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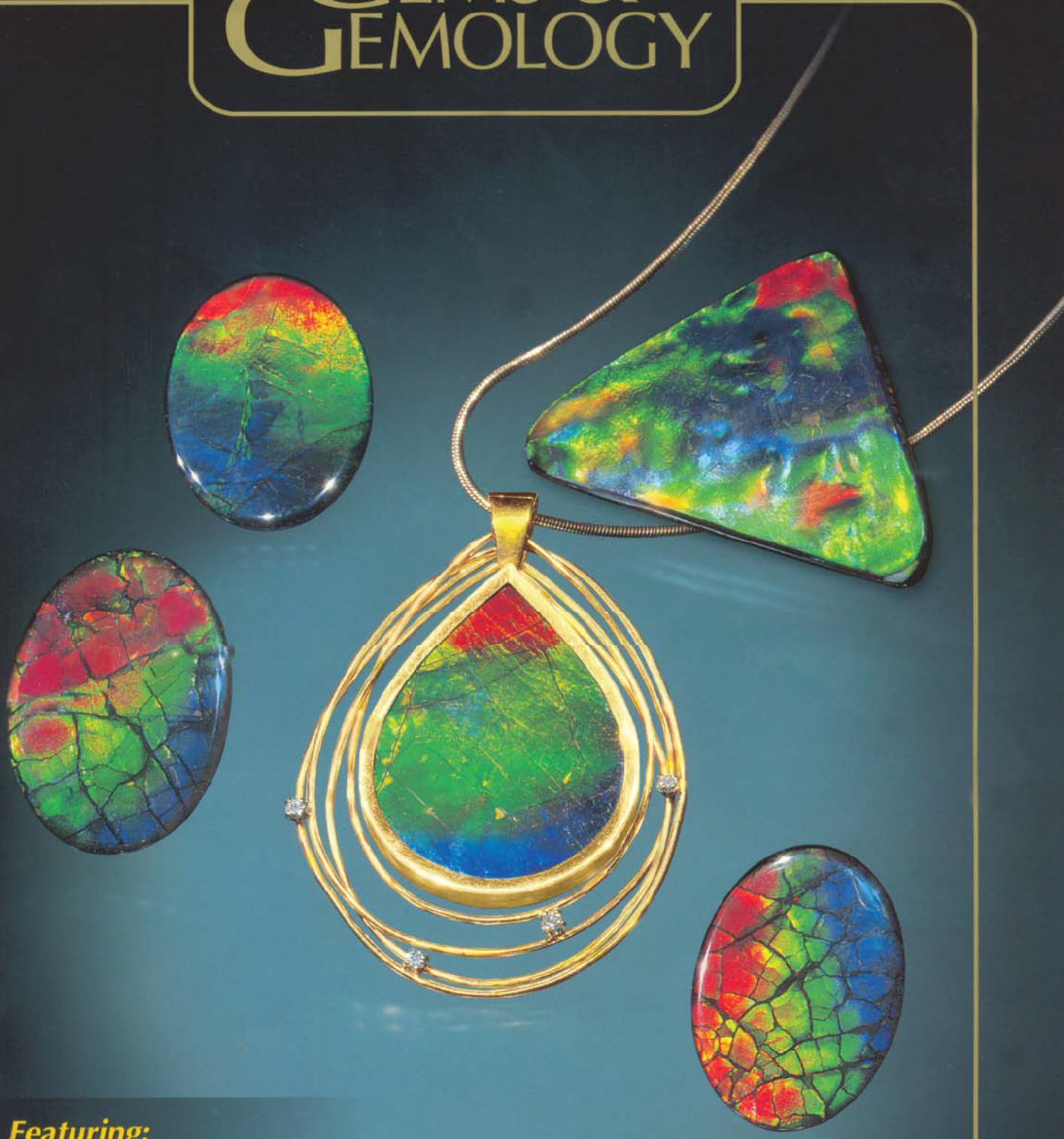
# GEMS & GEMOLOGY

Spring 2001



**Featuring:**

***Ammolite . . . Argyle Diamond Deposit***

***Synthetic Red Beryl . . . Tucson Report***

THE QUARTERLY JOURNAL OF THE GEMOLOGICAL INSTITUTE OF AMERICA

*Figure 12. These attractive opals originated from the Banten area of West Java, Indonesia. Clockwise from the top, the samples weigh 48.04, 7.03, 2.55, 2.64, and 11.30 ct. Courtesy of Pelangí-Dharma Mulia; photo by Elizabeth Schrader.*

beads (both polished and faceted), Mr. Lennon had numerous freeform cabochons as well as a few faceted stones. All of the stones were hand polished in India.

