted from the reaction of beryllium- and fluoride-rich vapors with groundwater in the fractures. *JES*

Report from the 3rd World Diamond Conference, Vancouver. On June 17 and 18, 2002, this conference attracted approximately 450 diamond exploration company executives, as well as investors, government officials, mining geologists and engineers, and diamond dealers. As was the case with the previous conferences (see, e.g., Fall 2001 GNI section, pp. 222–225), Chaim Even-Zohar was the moderator. The conference program was well rounded, but was dominated by two topics: (1) Canada as a major player in the world diamond scene, and (2) "conflict" diamonds.

Figure 3. More than 50 companies are currently exploring for diamonds in Quebec, which is the most recent exploration region in Canada (i.e., since 1996). Six diamond-bearing kimberlites have been found in the Otish Mountains area since late 2001. A diamondiferous kimberlite dike was found in the Wemindji area in early 2002, and a system of diamond-bearing ultramafic dikes was discovered in 1996 in the Torngat Mountains. Diamond indicator minerals are being investigated in glacial deposits in several other regions of the province.

Canada. In 2001, Canada produced about 3.5 million carats of diamonds, all from the Ekati mine in the Northwest Territories (NWT). The diamonds were mined from both the Panda pipe and the newly opened Misery pipe, and represent about 3% of the world's supply by weight and 6% by value. Within one year, these figures are expected to increase to perhaps 10% in both categories when the Diavik mine (which has diamonds of overall lower quality than Ekati) starts production. The status of several Canadian diamond projects at various stages of evaluation and development (mainly in the NWT, Nunavut, and Saskatchewan) was also discussed, as were exploration programs in new regions. Currently, the most exciting activities in Canada, in which more than 50 companies are involved, are taking place in Quebec. Diamonds are now known from three new areas in this province (figure 3), and geologists have found encouraging diamond-indicator-mineral "trains" in others. Elsewhere in Canada, exploration continues at a feverish pace (e.g., in the North Slave geological province, also known as the Coronation Gulf area), and has resulted in the discovery of several new diamond-bearing kimberlites.

Inevitably, additional mines will be developed in Canada, which is a preferred country for diamond exploration and mining because of its good infrastructure and political, social, and economic stability, as well as favorable geologic factors. In fact, it is estimated that currently 50% of the diamond exploration monies budgeted worldwide are spent in Canada. The main requirements for diamond mining companies, as stipulated by all levels of Canadian government, are: (1) respect for the environment and local (indigenous) cultures; and (2) creation of meaningful opportunities for Canadian workers—for example, in diamond cutting as well as mining.

Conflict Diamonds. The future of the Kimberley Process (to certify locality of origin for diamonds as they move through the trade from the source to the retailer, so that conflict diamonds will be excluded from the marketplace) is not yet assured, because it has not been ratified by several of the approximately 30 countries necessary for its success; at press time, for example, it had not yet passed the U.S. Senate. However, the unrest that initially generated the issue—that is, civil wars in certain African countries—appears to be improving naturally. With political stability on the horizon for both Angola and Sierra Leone, and with signs of improvement in the Democratic Republic of Congo, the proportion of conflict diamonds may be as low as 1.5% of the total world rough diamond production (compared to as much as 4% two years ago).

Several conference participants expressed concerns about the practicality of the Kimberley Process. Some maintained that two factors are critical to the success of the initiative: (1) Control of the diamonds by authorized persons must be achieved at the point of extraction from the ground, and (2) uncertified stones must not be allowed

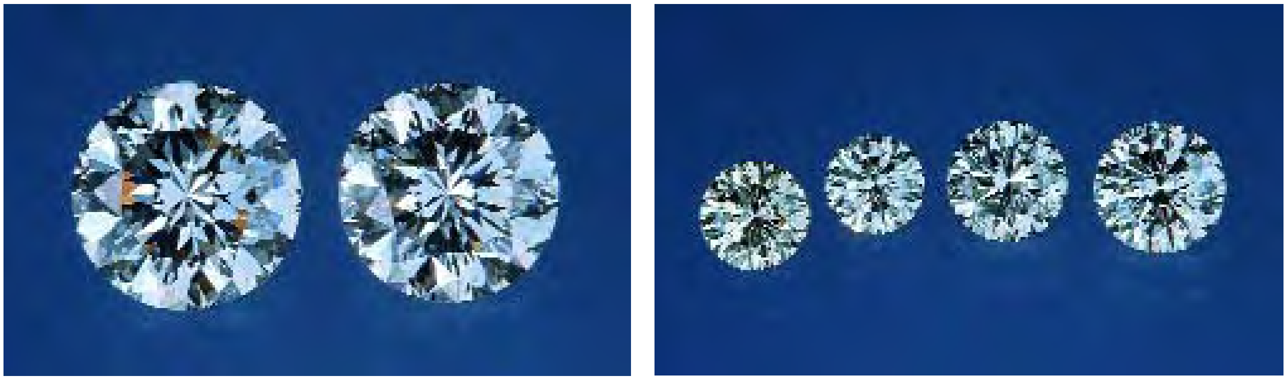

Figure 4. These round modified brilliants (0.50–0.76 ct) have unusual faceting arrangements. The two on the left have 100 facets, and those on the right, 73 facets. Courtesy of Rosy Blue International; photo by Maha Tannous.

to enter the legitimate stream. Nevertheless, the industry overwhelmingly supports the Kimberley Process, both for its humanitarian aspects and to safeguard the integrity of the market. Further, enforcement measures of the Kimberley Process may forestall any future attempts to use diamonds for inappropriate purposes.

Special Award. The conference ended with a fitting tribute to Charles E. Fipke, who was presented with the first "Diamond Pioneer of Canada" award for being instrumental in finding the Lac de Gras kimberlite field in 1990.

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DIAMONDS

New round diamond cuts. Rosy Blue International (Antwerp, Belgium) recently showed GIA researchers several examples of two unusual round modified brilliant cuts that provide additional perspective on the relationship between cut and the face-up appearance of a faceted diamond (figure 4). The faceting arrangements of these diamonds create an interesting pattern of contrasting light and dark areas in the face-up diamond. Over the preceding several months, we had begun to focus some of our diamond cut research efforts on the patterns displayed by round brilliants of various proportions, and how the properties of these patterns can affect human perception of a diamond's brilliance. Therefore, we were pleased to have the opportunity to examine these diamonds, to see how changes in the number and arrangements of facets could affect face-up appearance.

A standard round brilliant has 58 facets: 33 on the crown and 25 on the pavilion (including a culet but excluding girdle facets), with eight-fold symmetry around a central axis. As illustrated in figure 5, one of these new cuts has the usual facet types on the crown but with nine-fold symmetry, which produces 37 crown facets. The pavilion has 63 facets, also with nine-fold symmetry, for a total of 100 facets (excluding a culet or any girdle facets). The nine pavilion mains are each split into three facets, two trapezoids, and an elongated hexagon. Two more trapezoids plus two small triangular facets substitute for each of the nine pairs of lower-girdle facets. Both the nine-fold symmetry and the division of the pavilion into many facets with small angular differences among them contribute to the distinctive appearance of this cut.

