GemNews

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DIAMONDS

Cubic zirconia misrepresented as diamond. Two attempts to pass off cubic zirconia (CZ) as diamond were reported in International Colored Stone Association (ICA) Alert No. 73, dated August 13, 1993, and authored by K. T. Ramchandran and Dr. Jayshree Panjikara, of the Gemmological Institute of India. In the first, a parcel of rough diamonds included one CZ that was fashioned to imitate an octahedral diamond crystal, complete with "trigons" etched on the octahedral faces (although these ersatz etch markings were oriented incorrectly). In the other episode, CZ baguettes and round brilliants were salted into parcels of diamonds of similar shapes and dimensions.

On a related note, a major research project commissioned by De Beers revealed that India may have the highest ownership of CZ-set jewelry in the world. This was attributed in part to deceptive advertising. According to the study, some large Indian firms advertise jewelry as being set with "American diamonds," usually without disclosing the true nature of the material. (*Jewellery News Asia*, No. 108, August 1993, p. 172).

COLORED STONES

Jade-cutting factory on the Myanmar-Thai border. One of the Gem News editors (RCK) visited the northern Thai town of Mae Sai on the Myanmar border last fall to observe the trading in rubies from the Monghsu area (see Winter 1993 Gem News, pp. 286–287). This is not, however, the only gem-related business in that town. A number of firms have set up cutting factories in Mae Sai to take advantage of both the easy availability of rough and the relatively low cost of doing business as compared to Bangkok.

The editor visited one such facility, a jade-cutting firm. As with other such factories (see, e.g., the Fall 1989 Gem News entry on a similar factory in Guangzhou, China), jade is not the only ornamental material fashioned. At the time of the editor's visit, no Burmese jadeite was being cut, although both carvings and cabochons of jadeite were plentiful in the factory store. Instead, nephrite jade from the Canadian province of British Columbia was being fashioned into small Buddhist amulets, while white marble—from a quarry north of Mandalay, Myanmar—was being carved into statuettes of Buddha and other items (figure 1). When the editor remarked that this marble was visually similar to the host marble in which corundum is found in the Mogok Stone Tract, the factory owner produced a carved marble apple in which several large (approximately 1 cm in diameter), opaque red crystals were plainly visible. However, the piece from which this was cut was reportedly the only one his cutters had come across to date.

Figure 1. A quarry in the Sagyin Hills, north of Mandalay, Myanmar, was probably the source of this marble being fashioned at a "jade"-cutting factory in Mae Sai, northern Thailand. Photo by Robert C. Kammerling.

A subsequent check of the gemological literature suggested that the marble quarry in question is located in the Sagyin Hills, on the east bank of the Irrawaddy River, about 26 km (15.6 miles) north of Mandalay. In the May 1987 *Gemmological Review* ("Gem Occurrences in Burma," pp. 2–7), A. Chikayama stated that ruby, spinel, and occasionally sapphire are mined at this deposit as a by-product of quarrying marble.

ENHANCEMENTS

Instability of diamond filling. Although initial testing of filled diamonds indicated that the first commercially

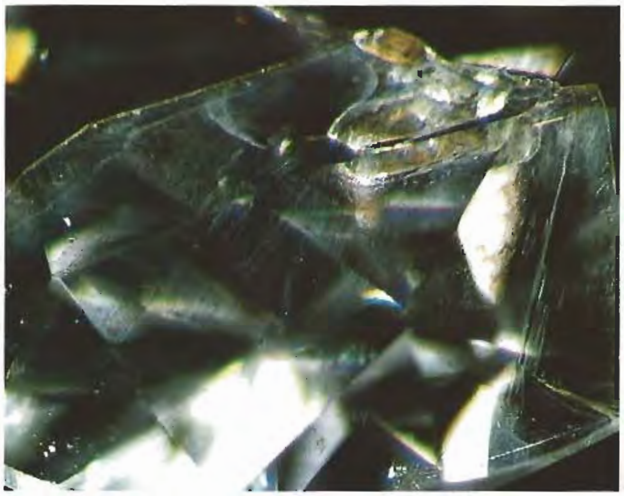

Figure 2. Discoloration of the filling material is clearly evident in this 0.27-ct fracture-filled diamond. It was subjected to a total of 101 hours under a short-wave U.V. lamp. Photomicrograph by John I. Koivula.

Figure 3. This approximately 1-ct sapphire, represented as diffusion treated, was found to be surface coated. Photo by Tony Laughter.

produced material was fairly durable and stable, the passage of time—and entrance of new treaters into the market—has shown that greater caution is needed. In addition to the early-documented damage to the filling material caused by jewelry-repair procedures involving heat (for example, in the retipping of prongs) and repolishing, we have since learned that prolonged ultrasonic cleaning can damage or partially remove the filling material from a diamond.

