



Gem News International

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TUCSON 2019

The 2019 gem shows came to Tucson with a wealth of material, both new and old, as eager buyers descended on exhibitors to take in the latest trends. While traffic was not as heavy as in recent years, several vendors noticed an influx of young people looking for natural, untreated gemstones. Spectacular color in gems and stunning jewelry designs were on view, while many pointed to sustainable and ethical practices as a major consideration in their colored gemstone and jewelry purchases.

The Asian market has slowed, according to Edward Boehm of RareSource (Chattanooga, Tennessee), and as a result, gems that have been popular in Asia, particularly China, are starting to gain traction in the United States. Boehm indicated that the growth of the Asian market is still driving production in African countries, particularly Nigeria, and Americans are the primary consumer of this increased production. Improving exchange rates have also worked in the American market's favor. Dave Bindra (B&B Fine Gems, Los Angeles) said that while higher-end gemstones are still difficult to come by, they are as much in demand as ever. Commercial-grade gems, Bindra noted, have become more accessible. Like Boehm, he attributes this in large part to activity in the Chinese market in recent years. Shahin Aboosalih of SR Trading's Hong Kong office talked to us about material that remains popular in the Chinese and Japanese markets (pp. 136–138).

Editors' note: Interested contributors should send information and illustrations to Stuart Overlin at soverlin@gia.edu or GIA, The Robert Mouawad Campus, 5345 Armada Drive, Carlsbad, CA 92008.

GEMS & GEMOLOGY, VOL. 55, NO. 1, pp. 118–160.

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Opal, particularly black opal, has seen a resurgence among high-end jewelers. Boehm believes there could be a growing appreciation for the gem due to the discovery of opal in Ethiopia, which has brought opal to different price points and different audiences in the past decade. Rod Griffin (Rod Griffin Boulder Opals) discussed his experiences in Australian opal mining and the new technology he is using to exploit deposits once thought to be depleted (pp. 122–123).

Color, of course, continues to reign, and dealers are seeing what Boehm called “an increased appreciation for the unusual.” Beyond the classic “Big Three,” vendors stocked gemstones such as sphene, grandidierite, and various colors of sapphire. Color-change stones seen in previous shows, such as pyrope garnet and alexandrites, were also on display and drawing new attention. Cutters, he noted, are making strides in recognizing and using to different effect specific phenomena in gemstones, such as the trichroism of tanzanite. Spinel remains the most popular “new” gem, according to Boehm, especially in nontraditional colors such as lavender and violet, which would have been cut too dark (or not at all) in the past. Gray spinel in particular made a splash at this year's show, with several exhibitors stocking the material in a variety of cuts.

Brian Cook of Nature's Geometry (Tucson) noticed a cross-pollination between the mineral and jewelry industries, with more designers and jewelers using raw euhedral stones to create unique looks. He also noted that several new mineral shows, developed out of dealers' collectives rather than sponsored by one promoter, have come to the city and seem to be here to stay. The popularity of the Granada Gallery (pp. 128–129), which prides itself on its dedication to “fine natural design,” is one such indicator.

American gemstones were also in heavy rotation at the shows. Eric Braunwart of Columbia Gem House, who has long stocked American production in his inventory, said that sales of these products were good. Designer Derek Katzenbach discussed his use of American gemstones such as Maine tourmaline (pp. 143–144). And among the material seen was Montana sapphire, nephrite from Washington State, Oregon sunstone, and hyalite opals from Oregon.



Buyers browse the selection of goods available at the 2019 AGTA GemFair in Tucson. Photo courtesy of AGTA.

Bindra noted that many of his company's rare gems came out of the ground 20–30 years ago, and that he relies heavily on the secondary market to procure such material. In this way, he is able to provide his clients with the high-end material they have come to expect. This sentiment was echoed by Jared Holstein of Perpetuum Jewels (pp. 146–147), a wholesaler working with antique diamonds and colored stones in historical cuts for the bridal market. Holstein also finds the secondary market to be a good way to source gemstones in an ethical and environmentally sustainable fashion.

Responsibly sourced material continues to be heavily sought after. Braunwart said this might have been his most successful show in his 41 years at Tucson (pp. 135–136). He credits this in large part to his commitment to providing fair trade, responsibly sourced gemstones. Susi Smither,

who founded The Rock Hound specifically to create an ethical jewelry line (pp. 149–150), delighted in showing us her Molten Muzo collection, which used responsibly sourced Colombian emeralds and recycled gold. And gem dealer and jewelry designer Roger Dery told us about Gem Legacy, the nonprofit he founded to benefit East African mining communities (pp. 147–148).

We hope you enjoy our coverage of the 2019 Tucson gem shows!

Jennifer-Lynn Archuleta
GIA, Carlsbad

The following contributed to this report: Erin Hogarth, Tao Hsu, Jonathan Muyal, Lisa Neely, Aaron Palke, Duncan Pay, Albert Salvato, Kevin Schumacher, Jennifer Stone-Sundberg, Wim Vertriest, and Robert Weldon.

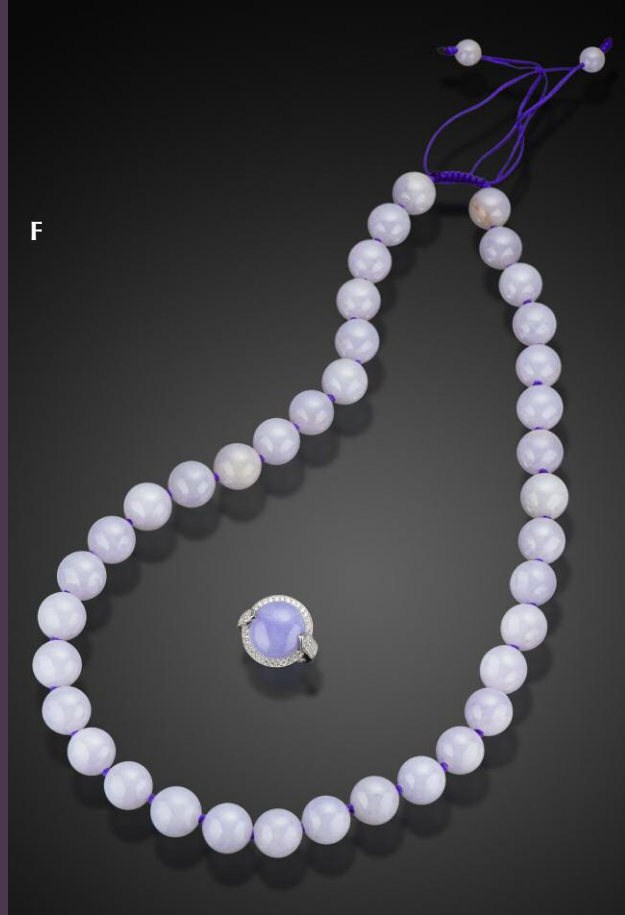
Left: Opals like “The Chief,” a 14.41 ct Australian black specimen, were in demand this year. Photo by Kevin Schumacher, courtesy of 100% Natural Ltd. Center: Fancy-color sapphires, including this 50.08 ct color-change gem, were also popular. Photo by Robert Weldon/GIA, courtesy of Edward Boehm. Right: The secondary market is an excellent source for material, such as this 115.13 ct golden sapphire. Photo by Kevin Schumacher, courtesy of B&B Fine Gems.



2019 Tucson Photo Gallery



A: 8.50 ct black opal and diamond necklace. Photo by Emily Lane, courtesy of Lightning Ridge Collection by John Ford. B: Gold butterfly with Tanzanian sapphires, spinels, and garnets, accompanied by loose purple spinel, pink spinel, and yellow sapphire. Photo by Robert Weldon/GIA, courtesy of Akiva Gil Co. C: 8.61 ct unheated purple sapphire and diamond ring. Photo by Emily Lane, courtesy of Jardin Jewels by Beacab. D: 33.36 ct Colombian emerald. Photo by Kevin Schumacher, courtesy of Karin Tremonti. E: Victorian spider pin with ruby, old mine cut diamonds, and natural pearl. Photo by Robert Weldon/GIA, courtesy of Pioneer Gems.



F



G



F: Burmese lavender jadeite cabochon ring and bead strand. Photo by Emily Lane, courtesy of Jade by Nikolai. G: Burmese white jadeite baby fu lion cuff. Photo by Emily Lane, courtesy of Jade by Nikolai. H: 661 ct unheated aquamarine and diamond necklace. Photo by Emily Lane, courtesy of Jardin Jewels by Beacab. I: 640 ct kunzite faceted by Victor Tuzlukov in his signature Lotus cut, containing 108 facets. Photo by Robert Weldon/GIA, courtesy of Victor Tuzlukov. J: Vintage oval cut and engraved Imperial topaz, 41.30 ct. Photo by Robert Weldon/GIA, courtesy of Fei.

COLORED STONES AND ORGANIC MATERIALS

Boulder opal mining with Rod Griffin. At the AGTA show, Rod Griffin (Rod Griffin Boulder Opals, Silverado, California, and Queensland, Australia) told us that the world market for all types of opals continues to be strong, but Australia's opal industry is shrinking due to the costs, challenges, and changing regulations of mining. He also cited recent flooding in Queensland as a challenge; opal mining in Australia has traditionally been difficult due to severe weather and rugged terrain. At the 2018 show, we heard that production of Australian boulder opal (figure 1) was low, with fewer than 30 people mining it in Queensland.

Griffin began mining opal in 1960 with a borrowed jackhammer and a lighting plant, in Andamooka, South Australia, 600 km (~372 miles) north of Adelaide. His methods have evolved considerably in the decades since. Along with standard equipment such as bulldozers, drills, and excavators, he recently began using gamma-ray logging for prospecting, and he will add drone magnetometer surveys and subsurface radar this year.

Mining is in Griffin's blood. His great-great grandfather worked in South Australia's Burra copper mines in the 1800s. Griffin's own introduction to mining was at his uncle's opal operation in northern South Australia. His uncle, who began with six camels and a scraper, eventually had one of the first bulldozers used in opal mining.

Griffin's first find, at Andamooka, was black opal matrix in the bulldozer ramps. In 1970 he found more, in the 17 Mile Field in Coober Pedy. In 1976 he sold \$400 (~\$1,800 in 2019) worth of white Coober Pedy opal and boulder opal, bought a squareback Volkswagen, and traveled around the

Figure 1. The Elusive mine in Koroit, Queensland, is known for boulder opal with the light pattern of color seen here. This stone fits in two hands (its weight is unknown). Photo by Kevin Schumacher, courtesy of Rod Griffin Boulder Opals.

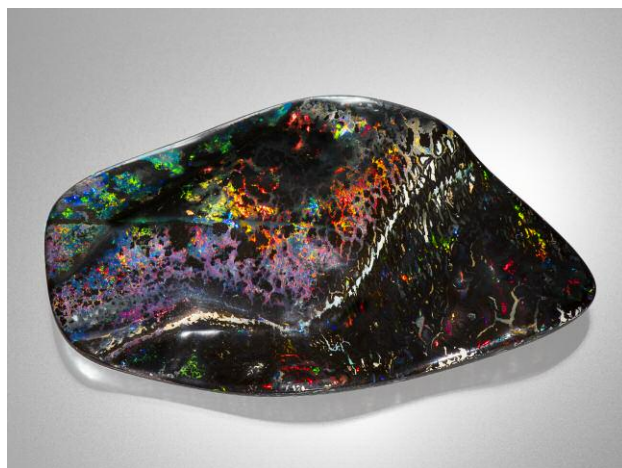
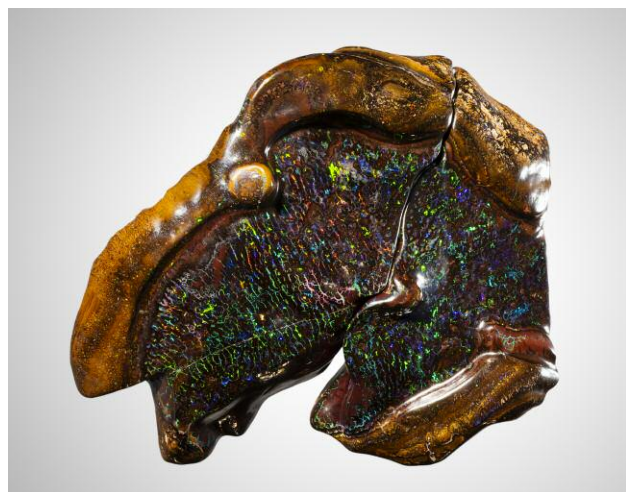


Figure 2. This 245 ct boulder opal came from an open cut in the Elusive mine. The flame-like pattern is unique to Elusive. Photo by Kevin Schumacher, courtesy of Rod Griffin Boulder Opals.

United States selling opal. He first exhibited in Tucson in 1977, at the Pueblo Inn (now the Riverpark Inn). "From that day on, I've been working all my life in opal," he said.

Since then Griffin has mined in New South Wales—where he was the first to bring a tumbling machine to White Cliffs and to use a drill in the Sheepyard field at Lightning Ridge—and South West Queensland, where he and a friend found success using an excavator for the first time. His current operations are in South West Queensland, where he owns the 40-acre Elusive mine in Koroit and will be prospecting west of Quilpie this year.

People thought Griffin was crazy when he bought the Elusive mine in 2013—it was said to be depleted after more than a hundred years of mining. But he found opal 22 feet below ground and has been finding it at 22 to 25 feet for the last several years. The mine is known for boulder opal with the light pattern of color seen in figure 1. Elusive also produces boulder opals with a flame-like pattern (figure 2), which Griffin said is unique to this mine. He added that because the stones were found at a shallow depth and the area is dry, they are stable and will not craze or crack.

In 2017 Griffin worked with two geologists to explore the Elusive mine using gamma-ray logging, which measures naturally occurring radiation in the ground to determine the potential presence of opal. According to Senior and Chaderton, microscopic lattices of silica spheres that produce precious opal's play-of-color contain radioactive elements ("Natural gamma radioactivity and exploration for precious opal in Australia," *The Australian Gemmologist*, No. 23, 2007, pp. 160–176). Gamma-ray logging of drill holes and open-cut mines has detected slightly higher radioactivity around opal deposits and led to new discoveries of opal in Queensland and New South Wales. At Elusive, it was determined that at the current rate of mining, at least seven years' worth of reserves remains. Later in 2017, in several areas of the mine that had previously been explored without success,

gamma-ray logging led to the detection of 1,230 opalized specimens, 30 of which were gem quality.

Griffin said this year he will use gamma-ray logging in prospecting 200 miles west of Quilpie; he will also use drones and subsurface radar for the first time. The drones will be fitted with magnetometers and flown a few feet above ground to measure magnetism and locate ironstone anomalies. Subsurface radar will determine the composition below the ground. Regulatory agency permitting has been secured for the property, and an indigenous land use agreement is in place. But Griffin said there has been a delay in the landowner acknowledging a standing agreement with the miners; he has seen more challenges in obtaining the agreement of all involved parties in recent years.

"There are easier ways to make money," Griffin said. "But I actually feel that I'm in heaven at the moment, doing what I want to do, because I think I found my peace in life."

*Duncan Pay and Erin Hogarth
GIA, Carlsbad*

Brazilian alexandrite update. Gil International's booth at the AGTA show featured something out of the ordinary: a display case with lighting selected to reveal the color change of their Brazilian alexandrites, from blue-green in daylight to reddish purple in incandescent light. Goel "Gil" Gul built the case himself, and he said it has drawn traffic to the booth over the years. Based in New York, Gil International began exhibiting in Tucson 30 years ago; 2019 was their 19th year at the AGTA show.

Gil International specializes in natural Brazilian alexandrite (figure 3), which exhibits a strong color change. Alexandrite was first found in Russia's Ural Mountains in the 1830s. It wasn't until the discovery of Brazilian sources in the late 1980s, most notably Lavra de Hematita (also called Nova Era or Itabira), that greater quantities became available, though alexandrite is still considered rare.

Alexandrite has been in greater demand over the last 15 years, Gul said, but business has been slow the last two. In the past decade, his sales to a company that caters to cruise ships have been particularly strong. He attributes this to people "always looking for something unusual" and having

more time to look at jewelry while on vacation. When Gul entered the industry, aquamarine, tourmaline, and zircon were big. Sapphire has always been very strong, he said, but ruby has come down in the last five years. The demand for stones rises and falls over the decades based on jewelry house promotion, he said, citing Tiffany & Co.'s marketing campaign after the discovery of tanzanite in 1967. He added that more people are buying brown diamonds, previously considered undesirable, because of Le Vian's branding and heavy advertising of "chocolate diamonds."

Gul said that every source has different color; for example, Sri Lankan alexandrite is typically an olive green in daylight, while Brazilian stones are more blue-green. He acknowledged that only laboratory testing can definitively determine country of origin, but he can often make an educated guess based on color. He noted that alexandrites from India are sometimes reported as Brazilian, but he can tell that they are from India because the color change is not as strong and the green tends to be lighter.

Born in Afghanistan and educated in Israel and New York, Gul worked in accounting for a decade before being introduced to the gem and jewelry industry by his four older brothers. They were already selling ruby and sapphire, so they sent him to Brazil. On his first trip to Teófilo Otoni, Minas Gerais, in 1990, Gul bought emerald. He saw some alexandrite but didn't buy any until his next visit. He later found out that the stones were from Lavra de Hematita.

"You buy one stone, but you've got three stones," he said, referring to alexandrite's color change. "I felt I could improve my life with this stone."

Gul bought alexandrite from a broker in Teófilo Otoni for several years and contacted the miner directly about 15 years ago. The miner didn't sell the rough; he had the stones cut in Hong Kong and Thailand, so he controlled the production entirely. Gul began to buy directly from him in Hong Kong.

Gul found that unlike many in the industry, the miner did not like to bargain. So he accepted the miner's prices, and as Gul bought more stones, the miner gave him better deals. As Gil International became stronger in alexandrite, Gul and the miner became good friends. Gul has bought almost all of his alexandrite from him.