**"Yosemite" topaz.** Its general lack of brilliance in faceted form relegates colorless topaz to the status of a less-than-popular gem material. It is now routinely irradiated and heated to create a more desirable blue color, but is rarely used in its natural colorless state. This year, however, we saw a beautiful exception to this rule. The 59.73 ct colorless topaz shown in figure 14 was among the small works of natural gem art on display in Tucson.

The lapidary, Kevin Lane Smith of Tucson, took advantage of the natural surface etching on this topaz.

*Figure 13. Significant quantities of attractive prehnite reappeared in Tucson this year. The largest stone shown here weighs 28.61 ct, and the pear shape weighs 15.32 ct. Courtesy of Jayrock; photo by Maha Tannous.*

The result is a dramatic natural art scene that looks like a landscape you might see in California's Yosemite National Park.

The Winter 1996 Gem News (p. 283) also featured naturally etched scenes that were incorporated into fashioned quartz and beryl. However, this is the first time we have seen colorless topaz used in this creative manner.

*John I. Koivula and Maha Tannous*

**Colored tourmaline from northern Pakistan.** Large quantities of gem tourmaline have been produced in Afghanistan, but thus far neighboring Pakistan has yielded little of this popular gem mineral for faceting. The country's most prolific pegmatites, in the Gilgit-Skardu area of northern Pakistan, typically produce aquamarine, brownish topaz, and schorl, although some deposits also have green and bicolored pink-green tourmaline crystals that are typically too included for faceting. Lesser-known pegmatites in the Azad Kashmir area yield spessartine garnet and some colored tourmaline. Another pegmatite district in the Chitral area has produced mainly aquamarine. (For an overview of these pegmatite deposits, see A. H. Kazmi and M. O'Donoghue, *Gemstones of Pakistan—Geology and Gemmology*, Gemstone Corporation of Pakistan, Peshawar, 1990).

Recently, some unusual gemmy yellow to greenish yellow tourmalines were mined in northern Pakistan, in the vicinity of the world's ninth highest mountain, Nanga Parbat (8,125 m/26,657 feet). We know of two dealers who were carrying this material in Tucson—Dudley Blauwet at the TGMS show and Syed Iftikhar Hussain in the Best Western Executive Inn. During a recent buying trip to Pakistan, Mr. Blauwet told us, he saw small parcels of yellow (see, e.g., figure 15), light pink, and bicolored green-pink tourmaline, reportedly from new deposits northeast of Nanga Parbat between Astor and the Raikot Bridge, which is on the Karakorum Highway. A few of the crystals were transparent enough for faceting. Mr. Hussain had 2–3 kg of greenish yellow to yellowish green tourmalines from this area that were mined in July and August 2000 (see, e.g., figure 16). Most were cabochon-grade, although some were facetable. The largest crystals recovered reportedly were up to about 7 cm. Gemological properties measured on one 16.07 ct crystal by GNI editor Brendan Laurs are as follows: color—yellow-green to green-yellow, R.I.—1.63 (spot), S.G. (measured hydrostatically)—3.09, inert to short- and long-wave UV radiation, and inclusions consisting of partially healed fractures, "feathers," and dust-like clouds.

Although quantities of colored tourmaline from Pakistan remain limited so far, pegmatites in the Astor–Raikot Bridge area show interesting potential for future gem production.

**Fashioning the "Green King of Africa" tsavorite.** Recently a remarkable suite of tsavorites was faceted from a single piece of rough, just in time for the Tucson show. This entry

provides some background on the difficult decisions faced by the cutter when dealing with large rough such as this.

Late in December 2000, a miner offered this contributor a 192 ct piece of tsavorite that was reportedly found in the tailings of the old Titus tsavorite mine in Tanzania. The stone had a heavily included and cracked surface, and appeared at first glance to have only a small central portion of facetable quality. If the rough was sawn in the directions shown in figure 17, the miner estimated, it could produce a single 12 ct cushion-cut gem and about 20–30 carats of smaller, lower-quality stones.