Another potential stability problem has been documented by gemologist Sharon Wakefield of the Northwest Gemological Laboratory in Boise, Idaho. Ms. Wakefield took a heavily fractured 0.27-ct diamond that she had purchased from the Koss firm as a filled diamond and exposed it to a 4-watt short-wave U.V. lamp at a distance of approximately 10 mm. The first visible degradation of the filling material—noted as a darkening of its color near the surface entry points—was seen at 40× magnification after only 1.5 hours of exposure. After a total exposure of 10.2 hours, the degradation of the filler had progressed so deep in the stone that it could be seen at only 10× magnification. After a total U.V. exposure of 18.2 hours, the discoloration could be seen clearly using only 2.5× magnification; further exposure—to a total of 101 hours—caused additional discoloration (figure 2). Another stone, which had only minor filled fractures, was similarly tested. Although the time for noticeable visible degradation of the filler increased to about 34.5 hours exposure, this was not unexpected inasmuch as there was less filling material.

Coated sapphires misrepresented as diffusion treated. Tony Laughter, manager of the School of Gemological Sciences in Bangkok, told the editors about an interesting incident involving treated sapphires. Mr. Laughter was asked by a local dealer to examine a parcel of four small sapphires (see, e.g., figure 3). According to the dealer, the stones had been color enhanced by a new, "electric blue" diffusion process. Initial visual examination was consistent with diffusion treatment, as one of the stones had a large broken surface that revealed an essentially colorless stone with color confined to a shallow surface area.

When the stone was immersed in methylene iodide and examined with a microscope, however, there was no dark color outlining the facet junctions, a feature characteristic of blue diffusion-treated sapphires (figure 4). Also noted was a dimpled appearance on the surfaces, and a very slight repolishing of some facets very rapidly removed the color layer. When the dealer was told that the stones were coated rather than diffusion treated, he admitted that this was the case. He did not, however, offer any information as to how or where the treatment took place.

TUCSON '94

As is the case every February, the Gem News editors joined thousands in the gem and jewelry industry from around the world in attending the many gem and mineral shows held throughout Tucson, Arizona. According to the guide published by *Colored Stone* magazine, the various shows were held at 23 different venues, including the Convention Center and various hotels and motels. This number does not include the many roadside "shows" that sprout up around the city—many little more than small card tables covered with wares.

The Gem News editors thank all the participants and representatives of the various firms mentioned in the

Figure 4. When the stone shown in figure 3 was immersed in methylene iodide, color concentrations along facet junctions were noticeably absent but the facets revealed a dimpled appearance. Photo by Tony Laughter.

following entries for sharing their time to provide information. In addition, the editors thank Dr. Mary Johnson and Sam Muhlmeister of GIA Research and Dino DeGhionno, Patricia Maddison, Shane F. McClure, and Cheryl Wentzell of the GIA Gem Trade Laboratory, who provided information or helped test materials.

COLORED STONES

Arizona gem materials. The gem materials of Arizona, the host state, are always well represented at the Tucson shows. Turquoise from several mining areas, including the well-known Kingman region, was available in rough and fashioned form, as well as set in Native-American style silver jewelry. Chrysocolla chalcedony was also available. In addition to the sought-after bright greenish blue material some local dealers call "gumdrop blue," the editors saw some cabochons consisting of randomly disseminated bluish green "plumes" of chrysocolla in a near-colorless chalcedony groundmass. Azurite, another copper mineral, was being offered as drusy specimens and cabochons. We also saw some exceptional carvings that were fashioned in China from azurite mined from the famous copper-mining area at Morenci. Both rough and cut peridot from San Carlos was readily available. Some dealers were offering small chrome pyropes, sometimes referred to as "anthill garnets" because they are excavated by these insects and deposited on the mounds around their burrows.

Emeralds from Brazil. Emeralds from the Nova Era area of Minas Gerais, Brazil, were being offered by several dealers. James T. Drew, Jr., of Star Gem, reported that some relatively large stones have recently been recovered at this source. His firm had several stones over 10 ct, with the largest slightly over 20 ct. The medium-dark tone of these stones, combined with their sizes, make them very reminiscent of commercial-grade Colombian emeralds. Nova Era emeralds were also offered at a booth from the Cooperativa dos Garimpeiros de Nova Era (COOPNERA). In April 1993, this cooperative of independent miners was licensed by the state of Minas Gerais to prospect and work a total area of 27,365 hectares (67,591 acres) in the area of the Capoeirana mine at Nova Era.

Emeralds were also available from the Carnaíba mining area in Bahia State, where recently there has been a resurgence of activity. Roughly 1,000 *garimpeiros* arrived from Santa Terezinha de Goiás in late November 1993, according to Hugo Mol of FGH-Pedrabras Ltda., Belo Horizonte. The move was reportedly prompted by a slowdown in activity at the Campos Verdes mine in Santa Terezinha, due to a combination of restrictions on independent mining and difficulties caused by the great depths at which they are operating. The *garimpeiros,* who are working what are described as "new" areas at Carnaíba, timed their move so their children could transfer to public schools in Bahia at the beginning of the next school period.

When one of the editors noted a pleasing aroma emanating from the surfaces of Carnaíba rough (see, e.g., figure 5), Mr. Mol stated that it was a natural oil from the peroba tree that is indigenous to the area. This substance, which is also used locally as wood polish, is typically applied to emerald rough from Bahia. Mr. Mol noted that Opticon, which is popular at Santa Terezinha, is not presently used at Carnaíba.