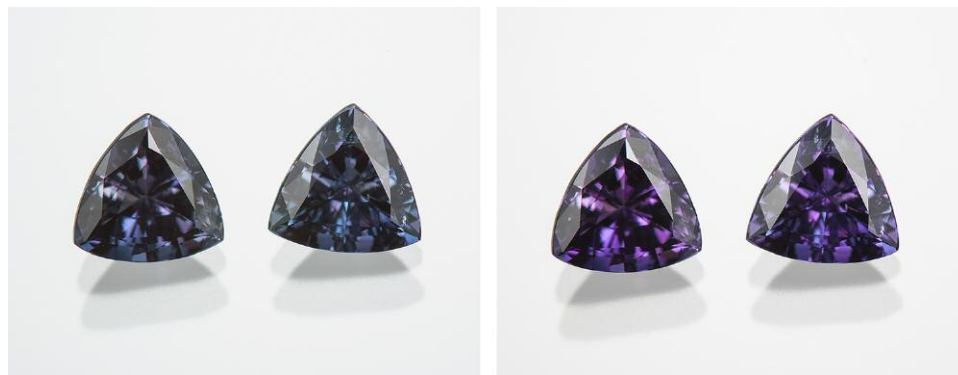


Figure 3. This pair of Brazilian alexandrites (2.41 ct and 6.7 mm each) is photographed in daylight (left) and incandescent light (right). Photos by Kevin Schumacher, courtesy of Gil International.

"The way to make a better business is to find a relationship with the miner," Gul said. "If you have a good relationship, he can trust you; you can trust him. Sometimes even big companies with big money try to bargain, so they don't find a relationship with the miner and can't buy from him."

Gul spoke of turning down the miner's repeated offers to buy goods on memo—including an offer of \$12 million of goods in 2010, when the miner closed seven stores in Greece after the 2008 market crash. "I buy what I can," he said. "And he feels that I'm different [than other dealers] and gives me a chance to do more business."

Erin Hogarth

Cat's-eye nephrite jade from Washington State. Washington Jade (Edmonds, Washington) made its Tucson debut at the AGTA show with nephrite jade from Washington State. They offered a selection of cabochons with and without chatoyancy, along with carvings and rough collectors' stones. The cat's-eye nephrite (figure 4) was the most popular by a wide margin, according to Washington Jade's Nathaniel Cook. Rod Cook, his father and business partner, said that according to many at the show the chatoyancy was reminiscent of the Siberian nephrite that dominates the mid- to high-end Chinese nephrite market.

Cat's-eye nephrite is found only in Washington and Russia; a deposit in Taiwan has been mostly depleted. While nephrite has been found in northwest Washington since the early 1900s, formal production was limited to an operation west of Darrington, near Everett, that ended in the 1970s. Chatoyant nephrite was documented there in 1974. Since then there has been an artisanal "gray market" for nephrite, with people collecting illegally from streams and state lands, but no formal production. This changed in 2012 when Washington Jade began staking claims. Most of their production comes from a deposit northwest of Darrington.

Figure 4. This 1.71 ct cat's-eye nephrite marquise (11 × 5.5 mm) was mined in Washington State. Photo courtesy of Washington Jade.

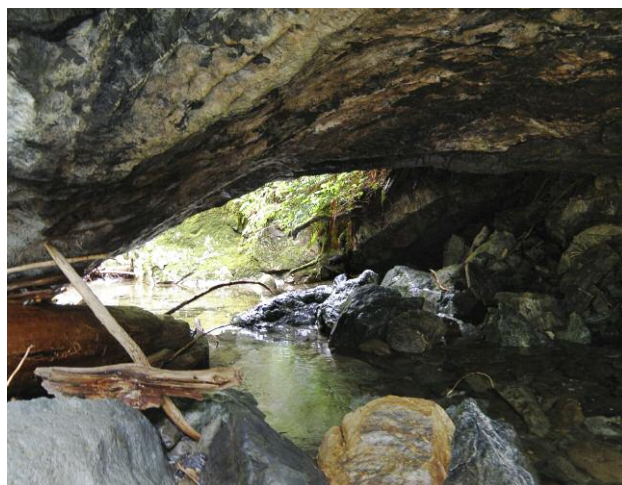


Figure 5. View from inside the "jade cave" on one of Washington Jade's mining claims. The ceiling appears to be a vein of chatoyant nephrite. Near the opening is another vein, the first couple feet of which provided the rough for many of the stones at the AGTA show. Photo courtesy of Washington Jade.

Washington Jade uses innovative small-footprint mining methods instead of more invasive traditional methods. To identify a jade seam, they use pattern recognition to look at geologic models of the area, along with biological indicators such as tree species and lichen growth. Magnetic and conductivity surveys are used to locate the high-grade portion of the seam. With these methods they can develop a 3D model of the subsurface and focus on the high-grade deposits, in contrast to the traditional model of core drilling, digging up an area with heavy equipment, and taking out all the jade to be sorted by grade. They take only the high-value materials, leaving the rest in the ground. Rod Cook said they backfill and replace the plants after extracting the jade, leaving a very small footprint.

British Columbia is the leading supplier of nephrite, but Washington's deposits, part of the same geological formation, have yet to be developed. The domestic jade market is much smaller than the Asian market, where jade has been part of Chinese culture for thousands of years. Nathaniel Cook said the nephrite market overall has tightened recently and prices have come down after steady growth the past two decades, but people were still surprised by what they saw as a low price point for the cat's-eye material.

Rod Cook said there has been an explosion of artisanal jewelers using nephrite. The cat's-eye nephrite is popular with them, though market acceptance is still in the early stage. He noted that Washington Jade's output is large enough to meet domestic demand and could be scaled up to the level needed for a jeweler with a few hundred stores. He sees a trend toward jewelry with "less bling" and said that millennials seem to prefer carved material over faceted.

The Cooks also discovered a "jade cave" (figure 5) in a 200-foot canyon cut by a stream. The jade exposed there in-

forms their geologic models by allowing them to see what a similar structure looks like deep in the ground. The cave formed when a piece of the main chatoyant seam broke loose, slid down the hill, and fell into the stream along one side, creating a tunnel underneath. During the spring melt, water flowed through and created a hydraulic plume, which washed away the overburden on one side and revealed a 2-foot-wide seam of chatoyant jade traveling up into the mountains. Rod Cook estimates there are 30 to 100 tons of chatoyant jade in the cave's immediate vicinity, and they have confirmed outcrops of the main nephrite lode containing the chatoyant seam for 1,500 feet over two of their 23 claims. Based on their discoveries so far, he estimates that the main lode is 150 to 300 feet wide and "goes for miles."

See more about Washington Jade's mining methods and cat's-eye nephrite jade at <https://www.gia.edu/gems-gemology/spring-2019-gemnews-cats-eye-nephrite-from-washington>.

Erin Hogarth

Color-change pink pyrope garnet update. Jewels from the Woods (Blanco, Texas) displayed color-change pink pyrope garnets (figure 6) at the AGTA show. Their color changes from purple in daylight-equivalent light to pink in incandescent light. This was the first time there had been such a large selection of the stones at AGTA, according to independent gem cutter Desmond Chan, who was assisting Jewels from the Woods. He said the material had been very well received.

The stone had been slow to come onto the market, Chan said, because not much rough was available, and the deposit—believed to be in Morogoro, Tanzania—has been depleted. The garnets are said to have been mined in 1988. Initially assumed to be rhodolite, they were put in a safe deposit box until 2014, when they were acquired by cutters Meg Berry, Todd Wacks, and Jason Doubrava. Wacks (Tucson Todd's Gems, Tucson and Vista, California) was the

Figure 6. This 20.00 ct oval color-change pyrope garnet was cut by Victor Tuzlukov. Photo by Kevin Schumacher, courtesy of Jewels from the Woods.



first to detect the color change, and he introduced the garnets in 2015 at the Riverpark Inn (Pueblo) show (Spring 2015 GNI, pp. 88–89). GIA performed a gemological study of the material (Z. Sun et al., "Vanadium- and chromium-bearing pink pyrope garnet," Winter 2015 *G&G*, Vol. 51, No. 4, p. 348–369). One interesting finding was that two of the larger stones had the strongest color change.

Garnets have been "on fire" the last four or five years, according to Doubrava (Jason Doubrava Gems & Minerals, Poway, California). He said the public is more aware of garnets and more appreciative of their varied colors than in the past. "These just absolutely glow," he said of the color-change pink pyrope garnets at the booth.

Erin Hogarth

Colombian emeralds and Mozambican rubies from Fura Gems. We had the opportunity to talk with Rupak Sen, vice president of sales and marketing for Fura Gems in Dubai. Founded in January 2017, Fura holds mining assets in Colombia (emerald) and Mozambique (ruby).

In Colombia, Fura Gems owns and operates the iconic Coscuez mine (D. Fortaleché et al., "The Colombian emerald industry: Winds of change," Fall 2017 *G&G*, pp. 332–358). During its long history, this mine has produced some of the finest gem-quality emeralds, such as the 1750 ct Guinness emerald crystal. In the 1970s, Coscuez accounted for nearly 90% of the world's emerald production, but mining virtually halted during the civil war in the 1980s. In the 1990s, artisanal mining picked up and small licenses were issued by the government. Each license consisted of one tunnel, and many were dug. The approach was very basic, with no scientific exploration or use of engineering to construct the tunnels. People knew that emeralds were associated with white calcite veins, but they had no way of knowing how rich or extensive these veins would be. In the 2000s, Hernando Sanchez acquired and combined all of the small licenses. He has partnered with Fura Gems, which is doing large-scale studies and surveys at Coscuez.

Since work began at the mine in January 2018, Fura has sought to improve the existing infrastructure. The company has done test sampling by washing 3,000 metric tons of emerald-bearing rock, retrieving about 6 carats of gem-grade emerald per ton (figure 7). These numbers will likely drop to 2–3 carats/ton once the mine is in production, since much more rock has to be processed. According to recent resource estimations, around 60 million carats are still unrecovered, representing 30 years of mining. If the mines are expanded deeper underground, those numbers could double or even triple, although geologic exploration is still underway via a drilling program to determine the deposit's depth.

Around 300 people are employed at the site, mainly in bulk sampling; 280 of them are from the local community. They have experience with most aspects of emeralds, including grading and local geology, but they lack knowledge of modern mining techniques and safety measures. Large companies such as Fura are able to instruct their employ-



Figure 7. Colombia's Coscuez mine, worked by Fura Gems since early 2018, produced the stunning emerald rough shown here. These specimens range in weight from 0.089 to 1.279 g (0.445 to 6.397 ct). Photo by Kevin Schumacher.

ees on these matters, which they focused on in the months prior to the production stage. Workers also receive formal contracts and monthly wages rather than being given a part of the production as their wages.

Fura also focuses on social responsibility, including gender issues and environmental reclamation. Fura will be opening a women-only washing plant, where emeralds will be handpicked from the processed host rock. They also understand that while mining is an important part of the community, the entire community cannot work in the mine. Fura has looked at alternative employment opportunities, such as a bakery and a sewing workshop to create uniforms and mining gear. While Colombia has strict environmental regulations that must be addressed every time a license is renewed, Sen says that Fura goes beyond what is required, since environmental issues are becoming more important for shareholders. These efforts are part of the larger concept of responsible mining: respect for the environment, safety, employees, and local communities. One example is setting up a football academy as an after-school activity for kids.

Emeralds will be presorted at the mine and taken to company headquarters in Dubai for final sorting and grading before auction. The plan is to bring these rough emeralds to auction in summer 2019 and invite 25–30 companies from Colombia, New York, Hong Kong, and Jaipur. Fura plans to hold two or three auctions per year and will sell only rough. This will provide a regular flow of emerald to the market while allowing for continuous upgrading of the mine and expansion of community programs.

Fura also has interests in Mozambique, where they own the largest ruby mining licenses in terms of area. Demand for rubies is huge and growing, so a consistent ruby

supply is highly valued. According to Sen, Myanmar produced about US\$1 billion of rough rubies per year at its peak. This has slowed to around US\$120 million annually, leaving an enormous demand for other producers to satisfy.

Since rubies were discovered in Montepuez only a decade ago, the deposit is still developing. The rubies are found there in very shallow gravel layers (figure 8); mining is very easy compared to Colombian emerald extraction. Fura has experience with this deposit and the material, as they helped develop the area's largest ruby mine. They have also acquired Mustang Resources' ruby licenses and assets

Figure 8. These rough rubies were collected from Fura Gems' claims near Montepuez, Mozambique. Photo courtesy of Fura Gems.



and produced there for more than a year. Sen feels that illegal mining is no longer a major problem, which will make it easier to work with the local population.

Fura is exploring the huge license with a drilling campaign to locate the ruby deposits, the extent of which will be determined by more detailed surveys. Once the deposits are identified, bulk sampling will establish the grade. Bulk sampling was scheduled to start in March 2019. They are aiming for a workforce of 400 to 500 by the end of 2019, consisting of 90% local people. Fura is working on social initiatives in Mozambique but did not disclose specifics because the company is still identifying the communities' needs.

Fura hopes to bring the first rough rubies to auction by the end of 2019, in a system similar to their planned emerald auctions. Using this system, a company can learn the pricing of these highly specialized goods and find out which type of buyer prefers certain material. This will allow for better presentation of goods at later auctions (e.g., creating matching sets of rough in the same lot). They also want to set up a ruby treatment facility in Dubai, where rubies can be enhanced by heating prior to auction for clients who do not have these skills. Most of the buyers are expected to be from Thailand, with others from India, Sri Lanka, and Hong Kong.

Sen sees changes in the jewelry market. The 1990s were heavily focused on gold, with diamonds taking the main focus in the 2000s. He believes we are entering the "decade of color," and consumers will move toward colored stones. Since retail margins on colored stones are also higher than on diamonds and gold, retailers are motivated to work with them, further increasing demand. Of course, this does not mean that emeralds and rubies will replace diamonds, only that they will complement each other. Fura Gems sees as its biggest competitor other luxury industries such as high-end designer fashion and accessories. Creating and advertising more attractive products in the jewelry range, Sen said, will be critical to keep customers.

*Wim Vertriest
GIA, Bangkok*

Conversation with Color Source Gems. Rough emerald crystals in a black host rock (figure 9) at the Color Source Gems booth stood out against the AGTA show's variety of cut stones and jewelry. Moshe Chalchinsky, president of New York-based Color Source, first admired the specimen on a supplier's desk during a buying trip to Brazil. Later, upon receiving the shipment of emeralds he had purchased, he was surprised to find the rough among them. For more than 30 years, it has accompanied him to every show. "It's like a mascot, a good luck charm," said Rachel Chalchinsky, his wife and the company's executive vice president. Although many have wanted to buy the emerald, it is not for sale.

While the emerald rough is their mascot, Color Source Gems has traditionally specialized in ruby, sapphire, and emerald (cut stones and jewelry). Moshe said that the current trend is more affordable gems, so they are branching out into tsavorite, spinel, and rhodolite. This year spinel



Figure 9. Moshe Chalchinsky of Color Source Gems acquired this emerald rough in matrix in Nova Era, Brazil, in the 1980s. Since then it has accompanied him to every trade show. Photo by Kevin Schumacher, courtesy of Color Source Gems.

was very popular—especially gray spinel, according to Rachel—and visitors were particularly drawn to the grape-like purple of their rhodolite garnets. Large pieces are harder to move, Moshe said. On a recent trip to Sri Lanka and Bangkok, he bought stones mostly between 1 and 5 carats.

Rachel said the gemstones they look for—clean, well cut, and well defined, with beautiful, consistent color—have become less available and more expensive. They stick to classic jewelry designs such as three-stone rings and tennis bracelets. Moshe said the market has changed because jewelry is often sold on memo now, which is not easy to compete with. They have begun focusing more on stones; two of their sons have joined the business and are also more interested in stones than jewelry.



Figure 10. The trend toward parti-color and fancy-color sapphires is exemplified by this 4.08 ct specimen. Photo courtesy of Color Source Gems.

Rachel sees social media, primarily Instagram, as a major force in the demand for colored stones. Instagram influencers, she said, are increasing the desire for stones people may not have been aware of, like Malaya garnet. People want something different now, a little out of the box, according to Moshe. Rachel noted that there's a big trend toward parti-color and fancy-color sapphires (figure 10) because they are different from traditional sapphire.

While Rachel is the fourth generation of a family in the industry, Moshe was new to the trade 35 years ago. After coming to the United States from Israel, he studied marketing and then sold insurance. He played soccer with peo-

ple in the jewelry industry, one of whom invited Moshe to work for him. "I was running on 47th Street, up and down, knocking on doors," he said. In the mid-1980s, he founded MCR Gems (renamed Color Source Gems in 2015). Moshe first came to Tucson more than 20 years ago.

Asked what's important to him from day to day, Moshe said, "It's about service....and trust. And I always treat my suppliers the right way." Rachel added that Color Source has had some of the same suppliers for over 30 years.

"We can't say no to anybody," one of Moshe's sons told him recently. "If it exists, tell them 'I'll find it for you.'"

Erin Hogarth

The Granada Gallery. Housed in a 1908 vintage Arts and Crafts building on Granada Avenue in Tucson, the Granada Gallery is replete with what its owners call "items of geologic relevance," or rare mineral and fossil specimens. These are carefully lit and displayed to accentuate their beauty and often combined with faceted and carved gem materials, one-of-a-kind *objets d'art*, and finished jewelry. For the visitor, this earth-to-jewel experience accentuates the jewelry industry's rich history.

"We want to further an exchange of ideas between artists, scientists, curators, and collectors," explained Rüdiger Pohl, who owns and curates the traveling gallery along with Alison Magovern. The gallery's Tucson space has been open during the gem and mineral shows since 2013.

The Granada Gallery collaborates with global artists and collectors, "sparked by happy coincidences, shared visions, and the passion for creating something unique," the owners said. This year's exhibit included a collection of Paraíba-type tourmalines from Mozambique (figure 11) and a stunning



Figure 11. Paraíba-type tourmalines from Mozambique. Left to right: a 29.34 ct oval, a 3.01 ct pear set in a rose gold ring, a 51.62 ct oval, and a 65.17 ct trillion cut. They were displayed with a 224.6 g gold nugget from Victoria, Australia. Photo by Robert Weldon/GIA, courtesy of the Granada Gallery.



Figure 12. Pezzottaite is carved into a coiled dragon by Patrick Dreher. The pezzottaite crystal measures $9.6 \times 4.7 \times 2.1$ cm, while the carved pezzottaite is 201.03 ct. Photo by Robert Weldon/GIA, courtesy of the Granada Gallery.