However, this contributor suspected that the rough had a much larger gem concealed within. After purchasing the stone, business partner Avi Meirom and I began a series of examinations which included immersing the stone in baby oil, tea, and at one point, a glass of whiskey. The cracks on the surface of the rough were misleading, because they did not penetrate the full depth of the stone. Therefore, we decided to saw the stone in entirely different directions from those proposed by the miner. We believed that the largest gem-quality portion was on the area seen on the left of side A in figure 18 (also seen in the lower part of side B). To liberate this area for cutting, three sawcuts would be needed (A, B, and C), each penetrating just part way into the stone (figure 19). Additional cuts were required to obtain the other gemmy portions. Cuts A and B were done with a very thin saw blade (0.1 mm) at relatively low speed with plenty of water. The blade was actually bent slightly along the major crack in the B direction.

After slicing and preshaping, we obtained a clean cushion preform weighing 28.8 ct. Final faceting yielded an exceptional 23.23 ct gemstone (figure 20). The rough also yielded a 6.80 ct pear and 18.32 carats of other gems weighing 1–3 ct. The total yield of the 192 ct piece of tsavorite rough was 41.50 ct, or 21.6%.

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**Highlights from the TGMS Show and Mineralogical Symposium.** As part of the four-day TGMS show, the Friends of Mineralogy, the Tucson Gem and Mineral Society, and the Mineralogical Society of America host an annual mineral symposium. The purpose of the symposium is to bring together amateur collectors and professional mineralogists to exchange information—this year, on Russian gems and minerals. Abstracts were published in the January-February 2001 issue of the *Mineralogical Record*.

The following presentations contained interesting gemological information. Dr. Dmitry Belakovsky, curator of the Fersman Mineralogical Museum in Moscow, provided an overview of famous localities—past, present, and future. He focused on two notable periods of collecting: In the middle of the 18th century, the great Siberian expeditions found aquamarine, tourmaline, heliodor, and topaz. Then, in the second quarter of the 20th century, geologic

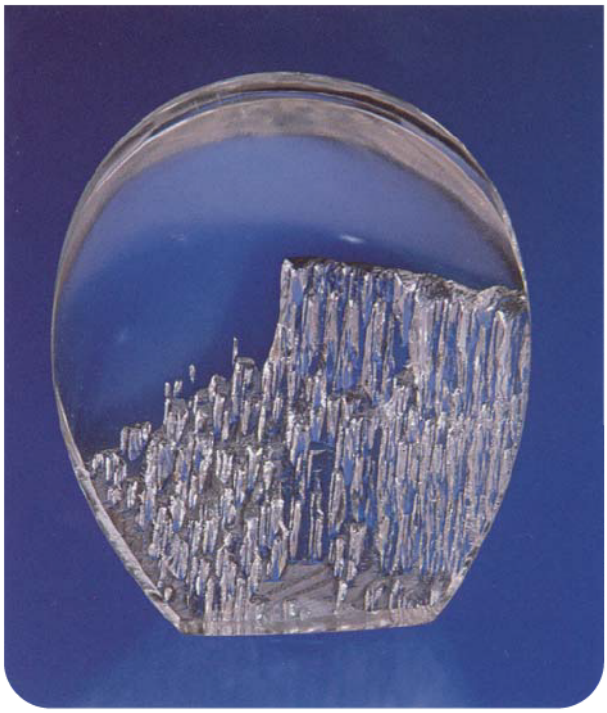

*Figure 14. The natural etch patterns on the surface of this polished topaz (32.67 × 25.0 × 7.1 mm) produce a scene reminiscent of Yosemite National Park. Photo by Maha Tannous.*

expeditions to the northern Ural Mountains and Siberia, the Central Asian Republics, and the Kola Peninsula located more gem and mineral deposits. As a result, about 200 important mineral localities are known in the former Soviet Union. Dr. Belakovsky concluded by pointing out that military and economic collapse have resulted in the closure of many important localities. In addition, the complications of mining licenses and export requirements make it difficult to export gems and minerals today.