We also saw phenomenal stones. These included some cat's-eye emeralds and green beryls from Santa Terezinha, which ranged from pale to dark green and

Figure 5. This 7.70-ct emerald crystal is typical of recent production from the Carnaíba mining area of Bahia State, Brazil. Such material is commonly treated with oil from a local tree. Photo by Maha DeMaggio.

Figure 6. Madagascar is the reported source of these gemstones. Back, left to right: 1.28-ct rhodolite, 1.86-ct hessonite, and 1.36-ct rhodolite; front: 0.84-ct pyrope-almandine and 2.14-ct "rainbow moonstone." Garnets courtesy of Allerton Cushman & Co.; "rainbow moonstone" courtesy of Gem Reflections of California. Photo by Maha DeMaggio.

from melee sizes up to a stone of 5.80 ct. The vendor, David Kaassamani, reported that some of these stones were of recent production, from sites known as "Mine 66" and (currently the largest producer of cat's-eye emeralds in the area) the "Vienna mine." Mr. Kaassamani also had a medium-toned 5.93-ct emerald from Santa Terezinha that exhibited a weak but fairly complete six-rayed star.

"Jurassic Park" gems and carvings. The box-office success of the film "Jurassic Park" had a definite impact on Tucson this year. Amber from both the Dominican Republic and the Baltic region was available at almost all the shows visited by the editors. In addition, it appeared that more dealers than in past years were offering "inclusion specimens." One Russian dealer offered his specimens with small, descriptive fact sheets about each of the insect types they contained. Another dealer was selling amber cabochons, both loose and mounted in earrings and pendants, that had dinosaur images carved into their bases, producing a three-dimensional effect when viewed from the top. (See figure 3, p. 200, of the Fall 1992 Gem News section for an example of this type of carving in amber.) On a related note, for the first time we saw a polishing compound developed specifically for use with amber. Named "Amber-Sheen," the product was being promoted both for use in the final polishing stage and for restoring the polish on fashioned material with worn or scratched surfaces.

Although carved gem materials are a regular fixture of the Tucson shows, the editors noted what appeared to be more materials carved in the form of dinosaurs this year, including amethyst-citrine, massive azurite, and a fossil marble from China. Carvings from this last material were labeled "fossil fossils."

Gems from Madagascar. The island nation of Madagascar, off the southeast coast of Africa, is a well-known gem source, and we saw a number of Madagascar materials offered. Tom Cushman of Allerton Cushman & Co., Sun Valley, Idaho, had emeralds from the areas of Mananjara on the east of the island and Tulear on the west. The Mananjara emeralds were predominantly medium toned and, according to Mr. Cushman, have a negative reaction when viewed through a Chelsea color filter. The Tulear emeralds are darker in tone and appear red when viewed through the Chelsea filter. Most of the emeralds seen by the editors were relatively small—under 1 ct; the largest, of very good color, was about 1.5 ct.

We also saw small quantities of Madagascar aquamarine and morganite. The aquamarines ranged from slightly greenish blue to almost pure light to medium blue; Tom Cushman reported that all were of natural color. In hue, they most resembled some of the fine Mozambique material that is sometimes called "Santa Maria Africana" in the trade. We were also shown some reportedly natural-color morganites of a deeper, purer pink than is typical of.the material coming from Brazil.

In the Summer 1991 Gem News column, we mentioned large carvings of labradorite from Madagascar. This year we saw a feldspar from Madagascar that was fashioned as small (roughly 1 ct) cabochons and offered as "rainbow moonstone" (figure 6)—a trade name typically used to describe an essentially colorless phenomenal bytownite from India that lacks the dark ilmenite inclusions seen in labradorite from other sources, such as Canada and Finland. The Madagascar material that we saw had a slightly gray body color and eye-visible dark inclusions, although these did not appear to be as heavily concentrated as in labradorite from the other sources mentioned above.

Mark H. Smith of Bangkok had 500 carats of faceted colorless phenakite in the 1- to 10-ct range, as well as two faceted stones weighing 36.34 and 171.12 ct.

Apatite from Madagascar in a slightly greenish blue to bluish green color similar to that of some tourmaline from Paraíba, Brazil, has been available at the Tucson shows for several years now. Mr. Cushman informed one of the editors (RCK) that all this material is heat treated at the mines, on large circular steel plates placed over open fires. The untreated material is described as having a rather unattractive "olive" green color.

Madagascar garnets were also being offered. The firm of Michael Couch, Ft. Wayne, Indiana, had about two dozen spessartines, ranging from under 1 ct to 7.89 ct and from brownish orange to a very pure orange. According to Tom Cushman, garnets of a predominantly red color are mined at Marlambo, in the central eastern part of the island, while hessonite comes from an area near Antsirabe in central Madagascar and pink to purple rhodolites come from a region near the central eastern coast.