Figure 14. "Chanting of the Stars" was created by the Kreis family of Idar-Oberstein. The "chanting" refers to the sound of a comet entering the earth's atmosphere. The rutilated quartz comet's impact with earth is denoted by the smoky quartz carving. Photo by Robert Weldon/GIA, courtesy of the Granada Gallery.

dragon—carved from the rare mineral pezzottaite, found in a single deposit in Madagascar—by Patrick Dreher (figure 12). Pakistani aquamarine was on display in rough and mounted forms (figure 13). And a year-long collaboration

with the Kreis family of Idar-Oberstein, Germany, resulted in their "Chanting of the Stars" piece (figure 14).

Robert Weldon
GIA, Carlsbad



Figure 13. Left: Jochen Leën's aquamarine and gold bracelet is displayed with a $6.1 \times 9.1 \times 8.5$ cm (369.2 g) aquamarine crystal from Pakistan. Right: This 3436 g aquamarine from the Pohl collection measures $5.0 \times 9.4 \times 7.5$ cm, and is also from Pakistan. Aside from its quartz overgrowth, the crystal exhibits phantom growth features and iridescence. Photos by Robert Weldon/GIA, courtesy of the Granada Gallery.

Gray spinel: A new trend in colored stones. In recent years, the colored stone world has seen a growing appetite for unusual colors. Ruby, sapphire, and emerald with strong saturation but not overly dark tones have always been the mainstay of the colored stone market. But now there is stronger demand for stones in nontraditional colors that might have been difficult to move a decade or two ago. Especially notable is the growing popularity of lighter-toned, lower-saturation pastel stones such as garnets from East Africa or Montana sapphires.

Gray spinels were one of the obvious new trends at the Tucson shows this year. It was not hard to find exhibitors showing off their gray spinel, and everyone who had them commented on how quickly they were selling. The story is remarkable in that the colored stone market has accepted a gemstone that by definition has an unsaturated color—a gray color, no less. Most gray spinel has a minor blue or violet secondary color component. It is relatively rare to find a spinel with a perfectly neutral gray color. These stones have the most value, which increases as the depth of the gray increases. Most of the specimens on display in Tucson were under a carat. Stones larger than a few carats were relatively rare, but we were able to document some with exceptional color, such as the 24.15 ct bluish gray spinel cut by 3090 Gems, LLC in figure 15 or the slightly bluish gray matched pair (10.34 carats total) from Nomad's in figure 16.

Gray spinel's success is due in large part to strong marketing. Of particular note is the influence of social media in bringing this material to the market. In the last year or so, these spinels became quite popular in gemstone circles on Facebook and Instagram. In our interview with cutter Jeff Hapeman (pp. 140–141), he noted how social media has fundamentally altered the industry by allowing gem dealers to satisfy more eclectic desires and by giving consumers power to find and purchase novel and unusual stones that were traditionally unavailable. As we continue to witness the disruptive power of social media in the industry, gray

Figure 15. Spinel with nearly perfectly neutral gray color with only a slightly bluish tinge, 24.15 ct. Photo by Robert Weldon/GIA, courtesy of 3090 Gems, LLC.

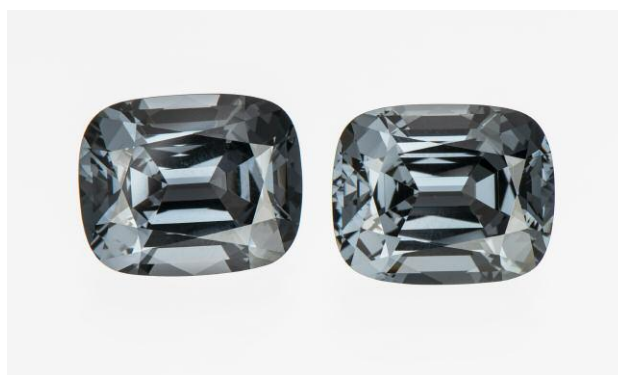
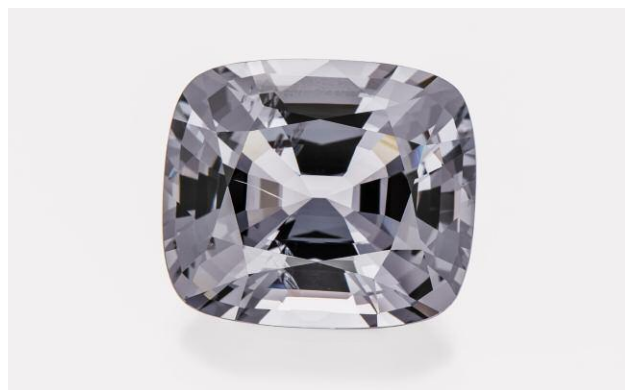


Figure 16. Matched pair of slightly bluish gray spinels with a combined weight of 10.34 carats. Photo by Robert Weldon/GIA, courtesy of Nomad's.

spinel will not be the last story we hear of a once unmarketable color being embraced by the colored stone world.

*Aaron C. Palke
GIA, Carlsbad*

Greenland ruby update. Greenland Ruby has been mining ruby and pink sapphire in southwestern Greenland since mid-2017. The mine is located near the town of Aappaluttoq, about 150 km (93 mi) from the country's capital, Nuuk. During the AGTA show, we had the opportunity to talk to Hayley Henning, Greenland Ruby's vice president of sales and marketing. She offered updates on the development of the mine and the market for their gemstones. Over the last year, the company has refined their extraction techniques. The deposit is challenging to work, and the miners improve their skills and knowledge by mining daily. The main difficulty in working this deposit is its isolated location. The remote area, though close to the coast, is covered in ice and snow most the year. And for most of the year, the only way to reach the mine is by helicopter.

Local residents make up the majority of Greenland Ruby's staff. Around 40 people work and live on-site. The mine is highly mechanized, and heavy equipment and blasting are used to retrieve gems. The on-site sorting house is also very sophisticated. Because of this high degree of mechanization, most of the staff operates the equipment, whereas other colored stone mines often rely heavily on manual labor. Once material is mined and sorted at the plant where ruby is separated from host rock, the ruby concentrate is sent to Nuuk to be cleaned with hydrofluoric acid and sorted by color, clarity, and size. Most of the goods require treatment, which takes place in Chanthaburi, Thailand. Cutting is done in Chanthaburi and India, and then the material is sorted in Bangkok, based on the characteristics of the finished rubies. In order to apply the highest safety, environmental, human rights, and security standards at the mine and the treatment and cutting plants, Greenland Ruby works within this closed system. They feel this is the only way to guarantee the quality and disclosure of the product, and it is their main argument for not selling rough.

Greenland Ruby is experimenting with various cutting styles but sees the greatest potential in cabochons. They can produce a consistent supply of large, fine-colored cabochons. Faceted goods are much rarer. The quality of their gems varies, though most of the goods are lower-end. The material ranges in color from light pink to deep red.

In December 2018, the first collection with Greenlandic rubies was launched by Hartmann's Jewellery, a luxury brand based in Copenhagen. This strategic decision arose from the longstanding connection between Denmark and Greenland. The collection sold out in a matter of weeks. Hartmann's clientele was drawn to the combination of the traditional ruby with an exciting new source that speaks to the imagination. Another aspect that appeals to consumers is the transparent supply chain. Greenlandic rubies are controlled by one company from the moment they leave the ground until the gemstones are finished. This ensures a level of traceability that is rarely seen in the colored stone industry.

Greenland Ruby works with preferred partners rather than selling goods directly to the public. These partners are jewelry brands that want access to a reliable supplier operating with a transparent supply chain, something many clients currently demand.

The Pink Polar Bear Foundation is Greenland Ruby's corporate social responsibility project, which is involved in various research in the Arctic region covering the impact of climate change on local communities and wildlife. The foundation is currently educating locals and supporting the local community.

The mine currently has a projected life of 10 years. At least two other ruby deposits have been identified and studied, though many more can be found in southwestern Greenland.

Wim Vertriest

Hand-carved cameos from Italy. Vincenzo Imposimato (Naples) brought his hand-carved shell cameos and his carving tools to the GJX show to demonstrate the making of these exquisite pieces.

This was Imposimato's sixth visit to Tucson. As a child, he was fascinated by the shell carvings he watched his grandfather make at home. He has also been passionate about drawing since his early childhood, so a career in cameo carving was a natural choice.

Imposimato mainly uses two types of helmet shell. One has a dark brownish background color and originates from the Caribbean Sea; the other, with lighter orange or reddish background, is from the coast of Madagascar. Consumers prefer the darker background because it displays the carved image in greater contrast (figure 17). The Caribbean shell also has a more curved shape, allowing greater complexity in its carving, while the African shell tends to be flat. The Caribbean shell is more expensive, so consumers pay more for these finished cameos.

With a shell in hand, carvers have two possible plans: They can either make a whole-shell cameo or a small piece with different shapes. The general process for both types includes a rough shaping by machine and then detailed carving by hand. For whole-shell cameos, carvers need to hold the shell very gently. Since the shell is empty, carvers must pay extra attention when applying force to avoid damage. As for small cameos, the shell needs to be sliced into small pieces and then shaped by machine. Carvers then attach the small piece to one end of a wood stick with fish glue. Fine hand carving is done by holding the stick next to a hard surface (figure 18).

Detailed carving by hand is done with the *bulino*, a traditional tool for carving and engraving. There are bulinos of different sizes and shapes for different carving purposes. For shell cameos, carvers remove the top whitish layer to



Figure 17. Shells harvested from the Caribbean have a dark brownish background color (left), while shells from Africa—especially Madagascar—show a much lighter background color (right). Photos by Vincenzo Imposimato.



Figure 18. A carver holds the stick attached to the small cameo piece next to a hard surface, which provides support. Photo by Kevin Schumacher.

form a carving against the contrasting background color. The character or theme depicted depends on the shell's natural condition. Factors such as the curvature of the piece, the thickness of the white surface layer, and the color contrast will determine what can be carved. A whole-shell cameo typically takes about two months to finish, while a small piece takes a few days.

Japan was once the biggest market for these handcrafted shell cameos. Imposimato first visited Japan in 1993 to show local consumers how to make cameos. After that, he was invited back more than 20 times. However, the

market has slowed down over the past five years, perhaps due to changing styles. Women used to wear woolen coats that were perfectly paired with cameos. Now that they have more fashion options, many choose other accessories. Even at their height of popularity, cameos were typically purchased by women over the age of 30. Imposimato feels that the themes carved onto cameos need to be updated to appeal to young consumers and expand the market share.

Whereas cameos carved by machines tend to be flat, handmade versions tend to keep the natural curvature of the materials used. While manufactured cameos of all different types of materials are readily available these days, handcrafted shell cameos still hold a unique position in the fine jewelry world.

Tao Hsu
GIA, Carlsbad

Moonstone jewelry. Blue moonstone, an orthoclase species of the feldspar group, is composed of two feldspar minerals, albite and orthoclase, that stack in alternating layers. Adularescence, the optical phenomenon resulting from the scattering of light as it interacts with these two different feldspar layers, occurs below the stone's surface. When the stone is moved, the glow produced by the scattered light appears to float like the moon in the sky. Rainbow moonstone, which shows flashes of multiple colors including blue, is also part of the feldspar group but falls under the labradorite species.

Exceptional blue and rainbow moonstone were both prevalent at this year's Tucson shows, and top designers had fashioned beautiful pieces with them. Paula Crevoshay created a bracelet with 121 moonstones flanked by 495 tiny blue sapphires (figure 19) that was as flexible and soft as a piece of fabric, allowing it to artfully showcase the move-

Figure 19. Paula Crevoshay's "Moon Dance" bracelet contains 121 moonstones totaling 133.19 carats and 495 sapphires totaling 38.61 carats, set in 18K gold. Photo by Kevin Schumacher.

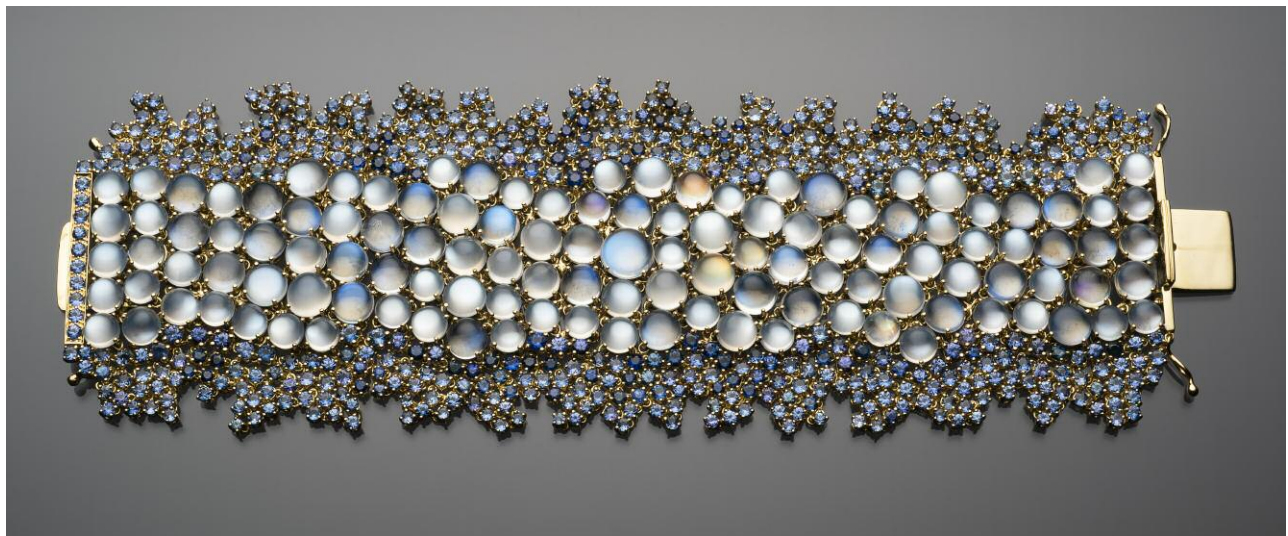




Figure 20. Erica Courtney's moonstone pendant and earrings. The mandala flower cross pendant features 20 carats of moonstones with Paraiba-type tourmaline accents. The chain contains 3.02 carats of diamonds. The double-drop moonstone earrings also have Paraiba-type tourmaline accents. Photo by Robert Weldon/GIA.

ment of the adularescent glow. Erica Courtney, winner of three 2019 AGTA Spectrum Awards, exhibited a stunning moonstone necklace and pair of earrings, both featuring African Paraiba-type tourmalines (figure 20). The intense adularescence of the moonstones in these jewelry pieces is truly captivating.

Jennifer Stone-Sundberg
GIA, New York

Ponderosa sunstone update. John Woodmark, president of Desert Sun Mining and Gems (Depoe Bay, Oregon), updated us on the Ponderosa mine, which he calls the most productive source of Oregon sunstone (figure 21). Demand has increased annually over their 17 years of production, he said. With the larger excavator and high-capacity screen they brought on in 2015, they now mine about 4,300 kg (4.8 tons) of sunstone rough per year, up from about 2,000 kg (2.2 tons) in 2014. About 3% of this material is facet grade. Pon-



Figure 21. Two Oregon sunstones weighing 7.07 and 2.48 ct. The stone on the right, faceted by Larry Woods, has a very rare deep red color. Photo by Robert Weldon/GIA, courtesy of John Woodmark, Desert Sun Mining.

derosa now produces 4,000 to 5,000 cubic yards of concentrate in seven days—more than enough to process in one season (which only lasts five or six months due to snow at the high elevation). Desert Sun was once limited to mining at about 50 feet deep, but the excavator has allowed them to go a few hundred feet deep into the source. Woodmark said the sunstones at that depth are larger and less fractured, and there are some excellent red stones of good size.

Woodmark said demand is especially strong from American and European customers age 45 and under because they want natural, untreated gemstones such as sunstone, opal, and jade. They also love Oregon sunstone's schiller effect, a sparkle caused by reflective copper platelets that makes the stone "different from what their friends have." Desert Sun will be using social media this year for the first time to reach customers looking for unique gemstones.

Jewelers are excited about Oregon sunstone because of the potential high markup, according to Woodmark. He noted that sunstone isn't competing with diamond, ruby, sapphire, and emerald, for which a jeweler might see a 10% or 15% profit margin. Oregon sunstone can yield a triple or quadruple markup, yet it is still relatively affordable: Woodmark said the yellow sunstones sell for about \$30 per carat while the reds can go for \$300 to \$4,000 per carat. Sunstone's affordability, profit margin, and appeal to young consumers make it attractive to jewelers.

Woodmark said the jewelry industry's demand for calibrated sunstones continues to grow, and Desert Sun now receives significant orders from large companies. A typical order might be a thousand 5 mm rounds of orange sunstone. Every color sells well, he told us, but it is difficult to get a specific band of color in natural, untreated gemstones, so

they are trying to grade more consistently. Desert Sun has seven colors, each graded with and without schiller, so overall there are 14. He tries to educate jewelers, manufacturers, and designers on the fact that color in natural stones is more variable—and that many have unique color—to encourage them to use more than one color in their pieces.

Woodmark sees a bright future for Oregon sunstone as more consumers become aware of it. He acknowledged that there will come a time when he and Bruce Moore, Desert Sun's executive vice president, will have to step away from the deposit. "We're barely scratching the surface of what people could do with this mine," he said. Desert Sun only exhibits at the AGTA show in Tucson, but Woodmark said if someone were to take over the mine, they could do 10 shows a year across the United States. At that point, he said, sunstone would "take off."

Duncan Pay and Erin Hogarth

Potentate's Montana sapphire mine: An interview with Warren Boyd. The history of the American West is told in stories of frontiersmen seeking fortune in gold and other precious metals. It was serendipity when these intrepid adventurers arrived in western Montana and discovered strange, shiny pebbles—sapphires—while looking for gold. Little did they know the gem wealth they had uncovered with the sapphires, which were simply a nuisance to the gold miners at first. More than 100 years later, this legacy of mining is carried on by several small-scale miners across Montana, and with the arrival of Potentate Mining at the Rock Creek sapphire deposit. We had the chance to sit down in Tucson with Potentate's director of marketing, Warren Boyd, for an update on their mining activities and their plans to find a place for Montana sapphires in the market.

Sapphire mining can be challenging in the rugged Montana terrain. Harsh winters limit the mining season to about six months a year, and even then water shortages can make mining difficult. The year 2017 saw extreme wildfires that forced the mine to be evacuated several times. Despite these challenges, 2018 was Potentate's third year at full production, yielding more than 100 kg of rough sapphire each mining season. In 2018, the mine commissioned a new processing facility with a larger throughput, which will allow Potentate to process more gravel and produce more sapphires each year. The facility features a gold recovery circuit to recover the fine gold that is produced along with the sapphires. Potentate has also devoted significant resources to protect the beautiful wild areas in which they mine, and a strict rehabilitation program is in place. They are only allowed to disturb five acres at a time, and after rehabilitation there will be little evidence of their mining activities. A water clarifier has also been implemented to purify their processing waters. This is important to protect the pristine trout fishing streams in the area.