The other round modified brilliant cut, named the "Aster" cut, has 73 facets (again, see figure 5). The crown

Figure 5. These faceting diagrams for the 100-facet and Aster (73-facet) cuts display the complexity of these designs. The many small facets demand precision cutting to achieve the desired optical effects. Courtesy of Rosy Blue International.

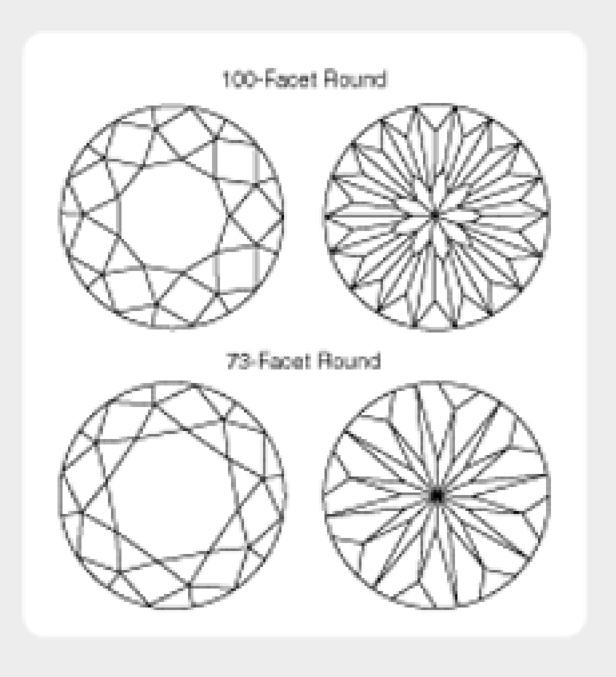

Figure 6. In an environment that emphasizes contrast, these diamonds show patterns with many small bright spots (some are circled), contributing to their scintillation. The images on the left and center are of the 100-facet round modified brilliants, whereas the one on the right is of a 73-facet round. Courtesy of Rosy Blue International; composite photo by Al Gilbertson.

is standard, but 16 facets have been added to the pavilion as eight additional pavilion mains (extending about three-fourths of the way to the girdle) and eight triangular facets above them (which break into the lower-girdle facets).

Figure 6 shows two of the 100-facet round modified brilliants and one of the 73-facet rounds photographed in an environment that emphasizes the contrast pattern of a faceted diamond in the face-up position. In the two 100-facet diamonds, the nine short, hexagonal facets that radiate from the culet create nine bright reflections under the center of the table, like a nine-petalled flower. At the same time, the pairs of trapezoidal facets beyond them are seen as nine dark reflections of these pavilion "mains" distributed under the bezel facets of the crown. The 73-facet design shows 16 distinct reflections of both the full and partial pavilion mains, while the eight triangular facets above the partial mains create an effect similar to that of a French tip on a fancy shape at eight spots around the girdle.

The size and distribution of spots of bright white and black in these patterns is significant. The movement of such spots when the diamond, light source, or observer moves is an important factor in scintillation (i.e., flashes of light seen through the crown as the diamond moves relative to the light source and observer), and the contrast they produce can affect human perception of overall brightness. For the 100-facet design, the specific distribution of these spots depends strongly on the precision of the pavilion faceting. We noted marked variations in this appearance aspect among the eight examples of this faceting style we examined, and we mentioned these differences to the client. By repolishing two of the samples (one of them more than once), cutters at Rosy Blue succeeded in making the pattern appear more uniform. These observations showed again the importance of precise cutting to achieve the desired result from a complicated faceting design.

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COLORED STONES AND ORGANIC MATERIALS

Benitoite recovery and cutting: Significant progress. Since March 2001, the Benitoite Gem mine in San Benito County, California, has been worked on a seasonal basis (generally from March to May, when water is available) by Benitoite Mining Inc., Golden, Colorado (see Spring 2001 GNI section, p. 68). During the 2001 season, the company focused on mining gem and specimen material from the lode and evaluating the best way to recover gem rough (including small fragments discarded by previous activities) from the eluvial deposit, mine dumps, and other unconsolidated material. In 2002, mining focused mainly on gem rough. By the time the 2002 season ended in early June, some important strides had been made in both recovery and cutting.

According to company president Bryan Lees, a new processing plant—with a capacity of 150 tons of material per day—began operation in April 2002 (figure 7). The plant uses a system of vibrating screens combined with high-pressure washing. First, the ore is dumped in a hopper and the boulders are removed; next, any fragments over $^{3}/_{4}$ inch (1.9 cm) are sprayed by water jets and directed to a conveyer belt for hand-picking of potential mineral specimens. The remaining washed and screened material is sent through a jig system. Two large jigs catch pieces over $^{5}/_{32}$ inch (4 mm), while smaller fractions pass down into their hutch compartments. This hutch material is dewatered and sent to a smaller jig, which catches pieces down to 2 mm. By comparison, fragments smaller than 3 mm were rejected during previous mining activities. The benitoite concentrate—including gem, near-gem, and nongem material—is removed from the jigs each day.

Experiments were done to test whether X-rays could be used to automate the concentration process (as is done in diamond mines), but benitoite's strong fluorescence to X-rays resulted in an unacceptably large amount of contaminants being allowed into the concentrate because the system was over-activated. Also, the technique could not discern between gem- and nongem material.

However, Mr. Lees indicated that another technique has revolutionized the processing of the concentrate: magnetic separation. Since benitoite is the only material in the concentrate that contains iron, 100% of the gems can be separated by this technique. In addition, this method has proved useful in separating much of the near-gem and nongem benitoite from the facetable fraction. Experiments to date have shown that 400 pounds (181 kg) of concentrate can be processed in just two hours. Mr. Lees feels that magnetic separation could be applied successfully to other gem minerals as well.

Cutting and marketing are being handled by Iteco Inc. of Powell, Ohio. Iteco president Paul Cory stated that approximately 1,000 carats of melee have been faceted during the last year, in full round brilliants ranging from

Figure 7. This new processing plant was installed at the Benitoite Gem mine in spring 2002. Material is dumped into the hopper (far left) and proceeds up the conveyer belt to a washing/screening apparatus (top right). Mineral specimens larger than ^{3}1⁄44 inch (1.9 cm) are hand picked from the conveyor belt on the far right. Smaller material is sent through a jig system, which is partially visible (tan-colored box) below the screening apparatus. Benitoite concentrate, down to 2 mm, is removed from the jigs each day. Photo by Bryan Lees.

1.5 to 4 mm in diameter. Based on the critical angle of benitoite (34.7°), all of the stones are faceted in a consistent set of proportions to yield the best face-up appearance. A range of color, from colorless to deep violetish blue, is available (figure 8). Most of the material is a medium violetish blue, with near-colorless and deep violetish blue each accounting for about 10% of the volume. Since all the melee was faceted from rough found during the 2001 season—derived mostly from the mine dumps—future production may show a different color distribution as various parts of the deposit are mined. Dichroism is taken into account when orienting larger rough to yield the best color, but the melee stones are not cut in any particular orientation. So far, the largest stone cut from the 2001 production weighed 3.55 ct, and several other stones exceeding 3 ct also were produced. Although Benitoite Mining sells many of the stones loose, it is presently seeking partnerships with jewelry manufacturers and developing its own line.

Depending on demand and mining activity, Mr. Lees expects the mine to produce commercial quantities of benitoite for approximately 5–10 years. Specimen material will remain an important part of the production, as there appears to be more *in-situ* lode material than originally anticipated. Mining of both loose material and the lode deposit will occur concurrently during the next several field seasons.