Mr. Cushman provided the editors with four stones (again, see figure 6) for gemological characterization in accordance with the criteria established by C. M. Stockton and D. V. Manson ("A Proposed New Classification for Gem-Quality Garnets," *Gems & Gemology*, Winter 1985, pp. 205–218). A 0.84-ct dark orangy red square modified brilliant—R.I. 1.758; S.G. 3.87; absorption bands at 420, 435, 465, 500, 525, and 575 nm—was identified as pyrope-almandine. A 1.28-ct medium purple-pink round modified brilliant—R.I. 1.750; S.G. 3.84; absorption bands at 465, 500, 525, 565, and 610 nm—was identified as rhodolite. A 1.36-ct dark reddish purple triangular modified brilliant—R.I. 1.756; S.G. 3.87; absorption bands at 435, 465, 500, 525, 575, and 610 nm—was also identified as rhodolite. The fourth stone, a 1.86-ct medium-dark brownish orange oval cabochon—spot R.I. 1.74; S.G. 3.65; absorption bands at 440 and 500 nm—was identified as hessonite.

Also seen was an attractive 0.73-ct faceted oval ruby that, according to Mr. Cushman, was cut from rough recovered from a streambed near Antsirabe. He reported that this alluvial material is typically very small (under 1 ct) and usually cuts stones of only about 3 mm in diameter. While larger, flat hexagonal ruby prisms are found near Tulear, this material is typically opaque and unsuitable for fashioning, even as cabochons.

Myanmar gems. Rubies from the new mining area of Monghsu in Myanmar were available from many dealers at this year's show. These stones are notable for their bright, consistent color, which makes them very easy to match for use in jewelry. This material was most readily available in calibrated melee sizes and stones up to about 1 ct (figure 7), with stones in the range of 0.50 to 0.75 ct most prevalent. There were far fewer larger stones, and these were often fairly highly included; stones over 2 ct seen by the editors generally contained eye-visible inclusions.

The ready availability of this material, especially in small sizes, apparently has led to its being marketed in some of the less traditional cutting styles. Omni Gems of Los Angeles was offering calibrated Monghsu rubies in trilliant and princess cuts.

Other Myanmar gems (again, see figure 7) were more abundant than in years past. In particular, many dealers offered good selections of very fine red spinels, which were once considered scarce, especially in larger sizes. Blue sapphires were also easier to find, especially asteriated stones. (See also the note on peridot in this section.)

More on obsidian. The Summer 1993 Gem News section reported on an obsidian from Mexico with striking iridescent colors. This material was available in greater quantities this year, both as rough and as fashioned gems and carvings. According to P. Damian Quinn of Talisman Trading Co., San Diego, California, his material came from this same Mexican source.

Figure 7. This suite is representative of some of the fine Myanmar gems available at Tucson this year. Front, left to right: 4.88-ct blue spinel, 1.87-ct pink spinel, 1.39-ct red spinel, and 1.13-ct ruby from Monghsu. Back: 13.32-ct peridot and 5.43-ct star sapphire. Courtesy of Gemstones Import, Seattle, Washington; photo by Robert Weldon.

Among the more unusual carvings seen at Tucson was an intertwined "rope" of obsidian, accented by sugilite and opal (figure 8). Arthur Anderson, of Speira Gems in Ashland, Oregon, carved the intricate piece—which measures 45 mm long by 25 mm deep—from a single

Figure 8. This 45 × 25 mm "rope" was carved from a single piece of obsidian and then accented with sugilite and opal. Photo by Robert Weldon.

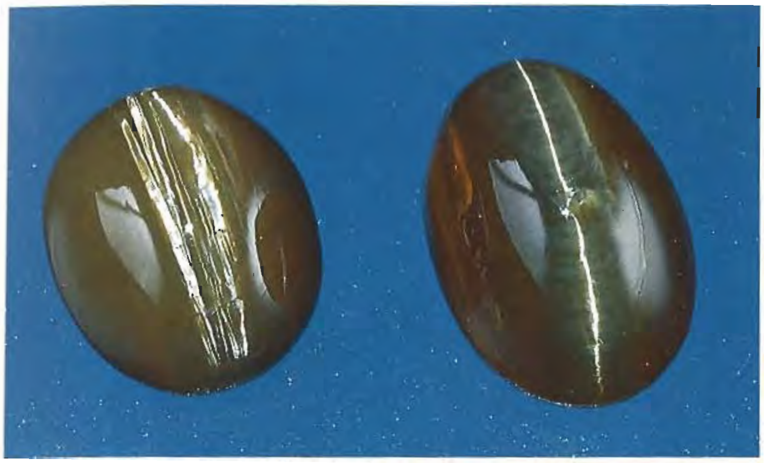

Figure 9. Before it was soaked in water for several minutes, the 1.74-ct cat's-eye opal on the right looked almost identical to the 1.40-ct untreated stone on the left. Stones courtesy of Jean-Claude Nydegger; photo by Shane F. McClure.

chunk of obsidian. He used a point carver for the actual carving, and then finished the work with a Foredom hand piece. He is currently experimenting with similar types of carvings using different, softer materials.

Cat's-eye opal from Brazil. The Fall 1990 Gem News section and the Fall 1992 Gem Trade Lab Notes reported on examples of cat's-eye opal. According to the owner of the latter stone (a 2.76-ct greenish yellow cabochon), the material originated in northern Brazil.

This year at Tucson, a considerable amount of cat's-eye opal was available from De Wal Brazil Ltda. of Teófilo Otoni, Minas Gerais. According to Jean-Claude Nydegger, his firm is involved in mining the material from the northern part of Bahia. At Tucson, they had approximately 6,000 ct of cabochons from less than 1 ct to as large as 57.6 ct, with the average about 5 ct.