The sapphires come in a range of colors (figure 22), from fine deep blues to fancy yellows, oranges, and pinks, and there are very rare Montana rubies. Some stones come out



Figure 22. Rough Montana sapphires in a range of colors. Photo by Albert Salvato, courtesy of Potentate Mining.

of the ground with a fine natural color, but the bulk of the production requires heat treatment to bring out these colors. Less than 1% of the sapphires recovered will end up as faceted stones in the 2–6 ct range, with most of the production cutting stones from 0.25 to 0.99 ct. Some extremely large stones have been produced, however. In the last mining season, Potentate recovered a 64.14 ct rough sapphire, the largest gem-quality sapphire ever found in Montana.

Potentate first exhibited at the Tucson shows in 2018, with a booth in the AGTA GemFair. With mining activities proceeding at full speed, Potentate's focus now is to create market awareness of their commercial-scale production of sapphires, which represents a reliable supply of stones. Their big challenge is not finding a market for their rare large stones, but moving large quantities of small and mid-sized stones. Potentate is building relationships with jewelry manufacturers that have the capacity to find a market for Montana sapphires in the 0.5 ct range. The main markets are in the United States and Canada, but Boyd has seen interest growing internationally as well. Social media has been an important tool for Potentate, and they have started exporting stones to clients in India, Hong Kong, Sri Lanka, and Europe. Montana sapphires have even found a substantial market in sapphire-producing countries such as Australia, where consumers might be looking for their unique pastel colors that are different from those sourced domestically. With their significant investments in mining infrastructure and a clear strategy for getting stones to the market, Potentate Mining could make a substantial impact in the story of Montana sapphires.

For a bird's-eye view of the Potentate mining site, visit <https://www.gia.edu/gems-gemology/spring-2019-gem-news-potentate-mine-warren-boyd>.

Aaron C. Palke



Figure 23. These “rainbow lattice” specimens, a 4.14 g rough stone and a 2.18 ct kite-shaped cabochon, are from Harts Range in central Australia. Photo by Robert Weldon/GIA, courtesy of Rainbow Lattice.

“Rainbow lattice” from Australia. One of the most striking materials encountered in the Riverpark Inn (Pueblo) Gem Show was “rainbow lattice.” This rare phenomenal gem is a variety of feldspar exhibiting aventurescence from exsolution hematite crystals and a rainbow lattice effect from oriented exsolution magnetite crystals. Supply is extremely limited, and the only source is the tiny Utnerengatye mine in Harts Range, Northern Territory, Australia. Rainbow lattice was discovered in 1985 and acknowledged as a new gem material in 1989. One of the original discoverers, Darren Arthur, showed us all-new material he mined in 2018 and

subsequently sorted and cut (figure 23). With its scarcity and unique appearance, rainbow lattice is a must for any serious rare gem collection.

Jennifer Stone-Sundberg

Sourcing stones with Columbia Gem House. Eric Braunwart (Columbia Gem House, Vancouver, Washington) spoke to us on how the industry has evolved since he opened his doors in 1976. Columbia Gem House has been a pioneer in the responsible sourcing of gemstones.

Braunwart traces his commitment to ethically sourced gems, those that he can track and trace and align with the company’s fair trade protocols, to a project he worked on with the World Bank in Madagascar about 20 years ago. His involvement with this project led him to set up fair trade standards for his own business—no small feat, as there were no such procedures for the gem and jewelry industry at the time. To create policies, Braunwart and his staff turned to industries such as food and agriculture. The company has remained open to public feedback; this is how Braunwart became passionate about prevention of silicosis in cutting communities. They have collaborated with different entities to create projects to benefit miners and their communities (read about one such project in J.-L. Archuleta, “The color of responsibility: Ethical issues and solutions in colored gemstones,” Summer 2016 *G&G*, pp. 144–160). The company continues to seek out projects in regions where they can make a difference by setting up schools, medical facilities, and other community needs.

Growing up in the American West led to Braunwart’s interest in the region’s nontraditional gem materials, such as agates, garnets, and petrified wood. Even though his business was involved in more traditional gem materials, he was drawn to the chalcedony, variscite, and turquoise that were not featured in classic jewelry. Today, Columbia Gem House sources and cuts about 150 different varieties of gemstones. American gemstones, such as the faceted blue hyalite opal from Oregon (figure 24, left), are one of their specialties. Much of their current business comes from small designers



Figure 24. Left: These trillion-cut blue hyalite opals from Oregon, weighing about 2.25 ct each, are reminiscent of moonstone. Right: Five Montana sapphires, ranging from 0.60 to 1.20 ct, showcase Columbia Gem House’s “GeoCut,” which follows the crystal’s natural shape. Photo by Robert Weldon/GIA.



Figure 25. This 21.33 ct blue and green unheated sapphire is from Tanzania. Photo by Robert Weldon/GIA.

rather than large corporate interests. They have run their cutting facility in China for 35 years, with a trusted team that can quickly respond to orders.

While the company was in business before millennials were even born, this generation has clearly influenced the company's sales; many of this year's buyers in Tucson were people in their twenties representing small designer firms making modest purchases. Braunwart has been able to capitalize on social media (particularly Instagram) to make decisions on materials, colors, and cuts, allowing followers to vote on what types of material to promote. He believes that social media will continue to drive consumers toward ethical and sustainable choices in jewelry, with the full impact being felt within the next five years.

The 2019 AGTA show brought many new and established buyers to the Columbia Gem House booth. In fact, Braunwart said that this Tucson show, the company's 41st, was their most successful ever. He attributes that to a growing interest in sustainably and ethically mined gemstones. Popular items included small baguettes in a variety of colors and materials, unheated Montana sapphire, Cortez pearls, and fossilized coral from Utah. The company's "GeoCut," a simple cut that follows the natural shape of the crystal, is used in materials such as Montana sapphire (figure 24, right). One remarkable stone from outside the United States was a 21.33 ct unheated sapphire from Tanzania showing distinct blue and green colors (figure 25).

Jennifer-Lynn Archuleta and Jennifer Stone-Sundberg

Thoughts on the Chinese and Japanese gem markets. At the Tucson shows, Shahin Aboosalih, director of SR Trading, spoke to us about his path to the gemstone and jewelry industry and his company's gemstone business in Japan and China.

Shahin, as he prefers to be called, comes from four generations of Sri Lankan gem merchants, but initially he took another career path. He spent seven years in the Sri Lankan

banking industry and then decided to go to school in Japan to study the language, with no intention of entering the gem industry. In fact, his father always encouraged him to pursue a career outside the gem business. In 1993, after completing his Japanese language studies and gaining experience in computer graphics, Shahin returned to Sri Lanka and joined Dilmah, a major tea exporting company, as a packaging designer. In 1996, he was offered an opportunity to work in Kofu, Japan, by STS Gems Japan Ltd., an Indian multinational colored gemstone and jewelry company. This was his stepping stone to the world of gems. "At that time, I didn't know what a tanzanite or sapphire was, even though my family had huge knowledge in corundum from Sri Lanka for several generations," he explained.

When Shahin started in the industry during the 1990s, Japan's economy was in recession, yet fine gemstones like Paraíba tourmaline (figure 26) were still in demand. As the recession continued, gemstones that were once rare and more difficult to source—such as fine blue star sapphires, emeralds, and Paraíba tourmaline—kept momentum and held their prices.

Sunil Agrawal, CEO of STS and one of Shahin's early mentors in Japan, taught him everything "from scratch." The company sent Shahin to Jaipur, India, for several months to learn colored stone identification. Then he traveled to Brazil, India, South Africa, Thailand, and Sri Lanka to find new material to meet the heavy demand from his Japanese clients for a wide range of stones, including fine corundum, spinel, tourmaline of all kinds, and aquamarine. He also learned finer cutting techniques in Sri Lanka from his father-in-law, Naji Sammoon (founder and chairman of

Figure 26. Paraíba tourmaline, such as this 3.71 ct pear-shaped stone, was popular in Japan when Shahin entered the gem trade. Photo courtesy of SR Trading.





Figure 27. This rare blue-green beryl from Madagascar, weighing 10.19 ct, contains iron, chromium, and vanadium. Photo by Kevin Schumacher, courtesy of SR Trading.

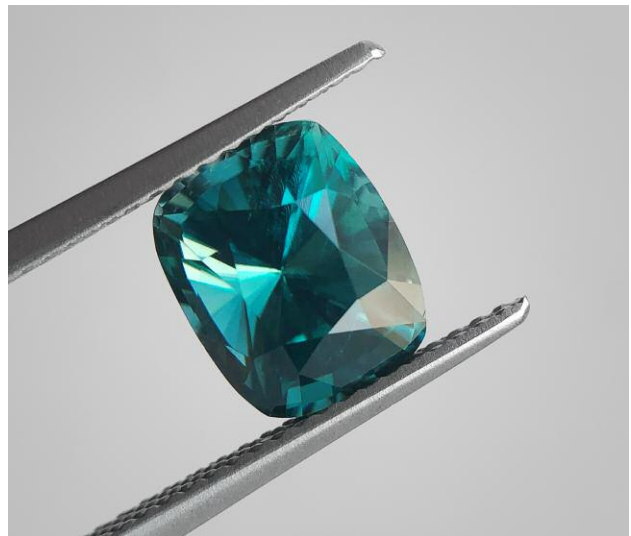


Figure 28. A 2.95 ct grandidierite from Madagascar. Photo courtesy of SR Trading.

Sapphire Cutters (Pvt) Ltd. in Colombo). He used these skills, along with his computer graphics background, to perfect gem cuts and meet the high standards for faceted stones in the Japanese market. "The trade is looking for nice material, precision, and perfection," Shahin said.

At the height of the global recession in 2008, Shahin became managing director of SR Trading, his older brother's company. Japanese clients were looking for unusual and rare material that had become more popular in recent years, including grandidierite and benitoite. In 2012, Shahin transitioned to the Chinese market. His brother Ruzaik Aboosalih runs the business in Japan, specializing in padparadscha sapphire, Paraíba tourmaline, and other rare stones. Shahin sees great opportunity in China and Hong Kong. He has developed a very strong client base along with Cindy Xin Hao, who started out as his Chinese translator and has become a gem expert and managing partner of the Chinese business.

Shahin thinks of China as a "young" market with consumers who are curious to see variety, more so than their traditional Japanese, European, and American counterparts. Here he targets almost every colored gemstone. His Chinese clients look for a wide variety of colored stones: corundum, emerald, and aquamarine and other beryls (see figure 27), as well as precious opal and tourmaline in its many colors. This gives Shahin opportunities to look for more stone varieties every day. Despite this market's demand for a wide variety of gem material, gemological education is relatively new in China. Therefore, Shahin and Cindy conduct mini-seminars to groups of 10–15 people to teach them about gemology and the supply, demand, and value of colored stones. They also conduct gem mining and leisure tours in Sri Lanka for small groups from China. They educate the tourists about the process, from mining and cutting to the finished product.

Shahin said that historically some of the finest corundum has come from Sri Lanka, but currently most sapphire is sourced from Madagascar. For other colored stones—such as grandidierite (figure 28), spinel, and Paraíba and other tourmalines—the main producers are mainly Brazil, Tanzania, Kenya, Congo, and India. Shahin buys stones from Hong Kong and Bangkok as well; such gems include spinel, rubies, mint-green garnets, and tanzanite (figure 29). Most of the time he buys faceted mate-

Figure 29. A 22.6 ct precision cushion-cut deep blue tanzanite. Photo by Kevin Schumacher, courtesy of SR Trading.





Figure 30. A pink 173.22 ct fluorite, measuring 35 × 33 mm, from Uri, Switzerland. This stone is representative of minerals discovered by strahlers, mineral hunters from the Swiss Alps. Photo by Kevin Schumacher, courtesy of Gravier & Gemmes.

rial, but as a perfectionist, he will recut 90% of his stones in Sri Lanka. He purchases all his stones, and they all undergo his personal inspection and quality control. His passion for his stones is what makes them easy to sell, because they are all very special to him. "I love them all," he said.

Shahin sees plenty of opportunity for those who can bring value-added merchandise to the market. The global industry is looking for attractive, ethical, value-added gems. While it can be a struggle to find quality material—be it corundum, Paraíba tourmaline, spinel, or any other colored stone—it is worth it to work hard and be patient enough to find the right opportunity and source. Shahin notes, "With the experience and connections and what I've learned in the past 20 years, it helps to meet the right people and prod-

uct to satisfy the demand. This demand will continue, and I see that as an opportunity to make business in the future."

Jonathan Muyal
GIA, Carlsbad

Unusual faceted gemstones. Denis Gravier of Gravier & Gemmes (Poncin, France) exclusively sells rare and unusual faceted stones, such as the pink fluorite from Switzerland shown in figure 30. During the GJX show, he shared insights about the market for such gems.

Gravier developed a passion for colored stones and minerals while growing up in the French countryside. He studied mineralogy, crystallography, and petrology before traveling to the Republic of the Congo, Pakistan, Mexico, the former Yugoslavia, and Morocco a few decades ago to collect mineral specimens. He also learned gemstone cutting techniques. With the knowledge and experience he gained, he decided to open a company specializing in faceted stones of unusual varieties. Some of these gems, he explained, are rarely if ever used in jewelry. The challenge is finding them, but after decades of traveling and visiting the mines, he knows many people in the trade. Now the stones come to him during major shows, so it is no longer necessary to go to the sources. He still travels occasionally to Sri Lanka and Madagascar, where he buys rough that he will have cut in France or overseas. Gravier says Tucson "is a great show...you can almost see all that is available in the world at that time during the show." In Tucson he meets with clients from the U.S., Japan and other parts of Asia, and European countries.

In terms of novelty and rarity, Madagascar offers the largest variety and supply. New gemstones are always emerging, Gravier explained. Among his stones from Madagascar were the dumortierite and green sphene in figure 31.

He also described the market for unusual faceted gems. Collectors, not the jewelry industry, are the clientele for rare stones in France and around Europe, which is dominated by



Figure 31. Unusual stones from Madagascar. Left: A 0.51 ct dumortierite (5.4 × 4.5 mm). This mineral, commonly known as an inclusion, is now available in very limited quantities as a gem. Right: A 19.65 ct round-cut green sphene. Photos by Kevin Schumacher, courtesy of Gravier & Gemmes.



Figure 32. A 1.21 ct intense yellow legrandite, a rare zinc arsenate mineral from Mexico. Since the last discovery of this mineral in the 1970s, it has appeared on the market only sporadically. Photo by Kevin Schumacher, courtesy of Gravier & Gemmes.

the “Big Three” and diamond. Faceted legrandite (figure 32), grandidierite, and dumortierite, for example, are generally not used in jewelry pieces. On the other hand, in Asia, especially Japan, people are attracted by rarity and there is a demand for “exotic” quality material, even in small sizes, for use in jewelry. Gravier feels that more people there have a general knowledge of and interest in gemology and colored stones. The Chinese market is becoming increasingly important for his business. One benefit of the rare stone market is that treatments are not common among these gems, making it a good source for people seeking untreated material.

Even though there is growing competition, with goods at all price points available on the Internet and aggressive marketing through the web and social media activity, Gravier chooses not to sell on the Internet. He invests in improving the quality and variety of his stock, relying on his long-term relationships with clients and suppliers.

Gravier sees a rising interest in rare stones. He believes he is helping to create more appreciation for a wide range of colored stone varieties. He hunts for rare treasures and, as an ambassador for unusual stones, gives them a chance for public exposure and recognition.

Jonathan Moyal

A variety of colored stones from Mayer & Watt. Mother-and-son team Laurie and Geoffrey Watt (Mayer & Watt, Maysville, Kentucky) noted that while there were plenty of customers at the AGTA show this year, the formula for success was a wide selection of materials and competitive pricing. Their booth had a selection of what was hot this year: the highly sought-after gray zircon, as well as pink and blue zircon; fancy colors of Montana sapphire;



Figure 33. An 8 mm 2.01 ct trillion-cut gray spinel from Myanmar. Photo courtesy of Mayer & Watt.

Ethiopian emerald from Shakiso; electric pink spinel from the Mahenge deposit in Tanzania; and a wide variety of garnet colors, such as true purple garnet from Mozambique. Gray spinel was one of the most popular stones this year for a wide variety of jewelry applications, including engagement rings. Mayer & Watt had one of the best selections of actual achromatic gray spinel, with no stray hues of blue, green, or purple (figure 33). The true purple garnet offered by Mayer & Watt and a handful of other vendors at AGTA and GJX comes from a single small source discovered in 2015 in Mozambique (figure 34). This garnet lacks a pinkish cast, unlike less expensive pinkish purple material coming from Tanzania.

Jennifer Stone-Sundberg

Figure 34. This purple garnet from Mozambique is a 1.25 ct hexagon measuring 6.1 mm. Photo courtesy of Mayer & Watt.



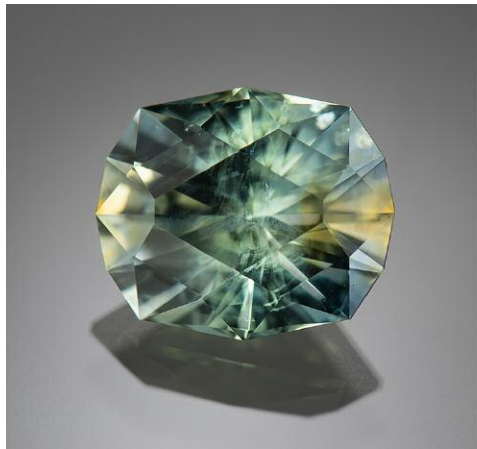


Figure 35. Left: This 4.37 ct unheated bi-color sapphire from the Potentate mine in Montana features Jeff Hapeman's signature Helena cut. Courtesy of Jeffrey R. Hapeman, *Earth's Treasury*. Right: A 4.57 ct heated blue sapphire from Potentate. Photo by Kevin Schumacher.