Cassiterite from Viloco, Bolivia. Faceted cassiterite is rare. Although Nigeria, Russia, and China produce limited quantities, the only locality producing significant amounts of gem rough is the Viloco mine, near Araca in La Paz Department, Bolivia.

Cassiterite is tin oxide, SnO_2, that is typically brown to black due to iron impurities. Cassiterite from Viloco forms as druses of highly lustrous crystals that are considered by collectors to be among the finest examples of the mineral species (figure 9). They too are usually brown to black, but very rarely the crystals are color zoned brown and light yellowish brown; the latter color is concentrated near the surface. The cut gems are most commonly light yellowish brown, but some bicolored brown and yellowish brown stones have also been faceted (figure 10). As part of a German foreign aid project, the Viloco miners have been instructed to separate out top-quality gem- and specimen-grade cassiterite rather than process it as ore. The gemstones are cut in Bolivia and marketed overseas. During a 2001 trip to Bolivia, this contributor saw hundreds of carats of faceted Viloco cassiterite.

According to R. Webster's *Gems* (5th ed., rev. by P. G.

Figure 8. Benitoite melee is now being faceted in full round brilliants with a consistent set of proportions. A range of colors is available, as shown here (0.07 ct each). Courtesy of Benitoite Mining Inc. and Iteco Inc.; photo by Robert Weldon.

Figure 9. This 9 ↔ 7 cm specimen with numerous partially transparent cassiterite crystals is from the Viloco mine in Bolivia. Photo by Jaroslav Hyrsl.

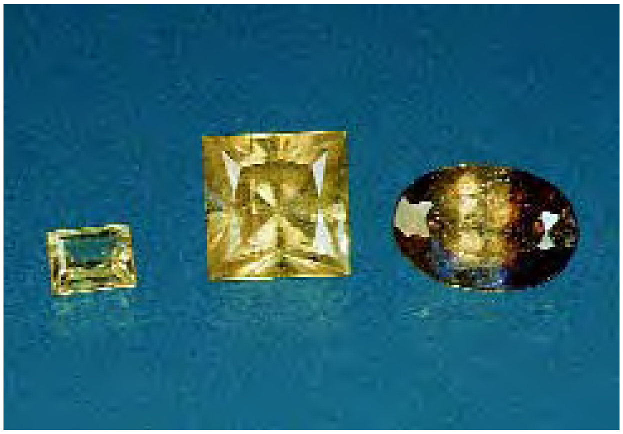

Figure 10. Faceted cassiterite from Viloco is typically light brownish yellow, although bicolored stones—similar to the oval on the far right—also are cut. The center stone weighs 11.77 ct; photo by Jaroslav Hyrsl.

Read, Butterworth-Heinemann, London, 1994), cassiterite is uniaxial with very high refractive indices—n_ω=2.003, n_ε=2.101—which are well over the limit of a standard refractometer. It also has very high dispersion (0.071, nearly twice that of diamond) and a hardness of 6.5 on the Mohs scale. Cassiterite has an extremely high specific gravity of about 7, so loose stones are easy to recognize by their heft. It shows no features with a hand spectroscope and is inert to UV radiation.

Due to its high birefringence (0.098), cassiterite is often faceted with the table perpendicular to the optic axis (similar to synthetic moissanite), so the facet edges do not appear blurred. Although near-colorless cassiterite is rare, it could be easily confused with synthetic moissanite. Like synthetic moissanite, it has high thermal conductivity, so it tests positive for "diamond" on conventional diamond testers. Cassiterite is electrically conductive, so it also will test positive for "moissanite" on some of the new synthetic moissanite testers. The best way to distinguish the two materials when set in jewelry is by microscopic examination of their inclusions. Parallel white or silvery needles are typical for synthetic moissanite, whereas virtually all cassiterites contain veils of two-phase inclusions. Cassiterite from Viloco also occasionally contains tourmaline needles (figure 11; probably dravite), as confirmed by X-ray diffraction analysis.

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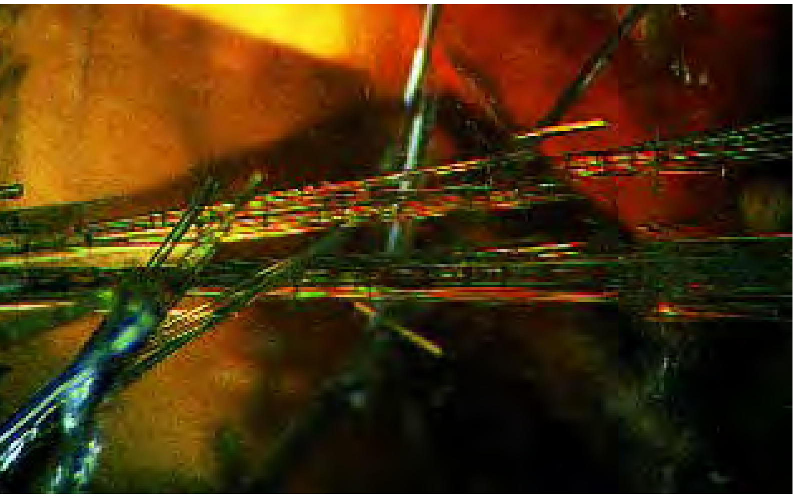
Figure 11. Tourmaline needles occur as inclusions in some cassiterites from Viloco. Photomicrograph by John I. Koivula; magnified 20↔.



Emerald with feldspar matrix from Brazil. While in Minas Gerais in summer 2001, this contributor encountered significant quantities of a new type of fashioned emerald from the Nova Era area. These cabochons consisted of irregular intergrowths of semitransparent emerald in a white matrix (figure 12). Only rarely were euhedral emerald crystals (i.e., with hexagonal cross sections) seen in the cabochons. Most of the white material showed well-developed cleavage, and X-ray diffraction analysis of one sample proved it was plagioclase (most probably andesine). Quartz was present only sporadically in the matrix, as small colorless grains without cleavage. Rough pieces of the emerald rock were surrounded by dark mica, probably phlogopite. Some of the polished stones also contained dark greenish brown flakes of mica. The specific gravity of five representative cabochons ranged from 2.67 to 2.74; it increased only slightly with emerald content. The emerald in the cabochons was inert to long- and short-wave UV radiation, and showed no reaction to the Chelsea filter.

A similar emerald matrix material is known from the Big Crabtree mine in North Carolina (see Summer 1993 Gem News, p. 132). In contrast to the new Brazilian material, however, the North Carolina cabochons contained well-formed emerald crystals in a granular quartz-feldspar matrix.

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Figure 12. These cabochons (here, up to 16 mm long) have been fashioned from irregular intergrowths of emerald and plagioclase found in Minas Gerais, Brazil. Photo by J. Hyrsl.

Sunstone feldspar from Tanzania. At the 2002 Tucson gems shows, Abe Suleman of Tuckman Mines and Minerals Ltd., Arusha, Tanzania, showed *G&G* editors a 7.88 ct sunstone from a new deposit in Tanzania (figure 13). He reported that the mining area covers several square kilometers in the vicinity of the village of Engare Naibor, northwest of Arusha, near the border with Kenya. The area, which is occupied predominantly by members of the Masaai tribe, is semi-arid and hilly. The feldspar reportedly is found in dolomitic layers, with mica schist and traces of calcite. The miners have dug several pits up to 4–5 m deep.

