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VIRTUAL REPORT ON THE INDUSTRY IN 2021

As the major Tucson gem and mineral shows were all canceled in 2021 due to the pandemic, we decided to use our annual Tucson report space a bit differently this year. We wanted to capture how some of the vendors we normally visit have been weathering the situation and their thoughts about the impact on the trade along the entire supply chain. We wanted to find out how the pandemic has shaped their businesses over the past year and if they foresee permanent changes to the way business will be conducted in the future.

From our understanding going into these interviews, fine jewelry has actually been doing quite well during this time, as consumers who would normally spend money on travel have opted to spend those discretionary funds on luxury items, including jewelry. With the initial onset of the pandemic creating a full disruption to in-person sales, retail jewelry was hit hard in the spring. By summertime, however, sales had increased for many compared to the same period in 2019. This trend reemerged during the end-of-the-year holiday season. As discretionary travel is a strong competitor to fine jewelry, having people stuck at home benefited retail jewelry sales. Online jewelry sales appear to have benefited the most, increasing by about 50% over pre-pandemic times. To what extent these patterns will hold is uncertain. Another trend was the popularity of “Zoom-worthy” jewelry such as earrings and necklaces as online interactions with

colleagues, friends, and family increased. To read more about some of the pandemic-related retail jewelry trends, see Victoria Gomelsky, “Even in a pandemic, fine jewelry is selling,” *New York Times*, December 3, 2020, <https://www.nytimes.com/2020/12/03/fashion/jewelry-rising-sales-pandemic-.html>.

Starting at the mines, activity was clearly affected by work stoppages and the inability of foreign buyers and traders to travel internationally. These situations were highly dependent on local restrictions, which were often different in neighboring countries. In East Africa and Asia, many mines temporarily stopped production to comply with regulations to avoid gatherings of people, while others produced plenty of material but initially had no foreign buyers to sell it to. Much rough trading went online, allowing the continued flow of some materials between miners and buyers with established relationships. This online presence also brought forth completely new relationships for miners and local traders who started dealing directly with downstream buyers, such as cutters and jewelers, who normally would have made purchases through other channels.

In many instances, cutting and jewelry manufacturing workshops were significantly impacted by the pandemic on three fronts: the disruption in the supply of new raw materials, the inability to work together in factories in light of social distancing policies, and (in some cases) difficulty in shipping goods across borders. However, some rough dealers and jewelers have been opening the vaults to work with gems saved for a rainy day such as this.

Gem markets have been significantly impacted, as here too social distancing policies and travel restrictions greatly

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Figure 1. Snapshots of an industry dealing with a global pandemic. A starkly quiet Jewelry Trade Center in Bangkok (top row) and Chan Gems Building in Chan-thaburi (middle right); temperature screening outside a Pranda facility on the outskirts of Bangkok (bottom left); and two glimpses of activity at the Hainan Expo in China. Photos by Jinting Yu, Shen Chen, and Sunny Jiang.





Figure 2. Local business owner Jianying Ma in China's Hebei Province is shown livestreaming to connect with clients while stores were shut down. Courtesy of Han Dan Zhao Du Gold and Jewelry Co. Ltd.

reduced or eliminated the ability to gather and kept the international buyers who supply the cash necessary to keep trade moving away from these sites. Similarly, virtually all of the major trade shows globally were forced to cancel for the same reasons. Political unrest has also been impacting the movement of goods across borders, something we heard from several sources.

Stone dealers and jewelers in general reported a challenging time last spring, but reasonable to good sales from summer 2020 on. Many of them had to adapt to virtual interactions with suppliers and clients, some for the first time. However, several had already started building online presences, which were put to the test and rapidly expanded to accommodate this unusual year. Communication through WhatsApp and Zoom proved essential for many in continuing business both upstream and downstream. Vendors reported using social media such as Facebook and Instagram to keep clients updated on their activities. Even though it was clear that these vendors look forward to the return to big trade shows, they believe that the way business is conducted along the supply chain has likely been changed in some permanent ways by the recent forced reliance on doing business virtually.

We hope you enjoy our report showing the mixture of positive and negative trends over this unprecedented past year. We look forward to seeing everyone in person in Tucson next year. The 2022 Tucson shows will also bring us the opportunity to visit the Alfie Norville Gem and Mineral Museum, scheduled to reopen in 2021, and its Somewhere in the Rainbow collection. These are also featured in our report.

Jennifer Stone-Sundberg, Tao Hsu, Wim Vertriest, Aaron Palke, and Robert Weldon

The Chinese gem and jewelry industry reacts to COVID-19. When COVID-19 struck at the end of January 2020, the Chinese jewelry industry was caught off guard. The whole country was locked down—travel halted and businesses closed.

As the country gradually reopened at the end of March 2020, business remained very slow. But China has one of the most advanced digital ecosystems in the world. Mobile technology leapfrogged laptops and credit cards, while cheap, reliable, and efficient delivery companies made it easier for consumers to spend. Local businesses turned to the internet to reach old and new clients during the pandemic (figure 2). With fewer clients visiting stores, sales often started by livestreaming products, followed by sending photos and videos through WeChat, and then utilizing WeChat Pay or Alipay to complete the transaction. Chinese digital infrastructure made a big difference in helping the jewelry business bounce back so quickly.