The material, which sometimes contains dendritic inclusions, ranges from yellowish green to yellowish brown; it is generally greener than the Brazilian cat's-eye opal reported previously. All of it is very fibrous; material with finer fibers has proved relatively easy to cut, whereas material with relatively thick fibers has a tendency to split during fashioning. The material is also very porous. An average-size cabochon placed in water will absorb the liquid in a matter of minutes. (As an example, one stone weighed 1.74 ct when dry and 1.88 ct after it was soaked in water.) Although immersion produces a dramatic improvement in apparent transparency as well as a shift to a browner body color (figure 9), these changes are temporary: A water-soaked stone left in air will return to its original appearance in several minutes. Mr. Nydegger is experimenting with possible methods to "stabilize" the material so that it retains the more attractive appearance exhibited after soaking in water.

At Tucson, we saw another unusual specimen from Brazil, a 25.83-ct matrix opal. This had a dark grayish brown matrix and exhibited a good play-of-color. Although matrix opal from Australia is commonly seen in the trade, this is the first such example we have seen from Brazil.

Opal from Ethiopia. Ethiopia is one of the more recent East African countries to join the club of gem-producing nations. As noted in the Spring 1993 Gem News section, peridot from this country made its Tucson debut last year. Now opal from Ethiopia has entered the market. According to a report by Dr. N. R. Barot in the February 1994 issue of the *ICA Gazette*, lots of rough Ethiopian opal ranging up to several hundred grams have appeared in the Nairobi market since mid-1993. These lots include some complete nodules ranging from 20 mm/15 grams to 55 mm/300 grams; 70%–90% of each is opal. Approximately 65% of this is opaque common opal, 5%–7% displays play-of-color (see, e.g., figure 10), and the remainder is transparent gemmy material without play-of-color.

Dr. Barot showed the editors some representative samples of Ethiopian opal at Tucson (figure 11). The more transparent material occurs in pale yellow, orange, and brown with either weak or no play-of-color. This material is visually similar to Mexican fire opal. More unusual is a dark brown to reddish brown body color with strong play-of-color in a mosaic pattern of rectangu-

Figure 10. This 63.4-gram nodule of dark brown opal with strong play-of-color is from Ethiopia. Photo courtesy of N. R. Barot.

Figure 11. These specimens (approximately 1.5–3 ct) are representative of the range of gem-quality opals coming from a source in Ethiopia. Photo by Robert Weldon.

lar to rounded patches. This material was more reminiscent of fire agate than any opal the editors had previously seen.

Miscellaneous notes on peridot. The San Carlos Apache Reservation, just east of Globe, Arizona, was the source of most of the peridot seen this year. Good-quality stones (i.e., with no secondary brown hue) in sizes up to about 4–5 ct were available from several dealers. Chinese peridot was also available, both as calibrated melee and in stones of a few carats.

Rudi Cullmann of the firm Karl August Cullman, Idar-Oberstein, Germany, had 5,000 grams of rough peridot from Ethiopia and stated that a regular supply of Ethiopian rough has been available this past year in Nairobi; this was corroborated by Dr. N. R. Barot.

Of particular interest was the number of fairly large (approximately 15–25 ct) peridots reportedly of Myanmar origin being offered, more than the editors had seen at any show in the past. Most of this material was a lighter, more yellowish green than what we typically associate with large Myanmar peridots. One dealer volunteered that at least some of this material may have been cut from large Chinese rough that was being passed off as from Myanmar. This was independently confirmed by another dealer well-versed in the gem materials being recovered and cut in China. Apparently mining at depth in China is producing larger stones of a slightly darker color than what has been found in the past. This material was described as being visually identical to material from San Carlos and "regularly" available in sizes that would cut 15- to 20-ct stones. We did not, however, see any stones over 10 ct among those claimed to be from China.

A small amount of the typically light-toned peridot from Norway was being offered. Rough and Ready Gems of Denver, Colorado, had a selection of about 50 stones in the 0.5- to1.5-ct range, plus a few around 2.25 ct. Finally, Robert Haag Meteorites was again offering a few very small peridots that were faceted from material taken from the Esquel pallasitic meteorite (see J. Sinkankas et al., "Peridot as an Interplanetary Gem," *Gems & Gemology*, Spring 1992, pp. 43-51).

Russian uvarovite garnet . . . With Russia's recent opening to world markets, it has become an increasingly important source of gem materials, both natural and synthetic. At Tucson this year, many dealers were offering Russian goods.

One of the more noteworthy materials was drusy uvarovite garnet on a chromite matrix. We saw numerous irregular matrix specimens that had uvarovite crystals ranging from microscopic size to no more than 4 mm in diameter (one dealer even advertised uvarovite on a billboard along the freeway). A few dealers, such as Bill Heher of Trumbull, Connecticut, had attractive matched tablets for use in earrings. Another dealer, Maxam Magnata, also showed the material set in jewelry (see, e.g., figure 12).

Figure 12. This 14k gold pendant is set with drusy uvarovite garnet on a chromite matrix, accented by a colorless zircon. The pendant, designed and fabricated by Laura Tremaine of Maxam Magnata, measures 27 mm wide × 42 mm long; photo by Robert Weldon.