Production is inconsistent and hampered by the remoteness of the locality. Both faceted stones and cabochons (figure 14) are produced. The polished stones commonly attain weights up to 10 ct, although Mr. Suleman has cut cabochons as large as 125 ct.

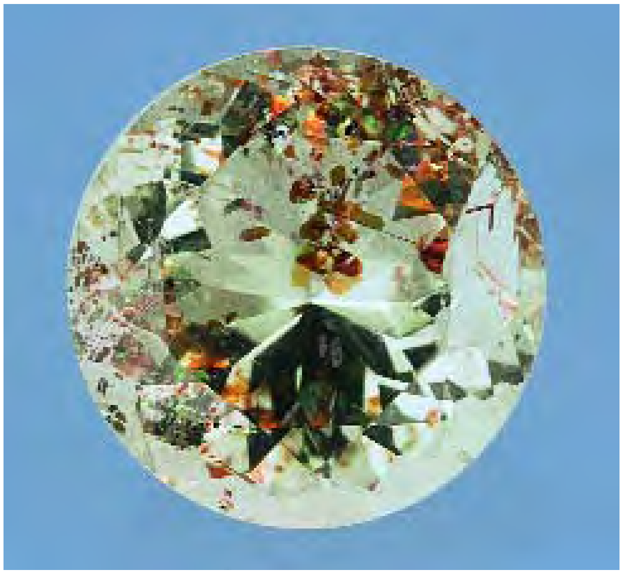


Figure 13. This 7.88 ct sunstone, from a new locality in Tanzania, contains conspicuous iridescent orange inclusions that were identified as hematite. Courtesy of Abe and Anisa Suleman; photo by Maha Tannous.

The 7.88 ct sunstone, which was donated to GIA by Abe and Anisa Suleman, was examined by Elizabeth Quinn of the GIA Gem Trade Laboratory in Carlsbad. The modified round brilliant was light grayish green with numerous eye-visible iridescent orange platelets (figures 15 and 16). Refractive indices of the stone were 1.537 and 1.547, and the specific gravity was 2.64; these properties are consistent with oligoclase feldspar. The orange inclusions were identified as hematite on the basis of laser Raman microspectrometry by GNI editor Brendan Laurs. Several near-colorless needles were identified as an amphibole, probably anthophyllite (again, see figure 15), also by Raman analysis. In addition, microscopic examination revealed lamellar twin planes and a fracture.

Figure 14. Abundant hematite platelets—some showing iridescence—are visible in this 20.81 ct cabochon of sunstone from Tanzania. Courtesy of Michael Randall, Gem Reflections, San Anselmo, California; photo by Robert Weldon.

Figure 15. The inclusion scene in the 7.88 ct sunstone consists of orange platelets of hematite and near-colorless needles of anthophyllite. Photomicrograph by John I. Koivula; magnified 10↔.

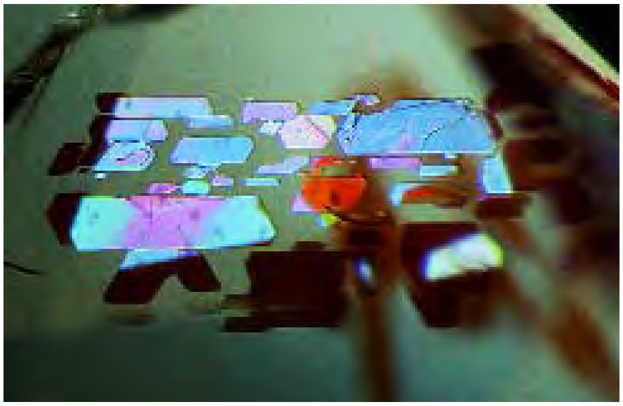
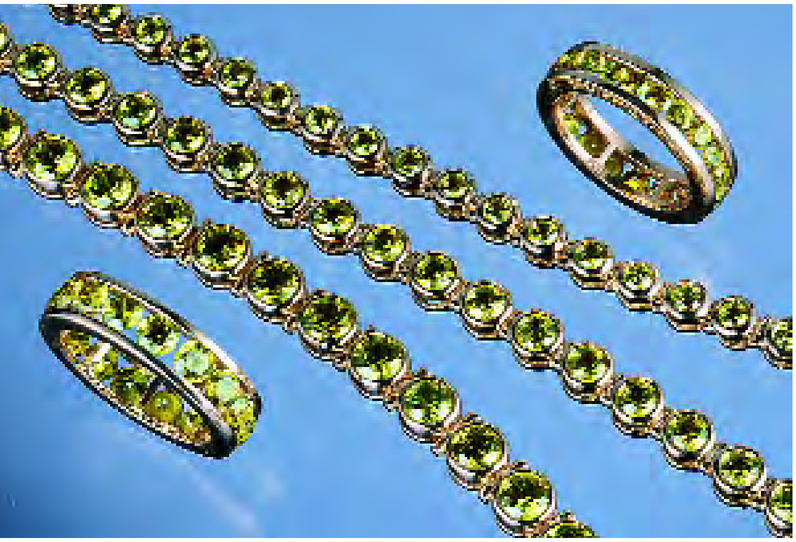


Figure 16. The iridescence displayed by the hematite inclusions in the 7.88 ct sunstone was particularly pronounced when a fiber-optic light was used in conjunction with the shadowing technique. Photomicrograph by John I. Koivula; magnified 15↔.

Update on Namibian demantoid garnet. At the 2002 Tucson shows, Chris Johnston, owner of Johnston-Namibia C.C. of Omaruru, Namibia, showed the *G&G* editors some attractive jewelry set with well-cut demantoid garnet in calibrated sizes (figure 17). To supplement the Fall 1997 (pp. 222–223) Gem News item on this material, Mr. Johnston provided the following information.

Demantoid from Namibia has been known since at least the 1930s, but the deposit lay idle until rediscovered by the gem trade in 1997. The mines are located in the Erongo Mountains area of west-central Namibia, between Omaruru and the small desert town of Usakos. The garnet is hosted by skarns (metamorphosed carbonate rocks) that are near the contacts with granitic rocks. Only near-surface, small-scale mining of these primary deposits has been done to date, with limited mechanized equipment. Most of the mining has taken place on Farm Tubussis off the Okombahe-Usakos road, near the small Damara village of Tubussis. Besides informal mining activities, currently there is one active mechanized operation, which markets the stones through Gem Demantoid Inc. of Bangkok, Thailand.

Figure 17. The Namibian demantoid in this 18K yellow/white gold jewelry was mined recently and cut to calibrated sizes ranging from 3 to 5 mm in diameter. Courtesy of Chris Johnston; photo by Maha Tannous.



Mr. Johnston estimates the total current production of demantoid at about 8 kg per month, of which 2 kg is gem quality, mostly in the 0.3–1 gram range. About 15% of the gem rough is top green color (i.e., without too much yellow/brown). Most of the cut goods he has sold range from 3 to 5 mm in diameter, in round, trillion, and oval shapes. He believes the market strength of this niche material is in melee and as accents in Art Deco- and Art Nouveau–style jewelry.