Figure 3. To maintain social distance, Van Cleef & Arpels limited the number of clients in stores. Here, clients wait outside the store in the Shanghai IFC Mall. Photo by Chen Shen.



During these difficult times, relationships with suppliers and clients are the key to keeping business moving. Trust built over years is extremely important when buying or selling valuable gemstones and jewelry online without actually seeing the items in person. Major jewelry chain stores, which rely more on foot traffic, experienced a dramatic double-digit decline in business in the first half of 2020, while small jewelry stores that rely more on personal contact and relationships felt little to no impact.

Due to travel restrictions, we did see certain product shortages on the market, as it was initially difficult for some goods to enter China. Some Chinese dealers took a risk and broke quarantine to visit Sri Lanka or India to source products. On the other hand, some international businesses even came to China for products and services when jewelry and diamond cutting factories closed in the U.S. and India.

In general, jewelry sales had negative growth for the first half of the year. Sales started to pick up in July. Sales from October, November, and December were up 16.70%, 24.80%, and 11.60%, respectively, compared to the same months in 2019.

International jewelry brands such as Cartier, Tiffany, and Van Cleef & Arpels (figure 3) did exceptionally well in 2020 since Chinese consumers could not travel for overseas shopping trips. With social distancing and a mandatory mask policy in stores, these luxury brands saw an immediate business jump in China by April 2020. Plaza 66 Shanghai, owned by Hang Lung Properties, is the country's top luxury shopping mall. Its reported retail sales were up 60% in a year with COVID-19, demonstrating an amazing year for luxury brands in China.

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Constantin Wild (Constantin Wild GmbH & Co. KG). Constantin Wild and his team started 2020 with a strong Tucson show and orders to fulfill from 2019. Upon returning to Germany, the severity of the COVID situation became apparent, and on March 14 they were forced to temporarily shut down the business. Mr. Wild was fortunate to keep his staff, though they did have to cut back work initially to only one day a week. Since August, they have been able to work at 80% of full-time. The second half of 2020 saw business levels basically return to normal, and overall the year was pretty good. Tucson was the company's only trade show in 2020, and they do not expect to attend any shows in 2021. The biggest disadvantage of not going to trade shows has been missing out on new opportunities.

To keep in touch with clients and partners, Zoom and WhatsApp became essential for video calls. Mr. Wild has also been inviting clients to their facility in Idar-Oberstein for relaxed face-to-face visits. The business has been sharpening its brand image and plans to relaunch its website and



Figure 4. A lively 24.07 ct yellowish green cushion-cut tourmaline from new fields in the Democratic Republic of the Congo. Photo © Constantin Wild.

blog as well as provide regular Facebook and Instagram feeds.

Without being able to travel, the team has taken the time to sort and recut stock in their inventory. They have also been cutting rough from their vaults, as the new rough supply has been restricted during the pandemic.

When asked about pandemic sales, Mr. Wild noted that gemstones suitable for high jewelry have been in demand, in addition to a new trend for high-value gems as stand-alone pieces. During the past year, sales have been particularly good for Paraíba tourmaline, green tourmaline (figure 4), aquamarine, and Imperial topaz (figure 5). Mr. Wild also noticed strong demand for gray spinel, whether atonal or modified by blue or purple. He has done well selling color suites of stones, such as his "Rhapsody in Blue," which features a diverse array of blues provided by tanzan-

Figure 5. This 4.06 ct red pear-shaped Imperial topaz is from Ouro Preto, Brazil. Photo © Constantin Wild.





Figure 6. The “Rhapsody in Blue” suite (145.2 carats total) is composed of 17 gems: nine greenish blue cushion-cut aquamarines from Brazil, four oval-cut tanzanites, and four intense blue oval-cut Mozambique aquamarines. Photo © Constantin Wild.

ite and both greenish blue and intense blue aquamarine from Brazil and Mozambique (figure 6).

During this time, Mr. Wild has been able to work on a book commemorating the firm’s 175th anniversary next year. Titled *Gems, Colours, and Wild Stories... 175 Years of Constantin Wild*, the book will explore the history of the company and provide many entertaining stories and high-quality images to capture the unique emotions associated with colored gems.

Mr. Wild looks forward to returning to Tucson in 2022 and predicts that demand will focus on vibrant colors to celebrate the end of the pandemic.

Jennifer Stone-Sundberg
GIA, Carlsbad

Dudley Blauwet (Dudley Blauwet Gems). In February, colored stone dealer Dudley Blauwet attended the only 2021 Tucson “show,” held at Mineral City and the adjoining Sun Gems building. The Mineral City hub consists of several steel unit buildings that are classified as permanent business storefronts and therefore were not subject to the same COVID-19 requirements as events. In the 18 days Mr. Blauwet was there, he estimated that fewer than 500 people attended, including those associated with the 20–25 vendors. Beyond these vendors, another 6–10 gem- and mineral-related businesses that own warehouses in Tucson were open. Mr. Blauwet and one other vendor were the only ones carrying cut gems, while everyone else was offering minerals exclusively. A lack of fossils and meteorites was noticed.