CUTS AND CUTTING

Jeff Hapeman: Stories from a gem cutter. Jeff Hapeman of *Earth's Treasury* (Westtown, Pennsylvania) loves a gemstone with a good story. Whether it's the story of a young couple buying one of his Montana sapphires for an engagement ring or the amethyst he dug out of the ground on an Amish farm in rural Pennsylvania, Hapeman feels that every gemstone needs a story. His own story starts with a boy reading old rock and mineral magazines, staring in fascination at the new find of blue-cap tourmalines coming out of Pala, California, in the early 1970s. These images were fresh in Hapeman's mind when he took a break from his career in finance technology in Southern California to work at the Oceanview pegmatite mine. One of the miners thought he might have the talent for cutting stones and pushed him to take up faceting.

Since cutting his first gemstone in 2013, Hapeman has developed his own style, creating designs he describes as "somewhat modern and somewhat classic at the same time." The modern elements are seen in the elegant but slightly angular and geometric appearance of many of the stones he cuts. At the same time, Hapeman claims there is a simplicity to his designs, even though "simple" is certainly not a term that comes to mind when you see his work. His designs are often born out of necessity as he fits the cut to work with a piece of rough that would not work with his previous designs. One of his more recognizable designs is the Helena cut, named in honor of Montana's state capital. Rough Montana sapphires are often found in flattened, slightly oval shapes. Ovals are among the least rewarding stones for many lapidary artists. Even when skillfully executed, the results can be boring. And yet, through a fine balance between rigorous mathematical modeling and his own gut feeling and intuition, Hapeman has managed to produce a visually interesting oval cut that is well suited for Montana sapphires, deepening the color of these typically pastel-hued gemstones (figure 35).

Montana sapphires have become particularly important in Hapeman's career. He became involved with the Potentate Mining operation at Rock Creek (p. 134) as they were

developing their mine. Montana sapphires can be trickier to cut than blue sapphires from Asia and Africa. While they often have exceptional clarity, fine cutting can greatly benefit Montana sapphires due to their sometimes lighter pastel colors and pleochroism. Early on, Hapeman cut many Montana sapphires in order to demonstrate this to Potentate Mining. Since then he has become one of the most prominent cutters working with Potentate's production, and he often collaborates with them to cut and market some of their larger and finer stones.

When sourcing material, Hapeman seeks out the unusual. His involvement with Potentate gave him the opportunity to cut several exceptionally rare Montana rubies from the Rock Creek deposit (figure 36). Unlike some lapidary artists, he actually likes cutting round brilliants, as he appreciates the beauty and symmetry of a perfectly executed cut. He especially seeks out materials with high lus-

Figure 36. A collection of eight Montana rubies from Rock Creek, mined by Potentate, ranging in weight from 0.172 to 0.578 ct. Photo by Kevin Schumacher, courtesy of Jeffrey R. Hapeman, *Earth's Treasury*.





Figure 37. This rare faceted scheelite weighs 6.08 ct. Photo by Kevin Schumacher, courtesy of Jeffrey R. Hapeman, *Earth's Treasury*.

ter and dispersion for his experiments with round brilliants, such as the scheelite from China in figure 37.

Hapeman also discussed the use of social media in the gem and jewelry industry. Social media has helped cutters like him who deal largely in nontraditional stones by allowing them to reach clients with eclectic tastes. It has profoundly reshaped the gem industry by giving more control to end consumers to purchase exactly what they want. Hapeman said that those in the gem and jewelry trade who can harness social media will gain a competitive edge. This is especially true for the younger generation of cutters and designers, who are using social media to find a market for gems and jewelry that could have been hard to move 10 or 20 years ago.

Aaron C. Palke

Largest square cushion-cut tsavorite. At the AGTA show, Bridges Tsavorite unveiled the largest known square cushion-cut tsavorite, weighing 116.76 ct (figure 38). The 283.74 ct rough stone was mined by the company in Merelani, Tanzania, in September 2017. Bangkok-based gem cutter Victor Tuzlukov cut the stone at Bridges Tsavorite's Arizona office over the course of a month in 2018.

The tsavorite could be a once-in-a-lifetime stone, said Bruce Bridges, the company's CEO and son of the late Campbell Bridges. Despite seeing most of the finest tsavorites in the world above 20 carats, he had never seen one comparable to this size in a square cushion cut. The square cushion and round cuts are the rarest shapes for tsavorite because the rough typically lends itself to other shapes.

Size and cut were not the only factors contributing to this tsavorite's rarity. The rough was extremely clean for its size. It had several very well-terminated euhedral faces, unusual for tsavorite, which typically has more fragmented face formation. The tsavorite also has the distinction of being the largest gemstone cut in the United States.

Bridges said that the public is much more concerned about ethical sourcing than in the past and wants to know where a gemstone came from; in keeping with Bridges Tsavorite's mine-to-market tradition, the stone's process from mining to finished product was completely documented. "My father would be very happy that we're doing this and that we're carrying on his legacy," he said.

In March 2018, a GIA team traveled to Arizona to document the cutting of the stone. Find out more about this rare tsavorite, and how Victor Tuzlukov approaches the cutting process, at <https://www.gia.edu/gems-gemology/spring-2019-gemnews-largest-square-cushion-cut-tsavorite>.

Duncan Pay and Erin Hogarth

Figure 38. This 283.74 ct rough tsavorite (left) was mined in Merelani, Tanzania, by Bridges Tsavorite and yielded a 116.76 ct square cushion cut (right). Photos by Robert Weldon/GIA, courtesy of Bruce Bridges.





Figure 39. This cuprian tourmaline from Mozambique measures 37×26.5 mm and weighs 109.62 ct. Photo by Kevin Schumacher, courtesy of Wild & Petsch.

Wild & Petsch: Sourcing rough and cutting in Idar-Oberstein. Wild & Petsch (Idar-Oberstein, Germany) was formed when two established companies, headed by brothers-in-law Alexander Wild and Thomas Petsch, joined forces. The roots of the merged company go back to 1901. Today the firm is still sourcing rough and faceting stones in their 15-cutter workshop in Idar-Oberstein. Over the last few years they have increased their quality levels, embracing the slogan “Nothing leaves our offices that is not perfect.” While most of their work involves freeform hand faceting, machine-assisted techniques are used during preforming to achieve optimal results. They supply other businesses mainly through trade shows and an international network of distributors.

According to Alexander Wild, high-quality material is not limited to facet-grade rough. Wild & Petsch produces faceted stones, cabochons, and beads, but all must be of the highest quality. To guarantee high standards of their craftsmanship, the firm has started an apprenticeship program. During this three-year period, enrollees learn high-level lapidary skills in the company’s professional workshop while attending school. After this period, they are certified as gem cutters, and after a few more years they can receive the distinction of Master Gem Cutter. The region has seen a renewed interest in lapidary work among young men and women.

All the material cut in the workshop is sourced by Wild & Petsch. They travel to the producing areas and buy as close to the mines as possible. In some cases, this means buying at the source, which requires a strong relationship with the mine owners. Wild & Petsch has such relationships with tourmaline miners in East Africa. Elsewhere, they collect stones in the local markets (e.g., Arusha, Tanzania) where material from a wide area comes together.

Wild said the rough trade has not changed much in the last few decades. As new sources are found, it remains extremely important to maintain contact with the source and the end client to strike the best deals. Flexibility is key, as they must be able to check out new finds right away. For example, the majority of beryl is sourced from Africa, but

in the mid-1990s the most amazing materials came from Ukraine and other former Soviet states. Without an extensive international network that covers nontraditional mining areas, such opportunities would be missed.

The biggest change in recent years is likely the speed at which information travels. Today a single social media post about a new find can alert the whole world, but simply having that information is not sufficient. Rough buying is clearly more complex than traveling to mining areas with sufficient funds. Being able to judge parcels quickly in terms of quality and value—and having the confidence to invest in the material—requires years of experience. This is not a skill that can be learned in school. In this area, established companies like Wild & Petsch have an enormous advantage.

For Wild & Petsch, the most exciting material in the last five years has been Mozambican cuprian tourmaline (figure 39), which satisfies a market demand created by the original Paraíba tourmalines from Brazil. Another exciting find is green non-cuprian tourmaline from Mozambique (figure 40), with its fresh, minty colors and blue-green tones. Apart from tourmaline, the company works with a wide range of colored gemstones, including different beryls, fine tanzanite, and African garnets.

Wild acknowledged that regional trends strongly impact rough buying and finished goods sales, using the interest in bicolor tourmaline from Asia about 10 years ago as an example. Many dealers had those stones in stock for decades already, with prices established. Clients paid a premium for these tourmalines, and everyone was happy to sell their old stock for an additional profit; this also raised prices at the source. This unusual market behavior did not last, and prices quickly collapsed. As a result, many people are now sitting on very expensive rough material that does not conform to current market prices. Even though those trends

Figure 40. A non-cuprian green tourmaline from Mozambique, weighing 37.01 ct and measuring 22×17.5 mm. Photo by Kevin Schumacher, courtesy of Wild & Petsch.





Figure 41. Katzenbach's "Colors of Maine" kaleidoscope features 71.74 carats of Maine tourmaline and 66.05 carats of Maine quartz between three lenses. Photo by Brian Moghadam, courtesy of AGTA.



Figure 42. Katzenbach created this top, which uses 18K gold, sapphire, alexandrite, tourmaline, tsavorite, and other garnets, to resemble a "spinning rainbow." Photo by Derek Katzenbach.

impact the trade on different levels, Alexander Wild stands by the motto "Good taste is international."

Responsible practices have become increasingly important in the gem trade, and Wild & Petsch is working on its own set of standards to provide to customers. Wild said that his larger clients have already requested such information. He noted, "This is a rocky road with many challenges and obstacles. We will have to take a realistic approach and acknowledge that there will be limits to what we can do and not everything is within reach. Unfortunately, you can't control the world." Wild does believe that everyone in the trade should see how they can apply responsible practices in sorting, cutting, manufacturing, and exporting.

Wim Vertriest

JEWELRY DESIGN

Derek Katzenbach: Faceter, gem artist, custom jeweler. Derek Katzenbach, winner of multiple AGTA Spectrum Awards, was once a marine biology student visiting a local gem show. Until then, the thought of working in a creative industry had never crossed his mind. He spent much of his savings at that show, leaving with a bag full of stones but no idea what to do with them. He decided to take jewelry manufacturing classes and learn more as an apprentice in a jewelry store. The owner convinced Katzenbach to attend GIA, where he completed the Graduate Gemologist and Graduate Jeweler programs. There he honed his skills and learned new techniques.

He also saw a lot of gems, triggering an interest in lapidary and how brilliance and scintillation can influence appearance. A friend taught Katzenbach the basics of faceting, and he kept practicing and experimenting with different patterns. He started working with concave faceting, inspired by the work of Dalan Hargrave and Richard Homer. Eventually he spent a week with them to refine his technique. After

graduating from GIA, he went back to work at the same store for five years before starting his own business.

In his experience, gem cutters and metalworkers look at stones very differently. Having a background in both fields gave him a unique advantage in pushing boundaries and experimenting even further.

One of Katzenbach's most celebrated pieces is a kaleidoscope, shown in figure 41, called "Colors of Maine." For this he chose Maine tourmaline (the official gem of his home state) and Maine quartz. Most of the gems in the kaleidoscope come from Plumbago Mountain, where about a ton of gem tourmaline was recovered between 1972 and 1974. The green tourmalines are from the Havey mine. Apart from the cutting of melee and very small stones, Katzenbach did most of the work himself.

"Colors of Maine" won first place in the Objects of Art category at the 2017 AGTA Spectrum Awards. Afterward, the piece was bought and donated to GIA, where it is on display at the Carlsbad campus with other Maine tourmalines. Creating the kaleidoscope sparked Katzenbach's interest in *objets d'art*. He had always been fascinated by such pieces but found most of them boring and restricted because you cannot touch them. Katzenbach wanted to do something different. This gave him the idea to create a spinning top (figure 42) reminiscent of a rainbow. He used a variety of gemstones—including sapphire, alexandrite, tourmaline, tsavorite, and other garnets—to create this 18K gold toy that no one can resist spinning. The top can be seen in motion at <https://www.gia.edu/gems-gemology/spring-2019-gemnews-derek-katzenbach>.

Katzenbach also creates traditional jewelry. He has always been drawn to a mix of modern pieces with micro-pavé and the lacy textures of Victorian and Edwardian jewelry, but he loves to add color to them. He works mostly with locally sourced Maine minerals, which he finds through miners, collectors, and even museums. Tourmaline (figure 43) is the most common, but he also uses garnet,

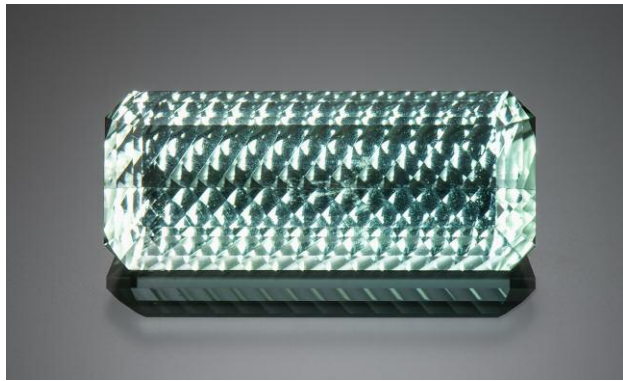


Figure 43. This 7.48 ct cuprian tourmaline uses what Katzenbach calls his “fantasy cut.” Photo by Kevin Schumacher.



Figure 44. This exceptional 10.02 ct 15.4 × 12.0 mm cushion-cut dark blue cobalt spinel is unheated. Photo by Robert Weldon/GIA, courtesy of Jeffrey Bilgore and John Bachman.

aquamarine, smoky quartz, and rare minerals. He occasionally sources internationally, but his favorite gems are Oregon sunstone and Montana sapphire.

Katzenbach would like to get back into engraving, something he enjoyed during his time as a gemology student. He feels that many great gemstone and jewelry artists, including carvers, metalsmiths, and gem setters, are embracing each other’s work and actively looking for collaborations. This will inevitably lead to new and exciting jewelry creations in the coming years.

Wim Verriest

Jeffrey Bilgore gems and jewelry designs. Jeffrey Bilgore is both a prominent gem dealer and an award-winning jewelry designer, and at his AGTA booth we found examples of exotic gems and exquisite jewelry. Among these was one of the most notable cobalt spinel gems we have encountered (figure 44). Displayed between two similarly sized

blue sapphires, the unheated spinel was almost indistinguishable from them. A stunning fire opal and Russian demantoid garnet pin with tsavorite garnets and yellow diamonds (figure 45) also caught our attention, a testament to the artistry of Bilgore’s work.

Jennifer Stone-Sundberg

New designs from Paula Crevoshay. Paula Crevoshay continues to delight with whimsical designs and masterful control of color and light. At the AGTA show, she introduced several new pieces in her collection of threatened and extinct species, such as the charming penguin shown in figure 46. Crevoshay currently has a one-woman exhibition at the Natural History Museum of Los Angeles County entitled *Art of the Jewel: The Crevoshay Collection*, which explores her exhaustive process for creating jewels depicting nature all the way back to the uncut gem materials. A collaboration with lapidary intarsia master Nicolai Medvedev



Figure 45. A fire opal and Russian demantoid garnet pin designed and produced by Jeffrey Bilgore. The piece contains five carved fire opal leaves (18.74 carats total), four demantoid garnets (0.40 carats total), seven tsavorite garnets (0.17 carats total), a 0.20 ct pear-shaped Fancy Intense yellow diamond, and five additional yellow round diamonds (0.03 carats total), set in platinum. Photo by Robert Weldon/GIA.



Figure 46. Paula Crevoshay's "Penguin" pendant features 120 white moonstones, 10.09 carats total. It also contains 152 black diamonds with a total weight of 4.22 carats, 14 yellow diamonds (0.43 carats total), and eight orange opals (0.27 carats total), set in 18K gold. Photo by Robert Weldon/GIA.



Figure 48. Crevoshay's "Anemone" features a 10.86 ct center sphenix surrounded by 16 opals with a total weight of 5.37 carats: four pears, four marquise cuts, and eight rounds. The outer layer contains blue zircon, sapphire, tsavorite, and apatite. Photo by Robert Weldon/GIA.

yielded the breathtaking "Garden of Delight" mystery box (figure 47), replete with a blue columbine on top, gold insects on each corner, mating hummingbirds that arise when the box is opened, and a delicate string of ladybugs making their way up the hinge. Another piece that demonstrates

Crevoshay's artistry is the "Anemone" pendant/brooch, which mixes greens and blues from a variety of gems, including sphenix, opal, zircon, sapphire, garnet, and apatite (figure 48).

Jennifer Stone-Sundberg

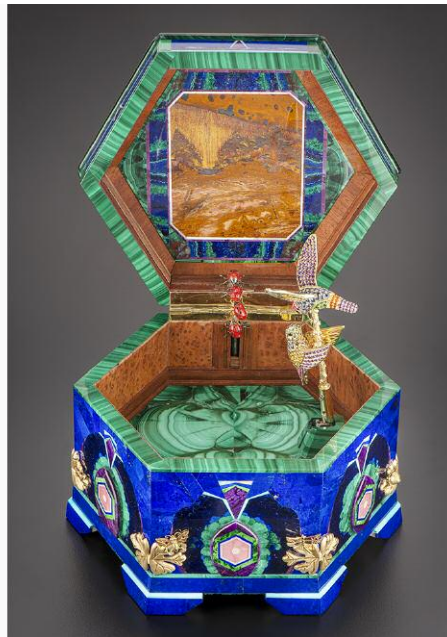


Figure 47. The "Garden of Delight" mystery box (165 × 188 mm) contains lapis lazuli, opal, sugilite, malachite, turquoise, azurite-malachite, rhodochrosite stalactites, and maw-sit-sit. The hummingbirds and branch inside the box feature amethyst, spinel, sapphire, tsavorite, opal, and black diamond. The removable columbine brooch on the lid is set with 13.89 carats of Yogo sapphire along with yellow sapphire and diamond in 18K yellow and white gold. Photos by Robert Weldon/GIA.



Figure 49. This 2 ct Old European cut diamond has a color grade of N and a clarity grade of VS₁. The faceted girdle is not original to the stone; originally this would have had a bruted girdle. Photo by Albert Salvato, courtesy of Perpetuum Jewels.



Figure 50. This 3.74 ct unheated sapphire was removed from a vintage 1960s platinum pendant. The sapphire was refaceted by Jean-Noel Soni of Top Notch Faceting. Photo by Albert Salvato, courtesy of Perpetuum Jewels.