Unusual kyanite from Brazil. Brazil is one of the main sources of gem-quality kyanite. During the last few years, large quantities of kyanite crystals (some with facetable portions) were mined from the vicinity of Vitoria de Conquista in Bahia. The crystals can approach 10 cm long, and very rarely they exhibit unusual shapes that result from natural deformation (figure 18). The faceted stones typically range up to about 5 ct, although attractive gems over 50 ct have been cut. The crystals can show both blue and green areas; generally a strip of blue is seen along their length. A few bicolored stones have been faceted.

One of us (JH) observed some interesting inclusions in recently acquired green and bluish green kyanite from Brazil (probably also from the Vitoria de Conquista area). In two stones, light brown to orange-brown inclusions up to approximately 1 mm in diameter were identified as garnet by Raman analysis at GIA in Carlsbad (figure 19); it was not possible to establish the particular species. Associated with garnet in one sample were green tourmaline and irregular masses of colorless quartz, also identified by Raman analysis (figure 20). Flat, black crystals with a metallic luster were probably ilmenite.

The two samples with garnet inclusions were light yellow-green, with greenish yellow and bluish green pleochroism. Both stones had refractive indices of n_α = 1.718, n_β = 1.727, and n_γ = 1.734, yielding a birefringence of 0.016; both were biaxial negative. (Note that n_β was found by rotating the stones on the refractometer to find the direction of maximum birefringence [n_γ], and then rotating the polarizing filter.) Specific gravity values were 3.67 and 3.69; both stones were inert to UV radiation.

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Figure 19. Garnet forms conspicuous inclusions in these Brazilian kyanites (largest, 9.62 ct). Photo by Jaroslav Hyrsl.

South Sea cultured pearls with broken beads. The Gübelin Gem Lab recently examined a single-strand necklace composed of 25 South Sea cultured pearls (figure 21). When X-rayed, several of the pearls seen on the x-radiograph were revealed to contain beads with a series of dark lines. The owners later mentioned that those particular cultured pearls were very difficult to drill, with several drill bits broken in the process.

At the CIBJO conference held in Munich, Germany, last March, Shigeru Akamatsu of K. Mikimoto & Co. Ltd. (Tokyo, Japan) announced that a new type of bead was being used to nucleate larger South Sea cultured pearls. These beads were fashioned from the shell of the giant clam (*Tridacna gigas*). He indicated that massive amounts of this abundant shell material were being used to produce large-diameter beads (i.e., 8+ mm), which are reportedly manufactured at Chinese factories on Hainan Island (S. Akamatsu, pers. comm., July 2002). It is difficult to obtain large-diameter beads from the Mississippi freshwater mollusks that are typically used for South Sea cultured pearls because of their size. Mr. Akamatsu noted, however, that the beads derived from giant clam shells have an inherent problem: They tend to break during the drilling process.

This necklace contains the first examples seen by the Gübelin lab of large South Sea cultured pearls with broken beads. It is not known what effect these broken beads may have on the long-term durability of the cultured pearls. With the large quantities of these beads that are reportedly being used, it can be expected that more such cultured pearls will be encountered in the future.

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Figure 18. These kyanite crystals from Brazil were deformed by natural forces. Portions of the crystals are transparent enough to be faceted. The largest crystal here is 5 cm long; photo by Jaroslav Hyrsl.

Figure 20. An unusual inclusion assemblage of orange-brown garnet, colorless quartz, and green tourmaline is present in this kyanite from Brazil. Photomicrograph by John I. Koivula; magnified 15×.

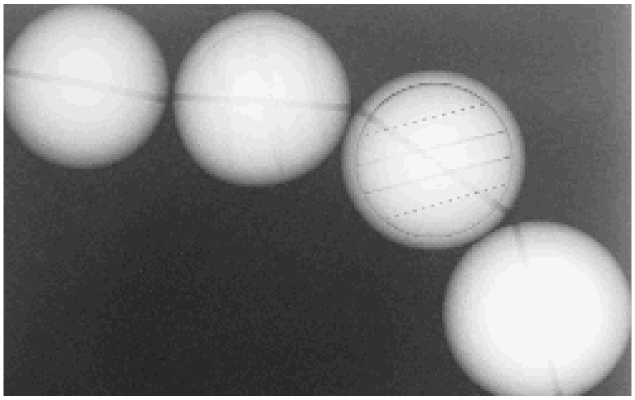

Figure 21. This necklace of South Sea cultured pearls (16.25–19.40 mm) contained several broken shell beads. The X-radiograph clearly shows a series of parallel breaks in two of the beads. In one of these, the breaks are visible as a series of sharp lines because they are parallel to the viewing direction; in the other, the breaks appear as elliptical areas because they are inclined to the viewing direction. These cultured pearls apparently contain a new type of bead, made with the shell of the giant clam. Photo by Franzisca Imfeld.

Some developments in freshwater cultured and "keshi" pearls. At the AGTA show in Tucson last February, this contributor noticed some eye-catching freshwater cultured pearls. Betty Sue King of King's Ransom (Sausalito, California) had some of the popular cross-shaped tissue-nucleated cultured pearls in dramatic strands that were aptly marketed as "spikes" (figure 22). The individual crosses averaged approximately 45 ↔ 25 mm, and were available in white, pink to orangy pink, grayish pink to purple, and multicolored, as well as dyed "silver"-gray to black. Ms. King indicated that naturally colored cultured pearls are used to produce the dyed colors, since they accept the dye better than the white ones. Although large amounts of low- to medium-quality material are on the market, the higher-quality cultured pearls—with smooth surfaces, even luster, and perpendicular cross members—are available only in limited quantities.

Figure 22. Strung together, these cross-shaped tissue-nucleated cultured pearls resemble a crown of thorns, and are marketed as "spikes." Their dimensions average approximately 45 ↔ 25 mm. Courtesy of King's Ransom; photo by Maha Tannous.

Ms. King also had pink Chinese freshwater cultured pearls that were nucleated with square-to-rectangular shell preforms. They measured approximately 25–20 mm on a side, with rounded corners. Their surfaces varied from smooth to wavy or welted, with high luster and very high orient.

Distinctive shapes of freshwater "keshi" pearls were seen at Adachi America Corp., Los Angeles (figure 23). The pink to light purple "butterfly keshi" resembled two thick flakes or "wings" attached at the edges. A similar-appearing white product was named "snowflake keshi." Other names include "keshi twins" and "flowering keshi." Another freshwater keshi product, which Sayoko Adachi called "puka pearls," took the form of wavy, wafer-thin disks, which were available in natural cream to brown, brownish green to greenish brown, and pink. In strands, they resembled a puka shell necklace. Both the butterfly and "puka" products, which measured about 11 mm in longest dimension, are non-nucleated by-products of the freshwater pearl culturing industry in Shanghai, China; they result from spontaneous growth after a harvest of tissue-nucleated cultured pearls. An Adachi representative reported that due to the popularity of the "puka" material, pearl farmers are now attempting to nucleate this shape.

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New sapphire locality in Afghanistan. At the 2002 Tucson shows, Dudley Blauwet of Dudley Blauwet Gems, Louisville, Colorado, showed GNI editor Brendan Laurs two sapphires (0.40 and 0.72 ct; figure 24) that were reportedly mined from Medan Khar, in Vardak Province west of Kabul. Small-scale mining of the deposit started in late October 2001. During a trip to Pakistan in June 2002, Mr. Blauwet learned that at least 2 kg of rough had been produced. Approximately 1,000 carats have been cut so far, with the largest stones reaching approximately 2 ct. Almost all of the faceted stones were being sold into the local market in Peshawar.