An interesting talk authored by Drs. William (Skip) Simmons, Karen Webber, and Alexander Falster of the University of New Orleans focused on tourmaline from the Malkhanskiy pegmatite district of the Transbaikal region of south-central Siberia. Seven pegmatites are currently being mined for rubellite and polychrome

*Figure 15. Yellow tourmaline crystals such as this one (5.1 cm long) were recently mined from a new area in northern Pakistan. Photo by Dudley Blauwet.*

*Figure 16. Northern Pakistan is also the source of these yellowish green tourmalines. The largest crystal measures 3.5 cm tall. Courtesy of Syed Trading Co.; photo by Jeff Scovil.*

tourmaline. Electron microprobe analyses of the tourmaline revealed elbaite compositions with a significant liddicoatite component in some samples.

Dr. Peter Lyckberg presented three lectures on gem deposits in Russia, the Ukraine, Kazakhstan, and Tajikistan. For each region, he reviewed mining during the past few decades. He also clarified an often-mislabeled locality, Sherlovaya Gora in the Transbaikal region of Siberia, Russia. Called the greatest gem beryl producer in Russia, it is a greisen deposit that has been confused with another pegmatite locality in the Adun Chelon Mountain Range, which also produces beryl, but with different characteristics.

A new gem map of Russia and adjacent countries was available at the TGMS show. Although printed in Russian, it is accompanied by a guide in English. The map and guide can be purchased from Mineralogical Almanac (minbooks@online.ru), P.O. Box 368, Moscow, Russia 103009.

Other gem and jewelry highlights on display at the TGMS show were:

- More than 60 Fabergé pieces from several collectors and dealers
- Fabergé memorabilia including invoices for two Imperial eggs, early catalogs, and photographs of the Fabergé workshops
- The Mackay emerald necklace, featuring the largest cut emerald (168 ct) in the National Gem Collection at the Smithsonian Institution
- Large gemmy aquamarine crystals from southern India, including the 10 kg crystal pictured in the Fall 2000 GN section (additional crystals on display weighed 2.3 kg, 650 g, and 280 g)
- A 2,750 ct treated-color blue topaz, fashioned by Dr. Artmura Kirk and donated to the Virginia Polytechnic Institute and State University.

Next year, the 48th Tucson Gem & Mineral Society show will feature minerals and art from Africa.

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**Faceted vesuvianite from California.** Although small quantities of polished yellow-green vesuvianite (idocrase) from northern California have been around for years, this year's TGMS show saw the commercial availability of faceted material (see, e.g., figure 21). The historic deposit—east of Paradise on the Feather River—was reopened three years ago by these contributors and Ben Halpin. The deposit consists of pods and lenses of massive vesuvianite within sheared serpentine, and is one of the original localities for a yellow-

*Figure 17. The miner proposed sawing the tsavorite rough in these directions, to yield a cushion-shape estimated at 12 ct and additional smaller gems that would total about 30 carats.*

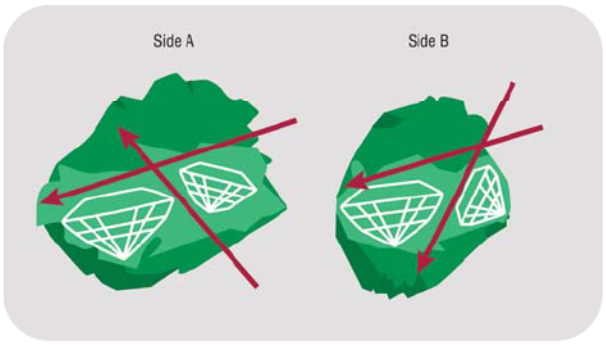
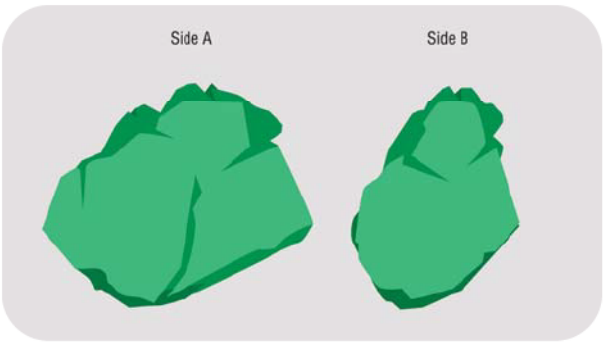



*Figure 18. A careful examination of the tsavorite revealed a much larger gem concealed within, so it was decided to saw the gem in entirely different directions.*



green variety of vesuvianite sometimes known as "Californite" or "Pulga jade." In addition to cabochons, as this vesuvianite is typically seen, about 250 carats of faceted stones recently have been cut, ranging from 0.1–3 ct. More faceted vesuvianite is expected this summer from a 10 kg parcel of rough that is presently being cut. An additional 10–20 kg of rough is being cleaned and processed for future cutting. The yield of faceted stones is typically just one-quarter of 1%, and of cabochons, approximately 5%.