RESPONSIBLE PRACTICES

Recycled gemstones from Perpetuum Jewels. The Tucson shows were busy for Perpetuum Jewels (New York and San Francisco), a wholesaler specializing in post-consumer recycled diamonds and colored stones in original, antique cuts. They also work with mine-to-market gemstones and estate jewelry. Co-founder Jared Holstein spoke to us about the importance of recycled gems to the industry (figure 49).

Perpetuum works mainly with designers and jewelry stores in the bridal market. The company originally sought to provide alternatives to newly mined material, focusing on stones cut before 1940. They are active on social media and with organizations such as the Women's Jewelry Association and Ethical Metalsmiths, which drives traffic their way. Holstein and his partner, Jay Moncada, enjoy working with antique stones because each one is different. Rather than achieving a "mathematical ideal of what a stone should look like," each is cut to different proportions and has a history and character all of its own. Holstein teaches his clients the progression from the first point cut (with eight facets) to today's multifaceted cuts. While they have a good deal of stock for center stones, they also have antique melee for eternity bands and other pieces.

Their clients seek the smallest possible environmental footprint—as Holstein points out, "Diamonds are the ultimate recyclable material, because they are so hard," allowing them to be used in jewelry again and again—or choose, for other reasons, to avoid newly mined gems. Many simply love the appearance and mystique of large antique-cut diamonds. The oldest one in stock was a Peruzzi-cut diamond with a double-cut bottom and a triple-cut top; the diamond came from a Victorian ring that it clearly predated. Diamond's hardness allows a long journey through many cuts and several mountings. Holstein explained, "I like to think that there is probably a modern brilliant, which was a transitional cut, which was an Old European cut, which was an

old cushion, which was a Peruzzi, which was a Mazarin, which was a table cut, and which was a point cut."

With the emergence of the "alternative bridal market," Holstein and Moncada see designers choosing to work with colored stones instead of diamonds. In these cases, they work with a large supply of corundum. While they carry fine classic and antique blue sapphire (figure 50), their clientele gravitates toward softer blues, teals, and greens (figure 51); Montana and Australian bi- and parti-color sapphire are also popular. Holstein would like to see a move toward spinel and garnets by their bridal clients.

Perpetuum is the only company to achieve the SCS Recycled Gemstone Standard, a third-party certification for 100% post-consumer recycled diamonds and gemstones. The SCS annually audits all aspects of a business to ensure it is a responsible source before awarding this certification. A company must prove, for instance, that its environmental footprint decreases every year while recycled inventory increases annually. The latter has become difficult for Perpetuum, as

Figure 51. This 1.28 ct blue-green sapphire is from Montana's Eldorado Bar deposit. Photo by Kevin Schumacher, courtesy of Perpetuum Jewels.





Figure 52. Sourcing gem rough from East Africa led Roger Dery to seek ways to benefit the communities. These pink and green tourmalines are from the Democratic Republic of the Congo. Photo by Rachel Dery.

they now carry recently mined Montana and Australian sapphire to meet their clients' needs. Doing so has lowered their level of recycled gemstones to below 100%.

Holstein said he has never been able to separate the jewelry pieces he loves from the issues endemic to the industry. He has always been aware that the makings are

“from someone else’s backyard.” He considers it his responsibility to engage in ethical, environmentally sustainable and responsible practices because they are better for the communities that mine and cut the metals and stones that help him make a living; this is at the core of his business practices. Perpetuum’s booth in Tucson allows him to meet with new and existing clients and educate them on these matters that are close to his heart.

Jennifer-Lynn Archuleta

Gem Legacy: A nonprofit for East African communities. The launch party for Gem Legacy, a nonprofit organization benefiting East African mining communities, was held in Tucson on February 8. This author sat down with founder Roger Dery (Roger Dery Gem Design, Royal Oak, Michigan) to discuss the organization’s mission and projects.

Dery entered the trade in 1981, supplying gems from Brazil, India, and East African countries to jewelry stores in the Midwest before becoming a cutter. He took his first trip to Africa in 2008, visiting a dozen mines in Madagascar over 17 days and purchasing rough from the communities (see figure 52). Over the course of several more trips, also visiting mines and gem dealers in Tanzania and Kenya, Dery realized that he did not just want to purchase goods and leave, nor did he want to conflict with local customs. Through 2017, he and his fellow travelers brought food to mining villages to build trust and contribute to each community.

After consulting with his wife and daughter about the best way to contribute to these communities, in 2018 Dery formed Gem Legacy, a nonprofit that supports specific projects in the areas of education, vocational training, and entrepreneurship. Gem Legacy has provided three sessions of gemological training in Malawi (in conjunction with the country’s Ministry of Mines), paid school fees for orphans in Malawi (figure 53), provided beds to orphaned children



Figure 53. Through the work of Gem Legacy, orphans in the Mwatate Children’s Home in Mwatate, Kenya, had their school fees covered. Photo by Rachel Dery.

in Kenya, and delivered equipment to women miners in southern Kenya. They are now raising funds to update the machines at Tanzania's Arusha Gem Faceting School.

There are many ways to give through Gem Legacy. Retailers may choose to stock souvenirs made in communities that benefit from the nonprofit and donate all proceeds back to the communities. Other options include event hosting and donating a percentage from sales of a given collection. Gem Legacy also encourages pajama, toy, and book drives; grassroots fundraising through platforms such as GoFundMe; and direct donations to the nonprofit itself. For more on Gem Legacy, go to <https://www.gemlegacy.org>.

Jennifer-Lynn Archuleta

Jewelry Development Impact Index. The Jewelry Development Impact Index (JDI), one of the initiatives from the second Jewelry Industry Summit in January 2017, has become the flagship project of the Minerals, Materials and Society (MMS) program at the University of Delaware. Patricia Syvrud, development manager of MMS, discussed the program, which she calls a "road map to responsibility."

The index is a work in progress; it has been part of the MMS curriculum since the fall 2018 semester. Rather than comparing products from various areas, the index analyzes the impact of sourcing on a given country. Graduate students are given two countries and asked to compare them using the seven UN Indicators of Human Security as a framework. From there, they devise a methodology for measurement. In fall 2018, students looking at sapphire mining in Madagascar and platinum mining in South Africa drafted a binary quantitative approach that created scores and rankings based on answers to closed-ended questions. Such questions included "Is this country a signatory to the Extractive Industries Transparency Initiative?" (Zero points are assessed for a yes, one point for a no.) After the total risk has been calculated on a scale from 0 to 10 for each category, recommendations for risk reduction are proposed. The fall 2018 assessment is being used and enhanced by the spring 2019 students. At the same time, students in the university's Energy and Environmental Policy program are developing a methodology to compile existing indices in order to help MMS students leverage this published knowledge.

Syvrud, who has worked in many areas of the gem and jewelry industry, became involved with the JDI on a volunteer basis. She advised the U.S. Department of State on how to measure a gemstone supply chain's impact on the welfare of a country, particularly since the sale of gemstones might fund terrorism and other illegal activities. It was decided that the best way to collect and compile this information was through academic research and case studies. During this time Syvrud met Dr. Saleem Ali, who had received a grant to create the Gemstones and Sustainable Development Knowledge Hub (GemHub; see Summer 2018 GNI, pp. 243–245). Shortly thereafter, Ali was awarded a grant from the Unidel Foundation to create an interdisciplinary program at the University of Delaware to study all extractable mineral

resources and the science, politics, and socioeconomics surrounding them. He and Syvrud identified the JDI as the project that would anchor the MMS program and the graduate certificate that students would earn upon completion.

Response to the JDI has been positive. The Organisation for Economic Co-operation and Development, among others, has taken notice, and invited the MMS program to participate in their responsible minerals forum in April 2019. Syvrud is hopeful that the JDI can help members of the industry understand and answer questions about supply chains; it will also help companies understand and adhere to the numerous supply chain certifications and standards to become more transparent themselves.

Jennifer-Lynn Archuleta

Reinvesting in Cartagena: Jewelry School of the Caribbean. Alfredo Diaz (Caribe Jewelry, Cartagena, Colombia) spoke to the authors about the Jewelry School of the Caribbean (FEJOCAR), a nonprofit organization that teaches at-risk youth the art of jewelry making.

Working as a tour guide in his native Colombia, Diaz was frequently asked by tourists where to buy jewelry. He and his brothers opened a small jewelry repair workshop in 1983, catering to both tourists and locals. They expanded into selling their own small jewelry pieces, often featuring Colombian emerald. They sold through other businesses at first but eventually began selling pieces directly to the public. As they made more money, the brothers realized it was important to generate more employment in Cartagena. In 2009 they formed FEJOCAR and began outreach to poverty-stricken areas of the city, focusing on young people from neighborhoods with heavy gang and criminal activity.

The school accepts 75 students per year. Once enrolled, the students may choose between the jewelry design, manufacturing, gemstone polishing, and goldsmithing tracks. Caribe hires the most promising students for their own business. The education at FEJOCAR involves knowledge of jewelry techniques and training in software so that the students can use CAD/CAM and create prototypes. The gem polishing and jewelry design programs take four to six months to complete, while the jewelry manufacturing and goldsmithing tracks take one year.

The Diaz brothers faced challenges at the outset of the program. Some found it hard to believe that the brothers would trust their new employees, some of whom had criminal backgrounds. In fact, Diaz said, trust is essential to their working relationships. Employees appreciate this trust and respond in kind. While investigating student absences, they found out that many did not have the money for transportation or meals, so they started providing transportation fees and breakfast and lunch on-site. Today, FEJOCAR provides 30 full scholarships to help students in need enroll and complete their programs. Of the 120 employees at Caribe Jewelry's stores, about 40 were recipients of scholarships.

About 60% of their students are women, a dramatic shift from when the program began; at the start, all of the

goldsmithing students were men. Diaz also intends to set up home workshops for employees who are mothers, to reduce their need for childcare while maintaining production. They have plans for one employee to polish emeralds at home; the other will have a goldsmithing station.

Emeralds are very important to Colombia and to Caribe Jewelry; to that end, the Diazes have set up the Emerald Museum at their store on Bocagrande Calle in Cartagena. The highlight of the museum is "Petra," the largest emerald in matrix ever to emerge from Colombia. They also have space dedicated to other varieties of beryl, including heliodor, aquamarine, red beryl, and goshenite.

The success of the school led the Diazes to move to a larger building to accommodate their students; they have also been able to increase their in-house production. Diaz said their long-term goal is to produce 90% of their own jewelry and buy 10% of their goods from wholesalers; at this point they produce 60% of their own pieces (up from last year's 30%). One of the benefits of local craftsmanship is the ability to maintain a distinctive look that incorporates pre-Columbian indigenous imagery, separating it from Chinese or European designs. Another is the interaction between employees and tourists. The school offers a class for tourists wherein each visitor is paired with a FEJOCAR student. Visitors tour the museum before sitting down to make a piece of jewelry and getting to know a Cartagena local, a wonderful experience for both tourist and student. The Diaz brothers look forward to expanding their business, the school, and their students' horizons in the years to come.

To watch video of the FEJOCAR students, go to <https://www.gia.edu/gems-gemology/spring-2019-gem-news-jewelry-school-of-caribbean-cartagena>.

Jennifer-Lynn Archuleta

The Rock Hound: Muzo emeralds and ethical practices. At the JCK Tucson show, Susi Smither (The Rock Hound, London) displayed pieces that showcase her love of gemstones and her passion for color. Combining technical knowledge with aesthetics to create unique lines, Smither refers to her business as "the gemologist jeweler," and re-



Figure 54. The centerpiece of the Molten Muzo collection, the "Candelabra" necklace features 20.63 carats of responsibly sourced Colombian emeralds. Photo by Kevin Schumacher, courtesy of The Rock Hound.

ceives a number of commissions from gemologists. She offers jewelry at multiple price points, ranging from \$400 to \$11,000. A major point of pride for Smither is Molten Muzo, a five-piece fine jewelry collection launched in December 2018. One of 25 international jewelry designers selected by Muzo Emerald Colombia for collaboration, Smither combined ethically sourced emeralds in tumbled form with Fairtrade 18K yellow gold. The "Candelabra" necklace, the collection's lead piece, is shown in figure 54. The collection also features two pairs of earrings and two rings, one of which is shown in figure 55. Smither allows the emeralds to steal the show; the gold "dripping" from the gemstones complements, rather than overtakes, the simplicity of the tumbled stones.

The daughter of mineral collectors, Smither entered the industry as a jewelry designer and maker about 10 years ago.



Figure 55. Left: The "Drip" earrings from the Molten Muzo collection use 16.22 carats total of emerald, catching the light as the wearer moves. Photo courtesy of The Rock Hound. Right: An inner world is visible in this 11.05 ct emerald, from one of two rings in the collection. Photo by Kevin Schumacher, courtesy of The Rock Hound.



Figure 56. Pieces from The Rock Hound's Chromanteq line. Left: This pendant features a 6.48 ct Brazilian heliodor in an 18K recycled white gold setting and an 18K yellow gold chain. The pendant's blue color comes from a signature ceramic coating. Right: The rings in this line also use the ceramic coating. The ring on the left uses 18K recycled white gold and is set with a 9.95 ct Afghani peridot. The ring on the right has a 2.38 ct Tanzanian spessartine set in 18K recycled yellow gold. Photos by Kevin Schumacher, courtesy of The Rock Hound.

As she took on more commissioned work, she earned her FGA diploma from Gem-A, immersing herself in the world of "science and beauty." During a field trip to Sri Lanka with the Scottish Gemmological Association in 2012, she was struck by the disparity between the luxuriously appointed jewelry shops of Hatton Garden and Bond Street and the gritty, often dangerous reality of mining. Thus, at the core of Smither's brand are her ethical practices. The Rock Hound has been a Fairtrade licensee since its inception in 2015, using only recycled gold and Fairtrade Gold from Peru.

Smither noted that the industry has evolved even since The Rock Hound began. Last year she found a casting house in the UK that creates three different alloys of 18K gold three times a week, opening the doors for a fully Fairtrade Gold collection called RockStars, inspired by the shape of a natural tourmaline crystal. To ensure the integrity of her supply chain, she works with artisanal lapidaries who go into the field to work with mining communities. Stones sourced in this way are used in her Chromanteq line, which sets colored gemstones in ceramic-coated recycled 18K gold (figure 56).

Smither's commitment to responsible standards extends to her packaging, made from the perch leather that is a byproduct of the fishing industry. She has sometimes had to choose from a limited selection of materials due to her commitment to responsible sourcing. As a result she would design once she procured her materials rather than designing solely with good in mind. However, she feels that as a young designer starting out, she was better positioned to put sustainable practices in place. Trying to replace longstanding protocols would have been far more difficult for an established business. As this type of sourcing becomes more widespread, she feels that she can expand the design side of The Rock Hound—these days,

Smither is "dreaming bigger." She is eager to create new lines for the next wave of consumers who are equally passionate about sustainable jewelry.

Jennifer-Lynn Archuleta

CONFERENCE REPORTS

Accredited Gemologists Association (AGA) conference. The AGA conference, held February 6 in Tucson, was attended by 138 participants from 11 countries. The program was diverse and engaging, as evidenced by the audience questions after each presentation. During the break, participants were invited to a hands-on demonstration of traditional gemological and advanced spectroscopy equipment.

The first talk was by **Jeffery Bergman** of Primagem, who detailed the mine-to-market effort for emeralds from the Shakiso mine in southern Ethiopia. He described some of the material as similar to Muzo's in color, and some as having a "Paraíba-like glow." To ensure that the finest material can receive grades of "no clarity enhancement," mineral oil is never used on the rough. For material that warrants clarity enhancement, only high-grade cedarwood oil is used. A variety of inclusions have been identified, most commonly biotite mica. Other inclusions are growth tubes, blocky two- and three-phase inclusions, horsetails, dendritic magnesium oxide, chromite, and tourmaline. Color zoning in this material can be very strong.

Gina Latendresse of the American Pearl Company gave a fascinating overview of natural pearls from the Western Hemisphere. She described the vast quantities collected by Native Americans from the coast of Venezuela that made their way to Spain in the 1500s, establishing the New

World as a source. She then covered the pearl rush between 1850 and 1900 in New Jersey and the Tennessee Valley following the discovery of many impressive specimens. David Howell found the largest American freshwater pearl, 400 grains (100 ct) in size, in New Jersey in 1857. Shortly after, an attractive 93 grain (13 ct) pink pearl was found nearby and sold to Charles Tiffany. Unable to find a U.S. customer, he sold it to Empress Eugenie, resulting in the name “Queen Pearl.” By 1901, the lakes and rivers in the Tennessee Valley had developed pearl fisheries, with production peaking in 1904. Latendresse introduced U.S. natural pearls of many shapes and colors originating from a variety of mollusk species.

Claudio Milisenda presented an overview of tourmaline, including Idar-Oberstein’s efforts to promote the material, localities, and the roles of chemistry and heat treatment in tourmaline color. He walked the audience through the varieties verdalite, indicolite, chrome tourmaline, rubellite, red tourmaline, canary tourmaline, and Paraíba tourmaline. The talk also reviewed various tourmaline treatments and imitations encountered today.

To complement the Gübelin Gem Lab’s launch of “Provenance Proof Blockchain” by Gübelin Labs at Tucson this year, managing director **Daniel Nyfeler** gave a presentation on the traceability of gemstones. The talk addressed the lack of transparency in the gemstone supply chain and Gübelin’s solutions for this issue. Reasons cited for the lack of transparency included the mines’ remoteness and restricted access, the informal nature of mining, frequent changes of custody, trading based on relationships and trust, a complex and fragmented value chain, and the lack of an established method for traceability. The problems arising from this lack of transparency include unreliable information provided to consumers (gem labs try to fill this gap with provenance determination), the dilemma for ethically conscious consumers—particularly millennials—who are willing to pay for sustainably sourced products, and the lack of independent audits within the industry. Stakeholders who would benefit from greater transparency are governments (for legal and tax purposes), insurance agencies, financial institutions, and consumers.