Examination of the two sapphires by Elizabeth Quinn at the GIA Gem Trade Laboratory in Carlsbad yielded the following properties: Color—dark blue to very dark blue; pleochroism—blue and bluish green; R.I.—n_ω=1.772, n_ε=1.764; birefringence—0.008; S.G.—3.98, 4.03; inert to long- and short-wave UV radiation; and iron absorption bands at approximately 450, 460, and 470 nm seen with the desk-model spectroscope. These properties are consistent with those typically found in blue sapphires. Microscopic examination revealed lamellar twin planes, needles, clouds, feathers, "fingerprints," and straight (planar) color zoning. No evidence of heat treatment was seen.

Figure 23. These freshwater "keshi" pearls have distinctive butterfly and puka shell shapes. The "butterfly" cultured pearls are approximately 11 mm in longest dimension. Courtesy of Adachi America Corp.; photo by Maha Tannous.

Elbaite-liddicoatite tourmaline from Vietnam. In the process of researching potential liddicoatite localities for the Spring 2002 *G&G* article on this tourmaline (see D. M. Dirlam et al., "Liddicoatite tourmaline from Anjanabonoina, Madagascar," pp. 28–53), one of these contributors (BL) borrowed an attractive slice of Vietnamese tourmaline from the collection of William Larson of Fallbrook, California. The slice showed the red trigonal star that is so commonly seen in liddicoatite-elbaite from Madagascar (figure 25), and electron-microprobe analysis of the red area by one of these contributors (WS) confirmed the presence of liddicoatite (see table A-1 of the Dirlam et al. article). Since descriptions of gem-quality tourmaline from Vietnam are scarce in the literature, this GNI report will describe the sample in more detail.

As seen in figure 25, the slice was complexly zoned with an overall yellowish green rim and pink-to-red core, which is typical of "watermelon" tourmaline. Portions of the sample showed "aggregate"-type color zoning (see F. Benesch, *Der Turmalin*, Verlag Urachhaus, Stuttgart, Germany, 1990), but the most conspicuous feature was the red trigonal star mentioned above. Refractive indices of a representative portion of the red area were n_ω=1.647 and n_ε=1.625 (birefringence 0.022); by comparison, R.I. readings of the pink area yielded n_ω=1.641 and n_ε=1.623 (birefringence 0.018), and the yellowish green rim had n_ω=1.640 and n_ε=1.620 (birefringence 0.020). As mentioned in the Dirlam et al. article, the measurement of birefringence on tourmaline slices cut perpendicular to the c-axis may be related to biaxial domains within the crystal. When the slice was viewed parallel to the c-axis with a polariscope, anomalous double refraction was prevalent.

The pink-to-red tourmaline was inert to long- and short-wave UV radiation, whereas the yellowish green rim showed weak yellow-green fluorescence to short-wave UV. Microscopic examination revealed a network of

Figure 24. These two sapphires (0.40 and 0.72 ct) were reportedly mined from a new locality in Afghanistan, west of Kabul in Vardak Province. Courtesy of Dudley Blauwet Gems; photo by Maha Tannous.

Figure 25. This tourmaline slice from Vietnam (5.5 ↔ 4.1 cm) resembles liddicoatite from Madagascar, but was found to consist mainly of Ca-rich elbaite. Courtesy of William Larson; photo by Maha Tannous.

abundant partially healed fractures, as well as growth structures (or "graining") in directions parallel to the color zoning. Solid inclusions consisted of two white equant crystals that resembled albite, and a minute spherical brown particle.

The slice was analyzed by electron microprobe along two traverses: one starting in the core and following the dominant red zone to the yellowish green rim, and the other perpendicular to this (from rim to rim). Of 29 points that yielded quantitative data, one analysis—in the red zone, approximately halfway between the core and rim—corresponded to liddicoatite, with Ca/(Ca+Na) = 0.51. The other analyses revealed Ca-rich elbaite, with Ca/(Ca+Na) = 0.34–0.48. There were no systematic correlations between Ca content and color. However, the chromophoric elements Mn, Fe, and Ti did vary with color, as expected. Average values (in wt.%) were: Red = 0.12 FeO, 1.91 MnO, and 0.04 TiO_2; pink = 0.23 FeO, 0.91 MnO, 0.03 TiO_2; and yellowish green = 0.53 FeO, 0.44 MnO, 0.07 TiO_2. No other chromophoric elements (i.e., Cr, V, or Cu) were detected.

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Green zoisite reappears. Gem-quality green zoisite from the Merelani area in Tanzania reappeared at the 2002 Tucson gem shows this year after a 10-year hiatus (figure 26). This unusual color variety of zoisite was first discovered in Tanzania in 1991. Like some emeralds, it derives its color from trace amounts of chromium and vanadium (see N. R. Barot and E. W. Boehm, "Gem-quality green zoisite," Spring 1992 *Gems & Gemology*, pp. 4–15). As described by Barot and Boehm, "pure" green zoisite does not respond to heat treatment, whereas bluish green and yellowish or brownish green material typically will become a more saturated "steel" blue or greenish blue when subjected to temperatures above 600°C.

According to Tom Schneider (of Thomas M. Schneider, San Diego, California), several kilograms of green to bluish green rough became available just before the 2002 Tucson show. Most of the rough weighed approximately 1 gram and yielded cut stones of 2 ct or less. No new production has entered the market since then, although miners are again quite active in the Merelani region.

Aside from the original 1991 find and this most recent production from Merelani, this contributor knows of only one other discovery of green zoisite—in Pakistan in the early 1990s—which produced less than half a kilogram of rough and some attractive crystals (see Winter 1992 Gem News, pp. 275–276).

Also at this year's Tucson shows, zoisite rough exhibiting combinations of colors that may be seen in this gem material—green, blue, purple, and even pink—appeared more prevalent than in previous years (see, e.g., Spring

Figure 26. This 12.33 ct bluish green zoisite from the recent production at Merelani, Tanzania, was fashioned from a 32 ct piece of rough by Meg Berry. The characteristic distinct pleochroism of zoisite is quite evident. Courtesy of JOEB Enterprises and Pala International (Fallbrook, California); photo by Maha Tannous.

Figure 27. These three cabochons (up to 1.5 ct) were identified as massive fuchsite. This material has been sold as emerald in India. Courtesy of Shyamala Fernandes; photo by H. A. Hänni.