Figure 13. These stones are representative of some of the gem materials currently being mined in the Indian state of Orissa: (back, left to right) 1.22-ct ruby, 1.08-ct iolite, 3.62-ct purple sapphire; (front) 0.59- and 1.38-ct rhodolites. Iolite courtesy of Amar J. Jain Fine Gems, New York; garnets courtesy of Orissa Gems, Jaipur; ruby and purple sapphire courtesy of Gem Reflections of California. Photo by Maha DeMaggio.

Mr. Magnata and Abigail Harris, of Fairfax, California, provided the following additional information. One of the least known of the green garnets, uvarovite is quite new to the West as a gem material. Its matrix of metallic chromite provides a strong black contrast to the garnet's saturated green color. Just as the alexandrite variety of chrysoberyl was named after Czar Alexander, uvarovite was named after another notable Russian, the mineralogist Count Uvarov.

The Russian uvarovite is mined in the Ural Mountains, near the town of Ekaterinburg (named after Katherine the Great). Reflecting the radical changes that have taken place in the 20th century, the town was renamed Sverdlovsk in 1917, then changed back to Ekatirinburg in 1990. The mine has steadily produced material since the mid-1800s, albeit in limited quantities, but the outlook for future availability appears good.

For most gem materials, larger generally equates with more desirable, but Russian uvarovite does not occur as individual crystals large enough for faceting. Over the past few years, however, there has been a sustained interest in drusy gem materials (see, e.g., the Tucson Report in the Spring 1991 Gem News). This interest comes at a time when the major source of Russian uvarovite has become available to the international market.

Specimens composed of relatively small, closely packed individual crystals usually have the best overall appearance. With magnification, the surface looks as if it has been pavé set with minute crystals. In the best specimens, the entire surface that would be exposed when set in jewelry is totally and uniformly covered with uvarovite crystals—with no areas of exposed matrix. In addition, the smaller the individual uvarovite crystals, the more durable the piece, that is, the less likely the crystals are to separate from the matrix.

. . . and other Russian materials. Small amounts of a drusy pale brown-orange garnet in matrix that was labeled "Russian peach garnet" were also on hand at Tucson; similar matrix specimens with garnets of a slightly darker tone were labeled "hessonite garnet" by another vendor of Russian goods.

We also saw a number of demantoid garnets from Russia, all reportedly "new production." Most of the stones were small—no larger than 1.5–2 ct—and light to medium-light in tone. Because of the light body colors, the strong dispersion (0.057) of this gem was readily apparent even in the smaller (2–3 mm) sizes. Chrome diopside was available from several dealers, both rough and fashioned. Gem Reflections of California, from San Anselmo, had a selection that was fairly typical of what was available: faceted stones ranging from 4.2 mm rounds to gems as large as 26 ct, and 4-mm round cabochons. The smaller stones tend to show the color to best advantage, as larger stones can be overly dark.

Several ornamental gems of Russian origin were being offered. Bartky Minerals of Livingstone, New Jersey, for example, displayed vases and small jewelry boxes assembled from materials including rhodonite, charoite, nephrite, and jasper. We also saw some ammonite specimens from a locality identified only as "Mihaelovich near Moscow," as well as purple sapphire in matrix from the Karelia area.

Rubies and other gems from Orissa. The firm of Orissa Gems, with headquarters in Jaipur, India, was marketing a number of gem materials from the state of Orissa. These included bright brownish orange hessonite garnets (3–5 ct) and rhodolite garnets of a very purple hue (3–15 ct). Also being offered were some slightly greenish yellow nonphenomenal chrysoberyls, near-colorless faceted sillimanites, dark red to purple zircons, greenish blue to violetish blue sapphires (which had a fair number of inclusions), and iolites.

Amar J. Jain Fine Gems of New York also had a number of good-quality iolites, in a wide range of calibrated sizes and cutting styles (including cabochons). Mr. Jain told one of the editors (RCK) that Orissa is the source of the vast majority of iolite coming from India today; little is being produced from the former major sources in the state of Madras.

Gem Reflections of California, in San Anselmo, was offering a selection of rubies and pink to purple sapphires from Orissa. According to firm representative Michael Randall, Orissa ruby rough only rarely produces cut gems

Figure 14. "Bleeding" of diffused color can clearly be seen in this 0.15-ct sapphire cabochon. The stone had been "salted" into a parcel of natural sapphires from Kanchanaburi and was subsequently repolished. Courtesy of Mark H. Smith, Bangkok; photomicrograph by John I. Koivula, magnified 10×.

over 1 ct, but some of the pink to purple rough can be cut to gems as large as 8 ct. Mr. Randall also noted that he saw considerably more rough when he visited the locality in November of 1993 than during his August visit only a few months earlier. Typically, the Orissa rubies contain numerous small, colorless zircon inclusions. A suite of gemstones from Orissa is shown in figure 13.