Two solutions that would work in tandem were presented: a physical tracer embedded in the stone at the mine, and a digital tracker. The physical tracer would involve Gübelin embedding 100 nm silica spheres that hold synthetic DNA programmed to include information such as the mine location. These permanently implanted spheres, which require openings of at least 400 nm, are designed to survive all cutting and cleaning processes. Gübelin would have the ability to later extract the DNA, sequence it, and verify the stone’s origin. This tracer is designed for emerald, and the present design would not survive the more physically punishing corundum processing. The digital tracker, meanwhile, would allow a stone to be tagged all the way back to the mine using blockchain so that each time the stone changed hands, a logbook entry would be made, allowing

for permanent storage of encrypted information at each step of the journey from mine to market. The Provenance Proof Blockchain system was released February 8 at the AGTA show. It is free and open to the industry for all gemstone types. The benefits touted for this tracking included new avenues of storytelling for retailers, reduced costs as gem reports would not be needed, and less inflated prices as non-value transactions would be eliminated. And with the ability to audit the supply chain, more aspects of the business could be properly insured. Following the presentation, a spirited question-and-answer session touched on privacy for dealers and consumers, the impact on artisanal miners, the logistics of implanting the encapsulated DNA, and resistance from gem dealers over security concerns.

The last scheduled talk, an overview of the new FTC rules, was canceled due to the recent U.S. government shutdown. A substitute talk graciously given by **Jon Phillips** (Corona Jewellery Company, Ltd.) covered Canadian diamonds. He noted Canada’s place as the world’s second-leading producer of diamonds and reported on the significant mines, the types of material coming from them, and notable stones found. The Ekati mine has both surface and underground components, and has produced numerous vivid and intense yellows as well as pinks and colorless. Within the mine, 53-million-year-old wood that had been perfectly preserved in the oxygen-free environment was found and brought to the surface. The Renard mine was plagued by the hardness of the kimberlite, making diamond separation extremely difficult. De Beers is showcasing its “Future Smart” mining process with the Chidliak project in Nunavut, Baffin Island, where there are no roads, environmental impact is minimal, and power is supplied by wind energy. Notable stones from the Diavik mine include the 177.71 ct Vega, the 24.82 ct Capella, the Fancy Vivid yellow 30.54 ct Arctic Sun, and a recently discovered 552.74 ct yellow diamond that is likely the largest diamond ever found in North America.

Following the conference, the AGA presented its 20th annual Bonanno Awards. For the first time, three categories were recognized in the same year: education, gemological instrumentation, and gemological research. The award for gemological education went to **Donna Hawrelko**, a gemology and jewelry educator at Vancouver Community College. Hawrelko’s 27 years of teaching has touched thousands of individuals, and she was key in developing the educational program offered by the Canadian Gemmological Association. The award for gemological instrumentation was given to the cofounders of Magilabs, **Alberto Scarani** and **Mikko Aström**. Scarani and Aström have made advanced spectroscopy accessible and affordable to a wide range of gemologists by developing portable tools such as the GemmoRaman system. These allow appraisers and gemologists access to technology that was recently available only through major laboratories. The award for gemological research went to **Karl Schmetzer**, a renowned researcher and author, for his more than 50 years of gemological and mineralogical work documented in over 400

publications, two books, and 12 new mineral discoveries. Dr. Schmetzer has shared his research with the community and strived to improve professional standards in the industry through work with CIBJO and other organizations.

Jennifer Stone-Sundberg

2019 Jewelry Industry Summit. The third Jewelry Industry Summit, held in Tucson February 2–3, revealed the successful implementation of several initiatives mapped out since the conference's inception in 2016.

Opening remarks by summit chair **Cecilia Gardner** and AGTA's **Doug Hucker** were followed by a session on mining communities. In a presentation on sustainable mining, **Assheton Stewart Carter** (The Dragonfly Initiative) discussed incentivizing improvements while managing environmental, social, and governance risks and needs at artisanal and small-scale mines. He explained how the Dragonfly Initiative creates partnerships with other organizations that can provide research, funding, and other assistance on the local level. This was followed by the Dragonfly Initiative's **Vivien Johnston**, **Fiona Wellington** of Myne, and **Mahmood Alam Mahsud** (Fine Cut Lapidary)—all by video chat—describing their efforts to create an emerald cutting and polishing center to employ and empower Pakistani women. **Tom Cushman** (Richfield Investor Services) recounted issues with sourcing gold in Madagascar, while **Toby Pomeroy** provided insights into the Mercury Free Mining Challenge, a quest to create a safe and effective alternative to the use of mercury by artisanal and small-scale gold miners. The Initiative for Responsible Mining Assurance, or IRMA, an organization dedicated to creating and sharing financial value for mines that achieve best practices, was introduced by consultant **Christina Miller** and **Lara Kortizke** of IRMA. Two breakout sessions occupied much of the first afternoon: one on creating an industry-accepted glossary (see www.gia.edu/gems-gemology/spring-2019-gemnews-jewelry-summit-glossary-initiative), and the other on building a business with responsible sourcing principles. This was followed by a lively discussion on the benefits and drawbacks of blockchain between **Mike Pace** (Connected Jewelry), **Robin Gambhir** (Fair Trade Jewellery Co.), **Carrie George** (Everledger), and **Mark Hanna** (Richline).

Day two provided a synopsis of the Jewelry Development Impact Index by **Patricia Syvrud** of the University of Delaware's Minerals, Materials and Society program (p. 148), as well as a discussion with Doug Hucker and Patricia Syvrud on the silicosis abatement program sponsored by GemHub, AGTA, and the Minerals, Materials and Society program. **Steven Benson** (CIBJO) reported on the release of CIBJO's Blue Book on the responsible sourcing of gemstones and precious metals (p. 158), available as a free download from www.cibjo.org. **Brian Cook** (Nature's Geometry) provided an update on the Bahia Brazil Golden Initiative, a cooperative of rutiled quartz miners in the Chapada Diamantina region of Bahia State, Brazil. Patricia Syvrud spoke with **Charles Lawson** (Lawson Gems International)

on the outcomes from four years of gem and jewelry training for women sapphire miners in Sakaraha, Madagascar. The day ended with a screening of the gold mining documentary *River of Gold*, with a speaker panel consisting of producer **Sarah duPont**, **Torry Hoover** (Hoover and Strong), Toby Pomeroy, and Tom Cushman.

Jennifer-Lynn Archuleta

ANNOUNCEMENTS

Second annual Buccellati Award winner. Ching-Hui Weng, a 2018 graduate of GIA's Jewelry Design program in Taiwan, received the second annual Gianmaria Buccellati Foundation Award for Excellence in Jewelry Design. One of 18 finalists from GIA's seven schools, her winning design was a bird brooch (figure 57) featuring white and yellow gold, white and yellow diamonds, opal, aquamarine, lapis lazuli, black chalcedony, and coral. "My inspiration for this piece is the *Urocissa caerulea*, a blue bird that represents Taiwan," said Weng. "The gemstones in this piece illustrate the bird's fierce temperament and flight."

Weng will travel to Italy to meet Mrs. Buccellati and view part of the foundation's collection. She will also receive a plaque recognizing her achievement.

"We are pleased to congratulate Ms. Ching-Hui Weng, and look forward to welcoming her to Italy. Together with GIA, we hope to continue to encourage and support the dreams of young jewelry designers throughout the world," said Larry French, chief officer of North America strategies for the Gianmaria Buccellati Foundation. "We know Gianmaria would have been proud to have his name on an event that celebrates, so beautifully, the art of jewelry design, the art that he loved so much."

Submissions were presented as original, hand-rendered designs. Following several phases of judging, they were finally evaluated by a panel of industry experts. Weng was announced as the winner at the annual GIA alumni event held during the AGTA Gem Fair in Tucson.

The Gianmaria Buccellati Foundation sponsors the award to inspire beginning designers and honor the house's founder. The 2019 award is now open to GIA Jewelry Design students who meet the eligibility requirements.

REGULAR FEATURES

COLORED STONES AND ORGANIC MATERIALS

Unique orange sapphire with golden sheen effect reportedly from Kenya. Golden sheen sapphires from Kenya have been reported in this journal and elsewhere (e.g., T.N. Bui et al., "From exsolution to 'gold sheen': A new variety of corundum," *Journal of Gemmology*, Vol. 34, No. 8, 2015,



Figure 57. Ching-Hui Weng's design, which won the second annual Buccellati Award, was inspired by the Urocissa caerulea bird, which is representative of her native Taiwan. The finished piece features white and yellow gold, white and yellow diamonds, opal, aquamarine, lapis lazuli, black chalcedony, and coral.

pp. 678–691; N. Narudeesombat et al., “Golden sheen and non-sheen sapphires from Kenya,” *The Gem and Jewelry Institute of Thailand*, July-August 2016, pp. 282–288). Those sapphires, however, were the cabochon-quality blue-green-yellow stones that exhibited a shimmering golden effect caused by the light reflection from hematite platelets and needle-like inclusions. No faceted transparent stones have been mentioned in the previous literature. Recently the Gem and Jewelry Institute of Thailand’s Gem Testing Laboratory in Bangkok encountered a faceted orange sap-

phire with an attractive golden sheen effect that was reportedly from Kenya.

The sample was a transparent, 4.34 ct faceted mixed-cut stone of orange hue with attractive golden sheen effect almost throughout the crown facets (figure 58). Standard gemological testing revealed a refractive index (RI) of 1.765 to 1.775, a birefringence of 0.01 with a uniaxial negative optic sign, and a hydrostatic specific gravity (SG) of 3.98. The stone exhibited brownish orange and greenish yellow pleochroism and was inert to both long- and short-wave



Figure 58. This 4.34 ct transparent oval-cut orange sapphire displayed an attractive golden sheen effect. Photo by Tasnara Sripoonjan.

UV radiation. Microscopic observation revealed abundant metallic hematite platelets and rutile needles (figure 59, left), confirmed by Raman spectroscopy, that were situated along the basal pinacoid face. A cluster of zircon crystals, as suggested by its crystal morphology, could also be found in the specimen (figure 59, right).

In previous studies, the golden sheen sapphires from Kenya were translucent to opaque, with yellow and blue bodycolor (Bui et al., 2015; Narudeesombat et al., 2016). They contained abundant internal features, such as exsolved intergrowth Fe-Ti oxide phases of hematite platelets and short ilmenite needles that gave the sheen effect, as well as inclusions of goethite, boehmite, and diasporite needles. They also had large surface-reaching cracks. The stone in this investigation is orange, transparent, and without surface-reaching cracks, though it also possesses a significant number of hematite platelets that are in part responsible for its golden sheen effect.

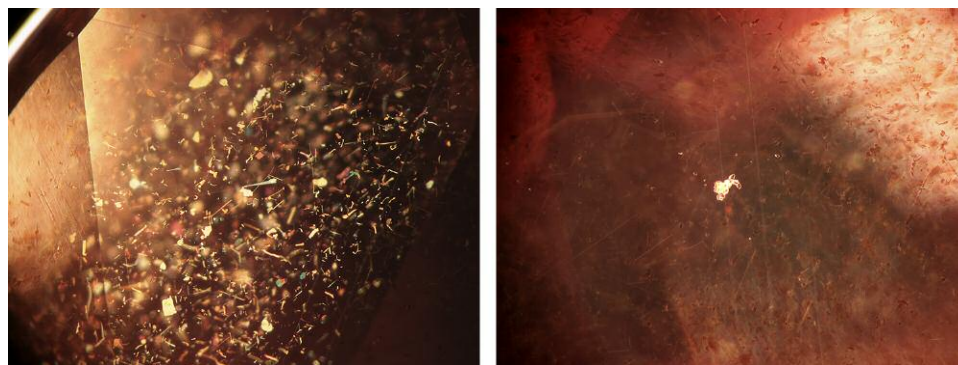


Figure 59. Internal features of the orange golden sheen sapphire: abundant metallic hematite platelets and rutile needles (left) and a cluster of zircon crystals (right). Photomicrographs by Saengthip Saengbuangamlam; field of view 3.00 mm.

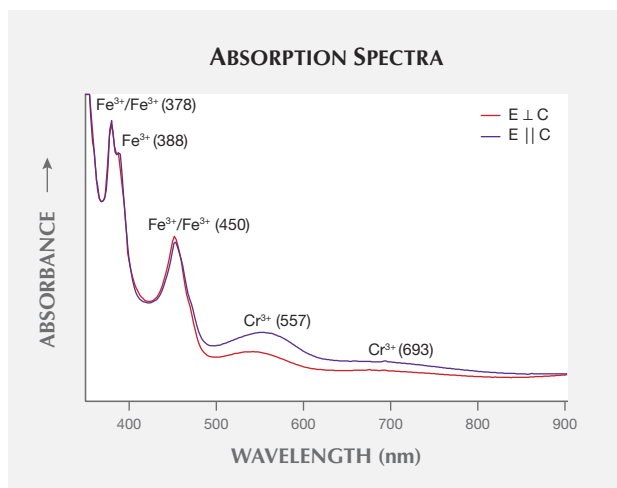


Figure 60. UV-Vis spectra of the orange golden sheen sapphire showing Fe³⁺- and Cr³⁺-related absorption peaks and bands.

The polarized ultraviolet-visible (UV-Vis) spectra of the specimen displayed predominantly Fe³⁺-related absorption bands at 378, 388, and 450 nm that are responsible for its yellow hue (e.g., J. Ferguson and P.E. Fielding, "The origins of the colours of natural yellow, blue and green sapphires," *Australian Journal of Chemistry*, Vol. 25, No. 7, 1972, pp. 1371–1385), whereas the absorption band at around 557 nm (also at ~410 nm) is caused by a Cr³⁺ transition contributing to the reddish hue (figure 60). As such, the stone coloration appears orange. R-line luminescence of Cr³⁺ near 693 nm also appears in the spectra. When compared to the more common non-sheen counterparts, the UV-Vis spectra yield only Fe³⁺- and Fe-Ti-related absorptions (Narudeesombat et al., 2016).

The energy-dispersive X-ray fluorescence (EDXRF) results of the orange sapphire showed very high content of Fe₂O₃ (1.94 wt.%) with moderate content of Cr₂O₃ (0.05 wt.%) and TiO₂ (0.04 wt.%). Ga₂O₃ and V₂O₅ were equal at about 0.01 wt.%. This result (particularly the iron content)

TABLE 1. Comparison of chemical composition of orange golden sheen sapphire with golden sheen and non-sheen sapphires, analyzed by EDXRF.

Oxides (wt.%)	Orange golden sheen (this study)	Golden sheen (Narudeesombat et al., 2016)	Non-sheen (Narudeesombat et al., 2016)
TiO ₂	0.04	0.01–0.02	0.02–0.07
Cr ₂ O ₃	0.05	0.00–0.01	0.01–0.03
Fe ₂ O ₃	1.94	1.00–1.50	1.19–1.58
V ₂ O ₅	0.01	0.00–0.01	0.01–0.04
Ga ₂ O ₃	0.01	0.02–0.05	0.02–0.04

is somewhat similar to those of the common golden sheen and non-sheen stones from Kenya in the previous work (table 1), which also suggests a similar magmatic source. Nonetheless, the Cr₂O₃ content in this orange sapphire is particularly distinctive, since such an oxide is almost undetectable in most golden sheen sapphires.

While Kenya is known to supply large amounts of golden sheen sapphires, some rare orange sapphires with sheen effect such as this one are also being supplied to the market. Sheen effect makes the stone distinctive compared to common orange sapphire from other sources, for example, from Songea in Tanzania (cf., originating from a metamorphic source and having somewhat lower iron content). However, the owner informed us that this specimen might eventually be subjected to heat treatment at a relatively low temperature to remove some silk-like inclusions and make it more transparent. Nevertheless, careful examination yielded no indication that this stone was heated. Its unique characteristics—heavily included hematite platelets and rutile needles that give rise to the golden sheen effect plus its high iron content—suggest a Kenyan origin.

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Sapphires from Colombia. Colombian sapphires were first reported in *G&G* nearly 35 years ago and are still circulating in the market today (see P.C. Keller et al., “Sapphire from the Mercaderes–Río Mayo area, Cauca, Colombia,” Spring 1985 *G&G*, pp. 20–25). The deposit is located in southern Colombia in the Cauca Valley, in the small town of Mercaderes. This location is notorious for being politically unstable and dangerous. This deposit continues to produce in small quantities, with most material extracted from riverbeds using picks and shovels. Independent miners collect year-round and go to Bogotá to sell the material. Vanessa Van Horssen (Carlsbad, California) recently purchased several unheated Colombian sapphires and learned about the active mines from a third-generation miner in Bogotá. She loaned GIA’s Carlsbad laboratory five samples (figure 61) for scientific examination.

Colombian sapphires occur in a variety of colors, such as blue, pink, and violet, and there have been past reports of color-change sapphire from this deposit. The five samples



Figure 61. Five unheated Colombian sapphires, ranging from 0.41 to 3.65 ct. Photo by Diego Sanchez.

consisted of a 0.41 ct pink faceted pear, a 0.92 ct color-change (blue to violet) faceted oval, a 1.66 ct pink rough, a 2.26 ct blue faceted octagon, and a 3.65 ct blue rough. All five had gemological characteristics consistent with corundum. They exhibited a refractive index of 1.762 to 1.770 and a specific gravity of around 4. Laser ablation–inductively coupled plasma–mass spectrometry (LA-ICP-MS) was performed to identify their chemical compositions. A high concentration of Fe ranging from 1515 to 1749 ppm suggested a magmatic source. Infrared spectroscopy showed no indications of treatment.

The internal features (figure 62) were color zoning, particle clouds, angular milky clouds, and twinning. The sap-

Figure 62. Zircon crystals scattered throughout angular milky clouds were more prominent in these sapphires compared to other high-Fe sapphires. Photomicrograph by Jessa Rizzo; field of view 4.7 mm.



phires contained transparent colorless and red crystals that showed no sign of heat treatment. Using Raman spectroscopy, the inclusions were identified as unaltered zircon and rutile crystals, consistent with the inclusions reported in Keller et al. (1985). Sapphires transported to the surface by hot magma tend to show characteristics similar to those of artificially heated sapphires, such as tension fractures around crystals and altered fingerprints. The suite of inclusions in these high-temperature-formed sapphires confirmed that no heat treatment was performed.

These stones provided useful data for ongoing origin determination studies. Although Colombian sapphires are rare, they are on the market, and the deposit continues to show great promise.

Jessa Rizzo
GIA, Carlsbad

Trapiche emerald from Colombia. Colombian trapiche emeralds, in general, consist of a transparent or nontransparent tapered core and six transparent prismatic growth sectors, which are separated by nontransparent boundaries. These boundaries form the arms of a six-rayed fixed star and radiate from a central point or a central area within the conical core. The tapered core is also designated a basal or pinacoidal growth sector. The boundaries consist of emerald, various minerals (e.g., calcite and albite), and trapped fluid phases.