1993 Gem News, pp. 61 and 63). This material was sold as "Mardi Gras tanzanite" by some dealers.

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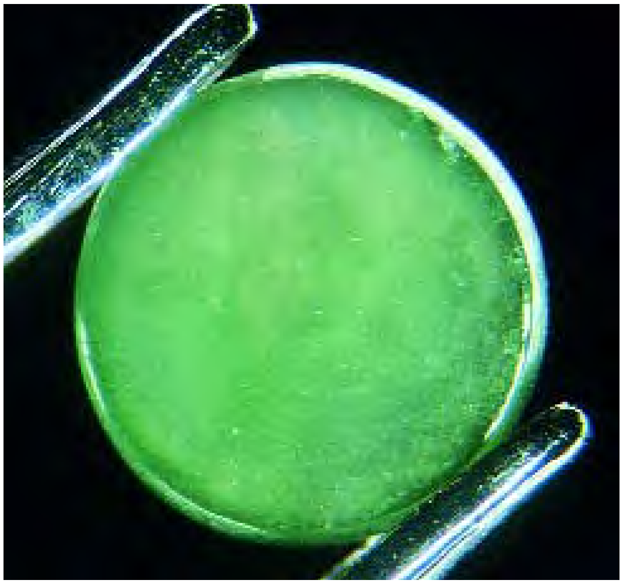

Figure 29. A green rim of higher saturation is visible through the polished base of this massive fuchsite cabochon (5.5 mm in diameter). The stone was probably treated with green oil. Photo by H. A. Hänni.

SYNTHETICS AND SIMULANTS

Massive fuchsite imitations of emerald. Recently Shyamala Fernandes of the Gem Testing Laboratory in Jaipur, India, asked this contributor for assistance with identifying three translucent green cabochons (figure 27) that are representative of material that is sometimes sold as emerald in that country. Certain aspects of their appearance were quite unlike emerald, however: A granular to flaky structure was visible with magnification, and the material appeared to be composed of more than one mineral that showed different tones of green (figure 28).

Figure 28. Microscopic examination of the massive fuchsite revealed an aggregate of crystals in different orientations, resulting in various tones of green. Photomicrograph by H. A. Hänni; magnified 50↔.

The specific gravity of the cabochons (measured together, due to their rather small size) was 2.89, and their refractive index was 1.58 (approximate value only, due to the shape of the cabochons and their polycrystalline structure). Since these results were not satisfactory for identification, the samples were studied by advanced techniques.

Raman analysis of five spots that showed various tones of green identified only muscovite. To investigate the cause of the green color, the samples were analyzed by EDXRF spectrometry, which revealed major amounts of Si, Al, and K, and minor amounts of Ca, Rb, Sr, Fe, and Cr. The presence of Cr was consistent with the green color of this mica, which we identified as the fuchsite variety. The texture of the mineral aggregate, with the strongly pleochroic crystals in various orientations, caused the appearance of different tones of green (again, see figure 28). The cabochons also contained rare orange and white grains, which were identified by Raman analysis as rutile and dolomite, respectively.

Examination of the flat polished base of one of the cabochons revealed a rim of higher green saturation (figure 29), which suggests that green Joban oil was present. FTIR spectroscopy confirmed the presence of an oil.

Fuchsite is typically found included in quartz (aventurine), but less commonly it forms in nearly monomineralic aggregates. A similar material—verdite—is a metamorphic rock that is composed of fuchsite and traces of rutile; it was originally found in South Africa (J. A. Jackson, Ed., *Glossary of Geology*, 4th ed., American Geological Institute, Alexandria, Virginia, 1997, p. 699). Similar fuch-

Figure 30. These two flux-grown synthetic rubies (7.61 and 4.49 ct) had an unusual combination of properties, including trace-element contents that have not been recorded previously. Photo by H. Hänni.

site-rich ornamental rocks have since been found in several world localities (see R. Webster, *Gems*, 5th ed., rev. by P. G. Read, Butterworth-Heinemann, Oxford, England, 1994, p. 383). The origin of the material used to fashion these particular cabochons is unknown. *HAH*

Unusual synthetic rubies. Recently, the SSEF and Gübelin laboratories examined three unusual synthetic rubies weighing 3.21, 4.49, and 7.61 ct (see, e.g., figure 30). With magnification, all showed flux remnants along healed fissures (figure 31) as well as linear trails of pinpoint inclusions (figure 32). An analysis of the internal growth structures revealed dominant bipyramidal and rhombohedral growth planes *n-r-n*. In addition, one of the stones also had incomplete twin planes along the positive rhombohedron *r* {1011}. Semi-quantitative chemical analysis by EDXRF revealed 0.54–0.92 wt.% Cr_2O_3, 0.06–0.11 wt.% Fe_2O_3, and 0.01–0.03 wt.% Ga_2O_3. Titanium and vanadium were at or below detection limits. In addition to these elements, traces of zirconium (0.02–0.03 wt.% ZrO_2) also were measured, which did not relate to inclusions visible with a standard gemological microscope. No other heavy elements were detected.

The presence of the flux remnants, together with the internal growth structures and trace-element concentrations, confirmed that these three stones were flux-grown synthetic rubies. However, the combination of these characteristics is not wholly consistent with the features seen in the more familiar flux-grown synthetic rubies. Similar forms of pinpoint stringers, commonly referred to as "rain," are generally associated with the Kashan product, and may be encountered in some flux-grown synthetic rubies from other producers such as Douros. The dominant *n-r-n* growth structures are typical of flux-grown synthetic rubies from a variety of producers, such as Ramaura, Douros, and Kashan. Nevertheless, zirconium has not been recorded in any commercial flux-grown synthetic rubies (i.e., by Chatham, Douros, Kashan, Knischka, or Ramaura, or in the experimental flux-grown synthetic rubies by Gilson). Zirconium has been recorded on occasion in natural rubies, but it always coincided with zircon crystals located at or just below the surface of the area being analyzed. In addition, the presence of iron and gallium, combined with the lack of titanium and vanadium, is uncommon in various flux-grown synthetic rubies. Heavy elements such as lead or tungsten, which would be expected in the synthetic rubies

Figure 31. This partially healed fracture contains a network of flux inclusions that is typical of those seen in most flux-grown synthetic rubies. Fracturing of the flux remnants gives them an appearance similar to crazing. Photomicrograph by Christopher P. Smith; magnified 30↔.

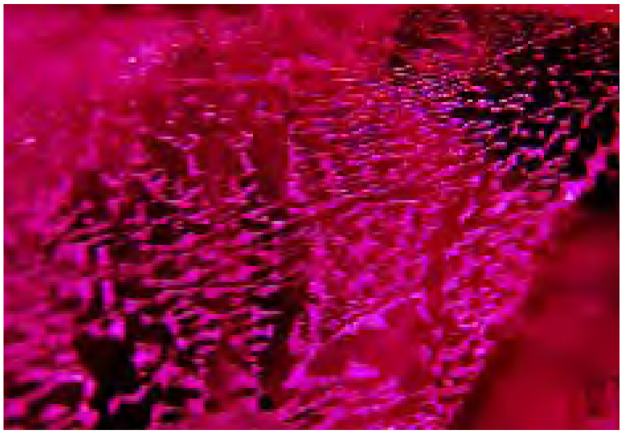

Figure 32. Very fine, parallel to subparallel stringers of pinpoints also were visible in the unusual flux-grown synthetic rubies. Photomicrograph by Christopher P. Smith; magnified 18↔.