Miscellaneous notes on tourmaline. Particularly scarce at Tucson this year were the saturated-color cuprian tourmalines from the state of Paraíba, Brazil. Most of the stones in the small amounts being offered were under 1 ct. Some attention seems to have shifted to attractive greenish blue to bluish green tourmalines from Bahia, Brazil. While this material occurs in hues similar to those of some of the Paraíba material, the color is significantly less saturated. Also from Brazil—specifically, the Governador Valadares area of Minas Gerais—were some brownish pink to pinkish brown tourmalines that were being marketed as "salmon" and "cinnamon" tourmalines by the firm Braz-G-Can of Rio de Janeiro. According to firm representative Fernando Otavio da Silveira, some of the more atypical colors were produced by cutting the stones from the central portions of watermelon tourmaline crystals, incorporating various amounts of the green "rind" into the edges of the faceted stones.

Bright green "chrome" tourmaline from Tanzania, in tones ranging from medium dark to very dark, appeared to be more available than in recent years. Affro Gems of New York offered half-moon cuts of this tourmaline matched with light yellow scapolite, also from Tanzania. Amoroko International, based in Los Angeles, had about 50 bright orangy yellow tourmalines from Kenya, in the 1- to 3-ct range. They reported, however, that this material was mined several years ago.

Tourmalines from the Nuristan region of Afghanistan were again available. This year, however, there appeared to be more lighter-toned material, including pink as well as bicolored (pink-and-blue and pink-and-green) crystals. Afghan-Basar-Gems, of Idar-Oberstein and Los Angeles, was also offering about 700 grams of a very saturated, medium-toned greenish blue tourmaline.

ENHANCEMENTS

Update on diffusion treatment. Diffusion-treated sapphires were less prominent this year than in any of the past three years. None of the editors came across any vendor specializing in or prominently displaying this type of material. One exhibitor, who asked to remain anonymous, stated that he was experimenting with the production of red diffusion-treated stones and showed one of the editors some material that was similar in outward appearance to that described in the article "Update on Diffusion-Treated Corundum: Red and Other Colors" (by McClure et al.) in the Spring 1993 *Gems & Gemology.*

According to Mark H. Smith of Bangkok, diffusion-treated sapphires regularly appear on the market in that city, salted into parcels of stones from Kanchanaburi. Mr. Smith estimated that perhaps 1%–2% of the stones he sees in parcels from this source have been diffusion treated. He showed the editors about a dozen small cabochons from such a parcel, which he had subsequently repolished. The characteristic "bleeding" of diffused color can be clearly seen in surface-reaching pits and fractures (figure 14).

One new diffusion-treatment product was being offered by the firm HRI International Corp. of Middletown, New York. These small (about 0.60–0.75 ct), pale blue synthetic sapphires had been diffusion treated with a cobalt compound; thus, the color was more reminiscent of blue synthetic spinel or the rare natural "cobalt" blue spinel than of natural or synthetic sapphire (figure 15). Examination with a desk-model spectroscope revealed three diffused bands centered at about 545, 580, and 620 nm. The stones were inert to long-

Figure 15. The cabochons on the far left (0.67 ct) and far right (0.71 ct) are flame-fusion synthetic sapphires, typical of material that was cobalt-diffused to produce stones like the 0.66-ct (left) and 0.69-ct (right) examples in the center. Photo by Maha DeMaggio.

Figure 16. This 9.76-ct beryl triplet cameo (approximately 18.23 × 14.01 mm) is one of the more unusual assembled stones seen at Tucson this year. Courtesy of Hermann Grimm; photo by Bart Curren, courtesy of ICA.

wave U.V. radiation and fluoresced a weak, chalky bluish green to short-wave U.V. They appeared a saturated dark red through the Chelsea color filter. All these features are consistent with those reported for the cobalt-doped blue diffusion-treated natural sapphire preforms described on page 123 of the article "The Identification of Blue Diffusion-Treated Sapphires" (by R. E. Kane et al.) in the Summer 1990 *Gems & Gemology*. Magnification revealed gas bubbles and/or curved color banding in each of the four diffusion-treated stones examined, which confirmed that the starting material was a melt-grown synthetic.

The editors were also shown cobalt-diffused synthetic sapphires for which the starting material was reportedly light pink. According to Professor Vladimir S. Balitsky, who serves as vice-president and gemologist for HRI, he produced these stones for use as a tanzanite simulant, as they exhibit a "cobalt" blue color in fluorescent light and a violet to purple color under incandescent light.

SYNTHETICS AND SIMULANTS

Beryl triplets. Assembled stones are still widely used as emerald substitutes, because synthetic emeralds are produced by two of the more expensive methods of gemstone synthesis—flux and hydrothermal growth—and because neither flame-fusion synthetic corundum nor synthetic spinel can be manufactured in a realistic "emerald" color. Although the synthetic spinel triplet—two sections of colorless synthetic spinel joined by a green cement—is the type of assemblage most often encountered as an emerald simulant, we occasionally see quartz triplets and beryl triplets as well. The last can present a problem to the careless gemologist, because the refractive indices of this material (typically near-colorless beryl or very pale aquamarine) are very close to those of emerald, another beryl variety.