In the gem trade, trapiche emeralds are mostly cut as slices or cabochons with an orientation perpendicular to the sixfold axis of the emerald to show the hexagonal growth pattern of the gemstone and especially to display the six-rayed fixed star. The conical shape of the core is derived from the different diameters of the core on both sides of such a cabochon. Slices of trapiche emeralds with an orientation parallel to the *c*-axis clearly show a tapered core, representing the basal growth sector, and a rim on both sides of the core formed by two prismatic growth sectors. However, because rough trapiche emerald specimens are mostly broken on both ends, the complete trapiche pattern parallel to the *c*-axis is not observed, and even textbooks dealing with Colombian emeralds show only sketches or photos of crystal fragments.

Recently, a complete outline of a trapiche emerald pattern consisting of two pinacoidal (basal) and six prismatic growth sectors was presented by I. Pignatelli et al. ("Colombian trapiche emeralds: Recent advances in understanding their formation," Fall 2015 *G&G*, pp. 222–259), but only fragments of trapiche crystals sliced parallel to the *c*-axis were available for that study. Consequently, the present author took the opportunity to examine the pattern in a transparent sample which, on a first view, seemed to be a complete or almost complete trapiche emerald crystal. The emerald was submitted by collector Georg Sellmaier (Kranzberg, Germany), who purchased the sample about 10 years ago from a local dealer while traveling in the Muzo area of Colombia.

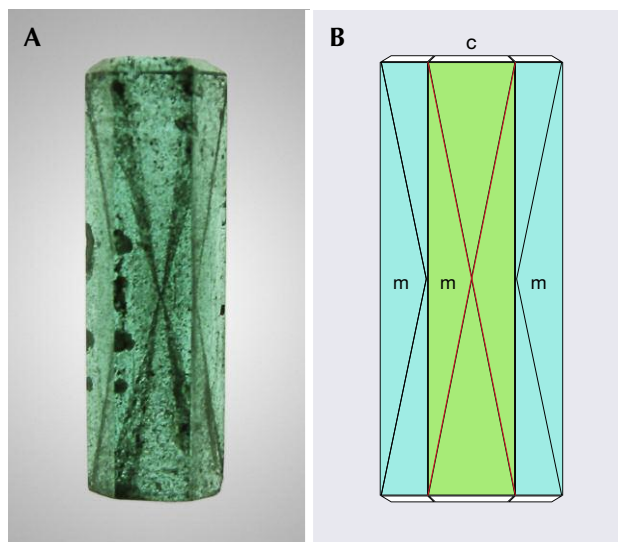


Figure 63. Colombian emerald crystal with prismatic habit; in the orientation shown, the sample measures 15.4×5.2 mm. A: View perpendicular to one of the six prism faces, transmitted light. B: Schematic drawing of the crystal in the same orientation. Three prism faces *m* are observed. In a view through the central face (green), a cross formed by four boundaries is seen (red lines); in a view through the two adjacent faces (blue), two boundaries are observed (black lines). Photo by K. Schmetzer.

The 3.49 ct emerald crystal (figure 63A) shows a prismatic habit with six elongated prism faces *m* ($10\bar{1}0$) and is terminated on one end by a basal pinacoid *c* (0001) and six small hexagonal dipyramids *p* (1012). Most likely, at the second termination of the crystal a facet approximately in the direction of a basal pinacoid was cut because the sample was slightly broken or did not show a plane face. The length of the crystal is 15.4 mm, while the diameter between the prism faces is 4.6 mm and the diameter between the crystal edges is 5.2 mm. Its pleochroism is blue-green parallel to the *c*-axis and yellow-green perpendicular to the *c*-axis.

In an orientation where the crystal is resting on one of the six prism faces (i.e., in a view perpendicular to this face), three different prisms are seen. In a view through the central prism, a cross in the form of an X was observed, with a pattern described as part of such a cross seen also in views through the two other adjacent prism faces (again, see figure 63A). A schematic drawing of this situation is presented in figure 63B. In the immersion microscope, upon rotation of the emerald crystal along its hexagonal axis, in each view parallel to two of the six prism faces (i.e., rotated by 30° versus the view perpendicular to a prism as described above and depicted in figure 63), a pattern consisting of a sharp cross is seen, with a vertical line dividing the cross into two parts (figure 64, A and B). The schematic

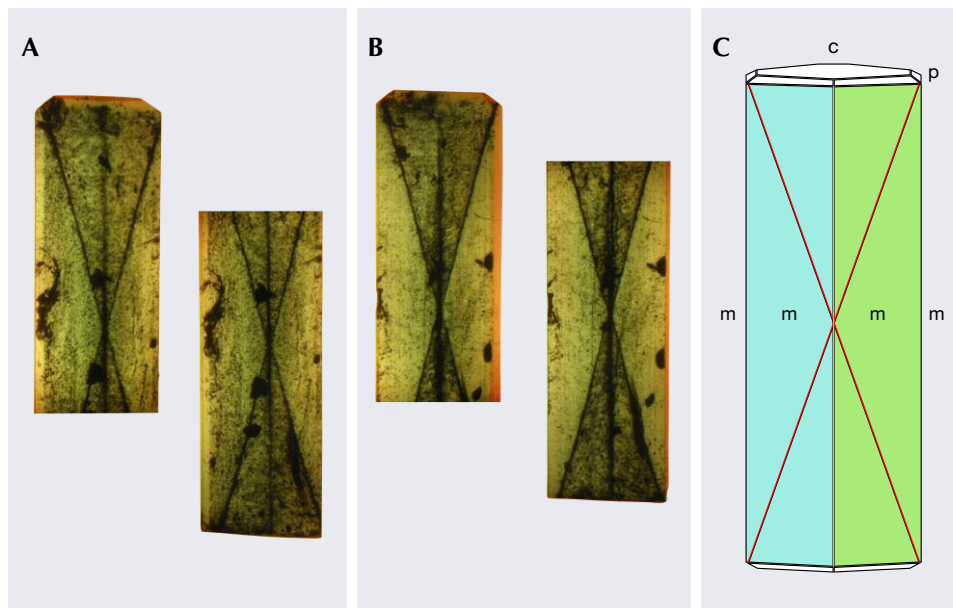


Figure 64. A and B: View in immersion through the emerald crystal in two orientations related by a rotation of 60° along the c-axis; two prism faces are parallel to the direction of view. The pattern observed consists of a cross subdivided by a vertical line. C: Diagram of the crystal; a view through each of two prism faces m (blue and green) shows two boundaries (red lines). These boundaries form an X, also subdivided by a vertical boundary (yellow line). Photos by K. Schmetzer.

drawing in figure 64C reflects this situation. In a view oblique to the c-axis, a tapered cone formed by six plane boundaries is seen at both ends of the crystal (figure 65). In a view parallel to the c-axis, due to the length of the crystal and the various layers covered with inclusions present throughout the crystal, the sample is only translucent, but a pattern of a six-rayed fixed star is observed.



It is evident that the various lines forming crosses in the form of an X are the traces of plane boundaries between the two pinacoidal and the six prismatic growth sectors. The vertical lines that subdivide these crosses in the second orientation described here represent boundaries between the six prismatic growth sectors (see figures 63B, 64C, and 66A). The cone-shaped outline of each pinacoidal growth sector is formed by boundaries between the tapered core and six prismatic growth sectors (figure 66B). The different patterns depend only upon the orientation of the crystal in the direction of view and the orientation of the various boundaries between the six prismatic and two basal growth sectors within the emerald.

The crystal described represents an almost complete emerald with prismatic habit and trapiche pattern. In the present case, the trapiche pattern is similar to an hourglass structure. However, the trapiche emerald shows numerous inclusions that are trapped at the boundaries between different growth sectors, forming thin layers. As described in the literature, these layers between the individual emerald growth sectors consist of a mixture of emerald with other minerals and fluid phases trapped in cavities. In contrast to most trapiche emeralds from Colombia, the layers in the emerald described in this paper are thinner and translucent, which allows an observation of the complete three-dimensional trapiche pattern, especially in views perpendicular to the c-axis. This observation is consistent with the conclusion made by several authors about the cone-shaped

Figure 65. View in immersion of the emerald crystal in a direction oblique to the c-axis. A tapered central core is seen, formed by six plane boundaries between a basal and six prismatic growth sectors; the diameter of the crystal in this view measures 5.2 mm. Photo by K. Schmetzer.

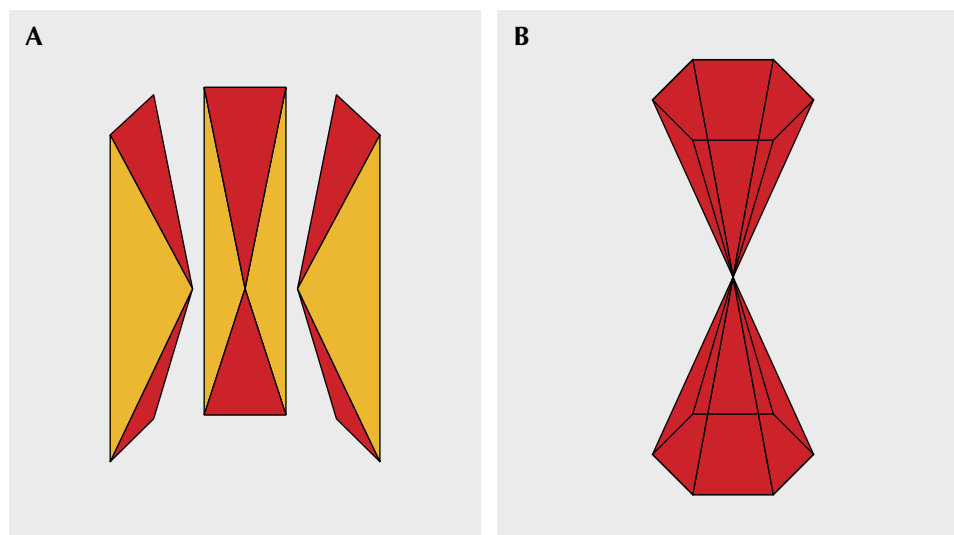


Figure 66. A: The patterns seen through the prism faces in different orientations of the emerald crystal are formed by boundaries between six different prismatic growth sectors (red, only three growth sectors are shown) and the two pinacoidal growth sectors, and boundaries between adjacent prismatic growth sectors (yellow). B: The outline of the tapered core is formed by the boundaries between six prismatic growth sectors (red) and two pinacoidal growth sectors.

cores of trapiche emeralds and confirms the three-dimensional model of the trapiche pattern presented by Pignatelli et al. (2015).

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RESPONSIBLE PRACTICES

CIBJO Blue Book and “Do’s and Don’ts” guide on responsible sourcing. The World Jewellery Confederation (CIBJO) released the first edition of the *Responsible Sourcing Book* in January 2019. The latest in CIBJO’s series of Blue Books, it provides a framework and guidance for due diligence related to the responsible sourcing of gemstones and precious metals in the jewelry sector. In March, the organization also approved a simplified “Do’s and Don’ts” guide.

The new Blue Book is the result of a yearlong effort, during which a responsible sourcing commission was formed and a policy document introduced at CIBJO’s 2018 congress in Bogotá. The book, which was thoroughly reviewed by external members of the trade, advises all industry members to have a responsible sourcing policy in place and to perform due diligence on their supply chains “to the best of their ability.” It also recommends that industry members check for and mitigate risks related to human rights, labor practices, or criminal activity. The Blue Book aligns with the OECD’s *Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas*, and it requires compliance with both the Kimberley Process Certification Scheme and the United Nations Guiding Principles on Business and Human Rights.

The “Do’s and Don’ts” document, at 11 pages, does not replace the Blue Book released in January. It is intended as a reference tool for business owners and their staff to ensure best practices and promote consumer confidence. As of March 2019, the simplified guide can be downloaded in English, Arabic, Dutch, French, Hebrew, Italian, and Por-

tuguese. Additional language versions are being prepared.

Both the Blue Book and the “Do’s and Don’ts” document are available, free of charge, at www.cibjo.org.

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CONFERENCE REPORTS

“The Ethics of Jewelry” at MetFridays. “The Ethics of Jewelry” panel (figure 67) was held on January 25, in conjunction with the New York Metropolitan Museum of Art’s temporary exhibit, “Jewelry: The Body Transformed,” which ran from November 2018 to February 2019. The exhibit featured an array of headaddresses and ear ornaments, brooches and belts, and necklaces and rings, along with sculptures, paintings, prints, and photographs that amplify the many stories of transformation that jewelry tells. The 230 objects were drawn almost exclusively from the Met’s own collection and displayed the museum’s jewelry artifacts from ancient to contemporary times. “The Ethics of Jewelry” panel was part of the museum’s MetFridays evening series of concerts, classes, and presentations open to the public. The purpose was to discuss timely issues facing the world of jewelry today, including urgent questions about mined, lab-produced, and sustainable materials.

Panelists were Monique Péan, a New York-based jewelry designer who prides herself on using sustainable materials in her one-of-a-kind pieces that are sourced globally through fair trade initiatives; Karen Smit, a GIA research scientist who holds a PhD in diamond geology; and Patricia Syvrud, program development manager for the Minerals, Materials and Society program at the University of Delaware, and immediate past executive director of the World Diamond Council. The panel was moderated by Ben Smithee, CEO and founder of The Smithee Group, a digital strategy, content, and advertising firm.

The panel opened with introductions, where each speaker described a bit of his or her background and rele-



Figure 67. Left to right: “Ethics of Jewelry” panelists Monique Péan, Karen Smit, and Patricia Syvrud joined moderator Ben Smithee at the New York Metropolitan Museum of Art. Photo by Stephen G. Strickland.

vance to the event. Péan shared her travels to the far reaches of the globe, where she gets the inspiration and many unusual materials for her pieces, such as pyritized dinosaur bone, Peruvian opaline, and Scandinavian meteorite. Smit gave a scientific overview of natural versus synthetic diamonds, and Syvrud shared the progress of the Minerals, Materials and Society education and training program and related research projects (see p. 148).

Smithee asked the panelists for clarification of some terms that are frequently used but little understood when speaking of “ethical jewelry,” such as “responsible sourcing,” “sustainability,” and “conflict-free” diamonds and gold. Although the terms “ethical jewelry” and “responsible sourcing” can mean different things to different people, the term “sustainability” has a globally recognized definition that basically means “meeting the needs of today without compromising the needs of future generations.” The current definition of the term “conflict diamonds” is also globally recognized, according to a United Nations resolution, to mean “Diamonds that originate from areas controlled by forces or factions opposed to legitimate and internationally recognized governments...” However, this definition does not address the human rights issues of artisanal and small-scale mining. The conversation then moved to a comparison of responsibly sourced gold vs. gemstones and how technology such as blockchain can be

integrated into supply chains to enhance transparency and sustainability in the jewelry sector.

The session concluded with a focus on the artisanal and small-scale mining (ASM) that takes place in the diamond, colored gemstone, and gold mining sectors. Although challenges related to human rights and environmental and social impacts remain, the benefits from ASM to local stakeholders and communities should be more widely shared.

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Minerals, Materials and Society Program

IN MEMORIAM

E. Alan Jobbins (1923–2019). Alan, as he was known to his friends and colleagues, passed away February 2 at the age of 95. He was internationally respected for his lasting achievements in the fields of mineralogy and gemology. He started down his lifelong career path at the age of 13, when his geography professor showed him some attractive crystal specimens of the mineral mimetite from the Cumberland area of England. This immediately sparked his interest and led to a lifetime devoted to mineralogical and gemological studies, and his career appointment from 1950 to 1983 as curator of minerals and gemstones at the Institute

of Geological Sciences in London. There he was responsible for organizing the extensive gemstone and mineral collection and exhibitions.

Over his 33 years at the museum, Alan conducted numerous important gemological and mineralogical research projects, such as a major study of East African garnets, research into the characteristics of synthetic opals, the discovery and description of the mineral magnesioaxinite, and the geological field study of the meteorite in Barwell Parish, England.

Alan's work took him on many assignments for the United Nations and the British government. These included gemological and geological surveys of gem deposits in Brazil, Cambodia, Guyana, India, and Sri Lanka for the United Nations and the British Overseas Development Administration.

In the late 1960s, Alan set up a mineralogical and gemological training and research laboratory in Burma, guiding that country's first gemologists to FGA diplomas. Some students went on to obtain doctorates at English universities. Alan led a study of Pailin ruby and sapphire deposits in Cambodia, resulting in a detailed monograph and important recommendations for improved recovery methods. He also spearheaded an assessment of diamond and opal deposits in Piauí State, Brazil, and a survey of the Sri Lankan gemstone industry in which he recommended improved mining methods and cutting techniques.

In 1988 and 1989, he initiated gemological training with new laboratory facilities at the China University of Geosciences in Wuhan. In the UK, his record includes 32 years as a gemological lecturer at the Sir John Cass College

(now London Metropolitan University), 20 years as chief examiner for the Gemmological Association of Great Britain (now Gem-A) gemology examinations, and eight years as editor of *The Journal of Gemmology* (1985–1993). He was also president of Gem-A from 2004 to 2008, and vice president from 2009 until his death.



Alan held various posts throughout his career, including executive member of the International Gemmological Conference (IGC) and past president of the Society of Jewellery Historians. He was also part of the team that conducted the first comprehensive gemological examination of the British Crown Jewels from 1986 to 1989, which led to the publication of an important illustrated catalogue. Among Alan's major literary contributions were very thorough revisions of B.W. Anderson's *Gem Testing* and Robert Webster's *Gemmologists' Compendium*.

In 1984, Alan became a founding member of the ICA (International Colored Gemstone Association). In 2005 the Accredited Gemologists Association (AGA) awarded him its sixth annual Antonio C. Bonanno Award for Excellence in Gemology. He served as a member of *G&G's* editorial review

board from 1994 on.

In addition to gemology and mineralogy, our dear friend Alan was an avid bird-watcher, an explorer of churches and cathedrals, and a wine aficionado. He was a devoted and loving husband to his wife, Mary. In his honor I will carry the moniker he bestowed upon me many years ago, "Young Buzzard." Alan passed away peacefully with Mary by his side. Rest in peace, dear friend.

*John I. Koivula
GIA, Carlsbad*

For More Coverage of Tucson 2019

Watch exclusive videos from the gem shows, featuring interviews and insider insight. Visit www.gia.edu/gems-gemology/spring-2019-gemnews-tucson overview or scan the QR code on the right.