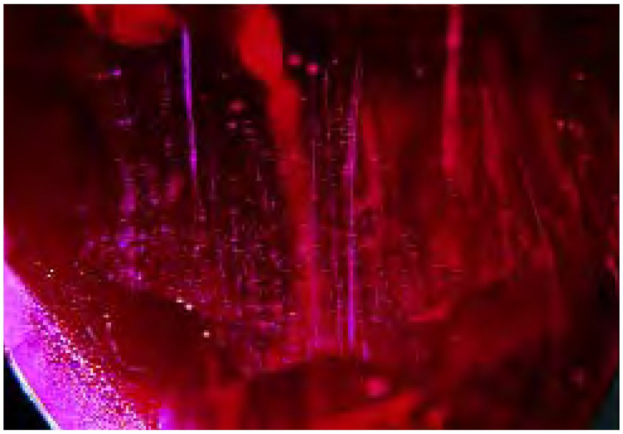

Figure 33. This 45.45 ct rutile with man-made asterism shows an 11-rayed asymmetric star with incomplete arms. Some of the arms also are split at the outer region of the cabochon. The star is sharp, but the stone appears fuzzy because the camera is focused below *the cabochon's curved upper surface. Photo by M. Glas.*

Figure 34. This yellowish brown, slightly translucent tourmaline (13.14 ct) with man-made asterism displays a 12-rayed, asymmetric star with additional "satellite" lines in the center of the sample. As in figure 33, the stone appears fuzzy (and the star sharp) because the camera is focused below the upper surface of the cabochon. Photo by M. Glas.

from Chatham, Douros, or Ramaura, were not detected.

Only once before, in October 2001, has the Gübelin Gem Lab encountered a synthetic flux-grown ruby that contained Zr. The other properties and characteristics of that stone were also similar to the three samples described here. Since it is difficult to explain how Zr would be incorporated into the corundum structure, we presume that it was related to the presence of submicroscopic particles in those four synthetic ruby samples.

It is unclear at this time whether these synthetic rubies represent a new product. Regardless, the identification of these unusual synthetics is easily accomplished through careful observation of the flux inclusions with a loupe or microscope. Chemical analysis will also reveal traces of zirconium, as well as distinctive trace-element patterns.

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TREATMENTS

Another identification criterion for imitation asterism produced by surface scratching. Oriented, man-made scratches on the upper surface of cabochons have recently been described as the cause of fake asterism in several gem varieties (see articles by S. F. McClure and J. I. Koivula, Summer 2001 *Gems & Gemology*, pp. 124–128; and K. Schmetzer and M. P. Steinbach, *Journal of Gemmology*, Vol. 28, No. 1, 2002, pp. 41–42). This man-made asterism can be easily recognized by several factors: the absence of oriented, needle-like inclusions; the presence of oriented scratches on the surface; incomplete arms on the stars; irregular splitting or misoriented "satellite" arms; somewhat curved or asymmetric rays; and/or extra rays or a number that is inconsistent with the symmetry of the mineral. These observations suggest the cabochons are scratched using a non-automatic (manual) production process without complex equipment. Most probably, the technique is similar to that described in 1950 by R. S. Mukai in U.S. Patent 2,511,510 (see K. Schmetzer, "Production of fake asterism," *Journal of Gemmology*, Vol. 28, No. 2, 2002, pp. 109–110).

While photographing some of these cabochons, we noticed another factor that also might be helpful for identifying the man-made asterism: The stars appeared sharpest when the camera was focused *below* the curved upper surface of the cabochons (figures 33 and 34). We noted this characteristic in all seven of the cabochons that were available to us (i.e., three rutiles, two pyrope-almandine garnets, and two tourmalines). In contrast, cabochons with natural asterism—such as ruby, sapphire, garnet, quartz, or spinel that contain oriented needle- or rod-like inclusions—have stars that appear sharpest when the camera is focused *above* the curved upper surface. These differences in asterism also can be readily seen with the gemological microscope. This technique is particularly helpful in examining very dark or opaque samples in which the asterism-causing inclusions may be difficult to see, as well as for gems (such as quartz) that commonly contain needles too small to observe with the gemological microscope.

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Figure 35. This 9.84 ct irradiated fluorite appears deep blue in daylight-equivalent fluorescent light (as shown here) and purple in incandescent light. Photo by Maha Tannous.

Irradiated color-change fluorite. At the Tucson 2002 AGTA show, this contributor noticed a small group of attractive irradiated blue fluorites at the booth of MCM Gems, Middletown, Ohio. The rough was reportedly obtained from the Tres Barras mine in Minas Gerais, Brazil, and was light yellow before gamma irradiation. This material was observed to show a color-change: deep blue in daylight-equivalent fluorescent light and purple in incandescent light.

Standard gemological testing of a 9.84 ct oval modified brilliant (figure 35) yielded the following properties, which are consistent with fluorite: R.I.—1.431, S.G.—3.19, inert to long- and short-wave UV radiation, moderate anomalous double refraction, 570 nm band observed with a desk-model spectroscope, and a red appearance with a Chelsea filter. Microscopic examination revealed numerous two-phase inclusions, a few cleavage fractures, and patchy blue color concentrations. No fade testing was conducted. However, the color appeared stable in several pieces that were on display for the duration of the show.

The irradiation of fluorite has been performed for many years, but it is interesting to find irradiated fluorite with an attractive blue color and a color change.

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ANNOUNCEMENTS

Now available: *extraLapis English*. Selected issues of the popular German periodical *extraLapis* are being translated into English and published by Lapis International LLC, East Hampton, Connecticut. Issue 1, "Madagascar," was published in 2001, and Issue 2, "Emeralds of the World," has just been released. Call 860-257-1512, fax 860-267-7225, or visit www.lapisint.com.

Conferences

Natural Glasses. Scheduled to be held in Lyon, France, on August 29–31, this fourth international congress will include presentations on materials such as obsidian, fulgurite, Libyan desert glass, meteorite glasses, and others. Call 33-04-7243-1037, fax 33-04-7243-1261, or e-mail natglasses.info@adm.univ-lyon1.fr, or visit http://natglasses.univ-lyon1.fr.

Diamond 2002. The 13th European Conference on Diamond, Diamond-like Materials, Carbon Nanotubes, Nitrides & Silicon Carbide will take place September 8–13 at the Granada Conference and Exhibition Centre, Granada, Spain. Sessions will cover diamond growth, optical properties, and mechanical applications and properties of diamond and other superhard materials. Visit http://www.diamond-conference.com, or contact Gill Heaton at diamond@heaton-connexion.co.uk, 44-0-1865-373625 (phone), 44-0-1865-375855 (fax).

Hong Kong Jewellery and Watch Fair. To be held September 25–29 at the Hong Kong Convention and Exhibition Centre in Wanchai, this show will feature educational seminars from leading gemological laboratories, as well as auctions of fine South Sea and Tahitian cultured pearls September 22–27. For more information, visit http://www.jewellery-net-asia.com.

Exhibits

***Pearls* exhibit at the Field Museum.** The comprehensive *Pearls* exhibition that debuted at the American Museum of Natural History in New York (see Winter 2001 GNI section, pp. 341–342) is now at Chicago's Field Museum until January 5, 2003. A weekly lecture series will complement the exhibit. Visit http://www.fmnh.org/pearls.

Diamond exhibition in Antwerp. The Antwerp Diamond Council (HRD) will present the exhibition "Living Diamonds—Fauna and Flora in Diamond Jewellery Until 1960" October 10–November 10 at the new Diamond Museum of Antwerp. The exhibition will illustrate animal and plant motifs in diamond jewelry from leading auction houses, jewelers, museums, and private collectors. Visit www.diamonds.be/hotnews, e-mail info@diamant.provant.be, or call 32-03-202-4890.