This year at Tucson, the firm Hermann Grimm of Idar-Oberstein, Germany, was offering several dozen beryl triplets in a very convincing "emerald" color, using beryl that was suitably included to add to the effectiveness of the pieces. While most of these were faceted in styles typically used for emerald, two were carved as cameos (see, e.g., figure 16). As noted in the article "Emeralds and Green Beryls of Upper Egypt" (by Jennings et al.) in the Summer 1993 *Gems & Gemology*, the carving of emeralds for use as ring stones dates back to the days of ancient Rome (see, e.g., figure 3 of that article).

This firm also had several dozen beryl triplets with a saturated, slightly greenish blue color for use as substitutes for Paraíba tourmaline.

Chatham flux-grown pink synthetic sapphires. At the 1994 Tucson show, Tom Chatham introduced his firm's new pink synthetic sapphires (figure 17). This flux-grown material shows a consistently saturated pink hue that ranges from light to medium light in tone. The lower chromium content (0.06 to 0.2 wt.% Cr_2O_3, compared to

Figure 17. This 884-ct crystal and three faceted stones (the largest weighs 13.35 ct) are representative of the new flux-grown pink synthetic sapphires being produced by Chatham Created Gems, San Francisco. Photo by Robert Weldon.

Figure 18. This 7.37-ct crystal and 1.89-ct faceted synthetic ruby are typical of the new "Douros" product from Piraeus, Greece. Courtesy of Melinda Adducci, Plymouth, Michigan; photo by Robert Weldon.

Figure 19. This 8.29-ct synthetic malachite and the 3.95-ct synthetic turquoise were produced in Russia. Photo by Maha DeMaggio.

0.5 to 2.0 wt.% Cr_2O_3 for ruby) is responsible for the pink color. We examined in detail five faceted stones ranging from 1.81 to 13.35 ct and found that the gemological characteristics are generally consistent with those previously reported for Chatham flux-grown synthetic ruby (see, e.g., Gem Trade Lab Notes, *Gems & Gemology*, Fall 1981, pp. 163–165). One exception is that the pink material's slightly orangy red fluorescence to short-wave U.V. radiation is of roughly the same intensity as its red fluorescence to long-wave U.V., whereas Chatham synthetic rubies generally fluoresce a weaker red to short-wave than to long-wave U.V. radiation. The material is being marketed in one quality, which the firm refers to as "clean."

We also examined a large (884 ct) crystal of this new synthetic sapphire (again, see figure 17), which shows the same morphology we have observed on large Chatham synthetic ruby crystals. It also contains elongated flux inclusions that are parallel to the striations observed on the crystal. These inclusions show a green fluorescence to short-wave U.V. radiation only, which may appear yellow if combined with the red emission from the sapphire itself.

Douros synthetic rubies. Another flux-grown synthetic to enter the gem trade recently is a product of Created Gems of Piraeus, Greece, that is being referred to colloquially as the "Douros" synthetic ruby after the family name of the brothers who developed it (see the relevant abstract from the 24th International Gemmological Conference, published in the Winter 1993 Gem News). One of these gentlemen, John Douros, was in Tucson this year to learn first-hand about the market for laboratory-grown gem materials and to show samples of his product (see, e.g., figure 18). A detailed report on this synthetic ruby will be published in an upcoming issue of *Gems & Gemology.*

More on Russian synthetics and simulants. Gem News has had several entries in recent years about synthetics and simulants from Russia that were being marketed at the Tucson shows. This year proved to be no exception. In fact, Rafi Dagan, president of New York–based Yael Importers, reported that his firm has begun marketing a number of synthetic products being provided by Pinky Trading Company of Bangkok. Pinky Trading, in turn, has a joint-venture—"Tairus"—with the Siberian branch of the Russian Academy of Sciences for the production and marketing of materials produced in Novosibirsk. Walter Barshai, president of Pinky Trading, subsequently confirmed that he had signed an agreement with Yael giving that firm exclusive distribution rights for materials produced by Tairus.

Among the faceted materials on display at Yael's booth were hydrothermal synthetic emeralds; synthetic rubies produced by three methods--hydrothermal, "horizontal crystallization" (a floating-zone technique), and a modified flame-fusion process; flux-grown red and blue synthetic spinel; flame-fusion synthetic sapphire; and Czochralski- pulled synthetic alexandrite.

Flux-grown synthetic emerald from Russia was again being marketed in Tucson by the Crystural firm (see the entry in the Summer 1993 Gem News). Russian hydrothermal synthetic quartzes seen include amethyst, citrine, a medium-dark blue, and a dark green, the latter two without natural counterpart (see, e.g., Winter 1992 Gem Trade Lab Notes, p. 265, for information on the green). HRI International Corp. of Middletown, New York, had a new, Russian-grown, pink synthetic quartz. A report on this material will appear in an upcoming Gem News section. This firm also had a small selection of Russian synthetic turquoise and synthetic malachite (figure 19).

Cubic zirconia from Russia was available in many colors, including a yellow-green that would make an effective simulant for peridot. A 20.70-ct emerald cut purchased for examination was inert to long-wave U.V. radiation, fluoresced a weak chalky yellowish green to short-wave U.V., and appeared greenish gray through the Chelsea color filter. Examination with a desk-model spectroscope revealed lines of varying intensity at 484, 514, 528, 535, 537, 541, 569, 572, 575, 577, 580, 582, 587, 591, 595, and 600 nm.