Gemological properties (obtained from one sample by Shane McClure) were: R.I. of 1.71; S.G. of 3.36; inert to long- and short-wave UV radiation; aggregate reaction in the polariscope; strong 464 nm band visible with a spectroscope; and a hazy appearance due to the aggregate structure. The material exhibited in Tucson was the first to be commercially recovered in several decades, and mining will resume in May 2001. The deposit shows strong potential to supply commercial quantities of gem vesuvianite for years to come.

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## SYNTHETICS AND SIMULANTS

**Opal imitations.** Among the unusual synthetics and simulants seen at Tucson was a semi-transparent synthetic opal triplet (see, e.g., figure 22) that consisted of a thin slab of synthetic opal sandwiched between two pieces of transparent glass (R.I. of 1.515): a dome top and flat base. (More commonly, opal triplets are opaque, because a black chalcedony or onyx base is used.) A variety of shapes were available, in sizes from 5 × 3 mm to 20 × 15 mm. Also seen were opal triplet beads ranging from 4 to 12 mm. Probably intended for use as ear studs, these beads were composed of glass that had a very small, thin, two-layered patch consisting of opal (represented as natural) attached to a dark gray- or black-coated glass. As shown in figure 22, the glass was very effective in reflecting the play-of-color from the thin slice of opal in the patch.

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*Figure 19. Using a fine blade, the tsavorite was carefully sawn to preserve the large facetable area on the left.*

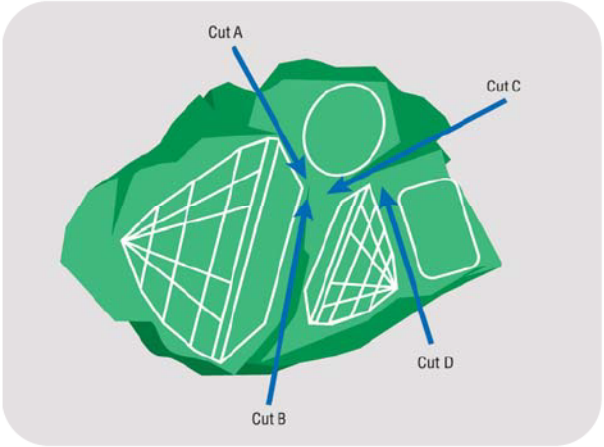


*Figure 20. The 23.23 ct "Green King of Africa" is shown here, together with several other stones (1.05–6.80 ct) cut from the same rough. Courtesy of Menavi Quality Cut Ltd.; photo by Maha Tannous.*

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**Green flame-fusion synthetic sapphire.** Green is an uncommon color for gem sapphires—whether natural or synthetic—but this year, significant quantities of green flame-fusion synthetic sapphires were being sold by one distributor at the GLDA (Gem and Lapidary Dealers Association) show. Robert Silverman of Lannyte (Houston, Texas) had several dozen faceted examples, as well as numerous boules (see, e.g., figure 23). He stated that this green synthetic sapphire has been grown in Europe for at least the past two years, but this was the first time it had been cut and made available to the trade in the U.S. The color ranged from green to bluish green, with the latter being more common.

The faceted green synthetic sapphires are usually in the 2–3 ct range. Larger samples are not readily available, because the boules are of limited size (typically not more than 50 mm long and 20 mm wide), and are color zoned with a pale exterior. During growth of the boules, the melt initially crystallizes into dark "cobalt" blue synthetic sapphire, but according to Mr. Silverman, the color changes to green shortly after crystallization. Typically, one end of each boule (i.e., the last part of the boule to crystallize) retains a small portion of blue color (again, see figure 23). Previous studies of green synthetic sapphire have documented $Co^{3+}$ or a combination of $Co^{3+}$ and $V^{3+}$ as the color-causing agents (see, e.g., Spring 1995 Lab Notes, pp. 57–58).