Since summer, business has been fine for Dudley Blauwet Gems, as many of his online customers have been doing well and are looking to fill specific orders or rebuild

stock. Using WhatsApp, he has been able to continue communicating with and purchasing material from suppliers such as a Sri Lankan family the business has worked with for nearly 40 years. This has included viewing sapphires from photos or videos almost daily. He has also been working with Russian contacts to purchase unoled emeralds (figure 7), alexandrite, phenakite, and some demantoid. A source in Southeast Asia has also been supplying gray spinel.

Figure 7. Unoled Russian emeralds (a 1.29 ct emerald cut and a 1.14 ct pear shape) from Malyshevo, Ural Mountains, with intense bluish green color reminiscent of Paraiba tourmaline. Photo by Aria Agarwal; courtesy of Dudley Blauwet Gems.



Sales have been predominantly natural sapphire, un-oiled emerald, gray spinel, and Vietnamese cobalt spinel. He noted that other stones such as aquamarine, green beryl, and morganite have been popular. The persistent demand for sapphire has been dominated by requests for teal, green to icy green, peach to apricot, “padparadscha,” periwinkle, purple-blue, and light to icy pink sapphire, as well as for traditional blue colors. Recently, he has received numerous calls for Mandarin garnet from Loliondo, Tanzania; heated blue zircon from Cambodia; and to a lesser extent Malaya garnet from Mahenge, Tanzania. Mr. Blauwet’s business mainly offers untreated natural sapphire, but they have had steady demand for heated blue rounds and matched pairs.

With the 2021 Pantone colors of the year being “Ultimate Gray” and “Illuminating” (a medium gray and butter yellow, respectively), Mr. Blauwet has seen a bit more interest in yellow sapphire over last year and steady interest in gray spinel (figure 8). They have also developed a good market for un-oiled Russian emerald, with some vendors regularly restocking.

Mr. Blauwet was able to provide some insight into the movement of material coming from mines around the world and the rough supply situation. With the political upheaval in Myanmar, Burmese gem production is expected to slow if not outright end for a while. Madagascar is opening up for travelers, but with a lack of express mail service, very little rough has left the island since last March. Some of the biggest gem mining operations in Sri Lanka are currently down. These combined supply slowdowns and stoppages have resulted in serious challenges—a very limited supply of rough worldwide and reduced movement of rough and gems to trading centers such as Bangkok or Hong Kong. As a result, the available supply of gems has been significantly dampened.

Mr. Blauwet mentioned that most of their trade shows for this year have been canceled, so they are handling increasingly larger orders and shipping 20 to 100 stones at a time to their manufacturing customers. Also, for the first time in Mr. Blauwet’s life, he has started a website to sell gems wholesale. His business is struggling to supply enough rough to its cutting factories to keep all of the cutters busy. Occasionally, they have been able to buy small rough to cut precision diamond melee in calibrated sizes, still a very popular product.

Finally, Mr. Blauwet shared with us some blue spodumene he has been storing in the vault. For decades he has been buying Afghan spodumene crystals, which have a strong blue color on the c-axis and a green color on the a- and b-axes. To avoid any exposure to daylight, these stones were wrapped in paper at the mines in Afghanistan. He has kept them in closed boxes to sell to customers specifically wanting spodumenes that have not been exposed to UV. As a test, he exposed several of them to Colorado sunlight in June and was able to literally watch them change to a full purple color down the c-axis and a pink color down the a- and b-axes within 40 minutes. Mr. Blauwet currently has



Figure 8. Yellow sapphire, gray spinel, and gray moonstone represent popular gems matching the 2021 Pantone colors of the year. Gray moonstone: 3.94 ct cabochon from India. Yellow sapphire: 2.39 ct oval from Dela, Sri Lanka, and 2.90 ct long cushion from Gilamale, Sri Lanka. Gray spinel: 0.93 ct cushion, 2.81 ct pear shape, and 1.16 ct round, all from Mogok, Myanmar. Photo by Aria Agarwal; courtesy of Dudley Blauwet Gems.

several clean faceted stones in sizes up to approximately 300 carats (figure 9). He has seen some dealers buy these crystals and take them to a show and watch in horror as they change over the course of three to five days from exposure to the various wavelengths of light present in the showroom—often the transition color before pink has

Figure 9. A 166.25 ct blue spodumene removed from storage. The stone is from Parun, a few kilometers from Paprok in Kamdesh District, Nuristan Province, Afghanistan. It was cut in Peshawar, Afghanistan, with the table perpendicular to the c-axis to achieve a blue color rather than green. Photo by Dudley Blauwet; courtesy of Dudley Blauwet Gems.





Figure 10. Popular sapphire colors, including bicolor stones from Montana. These heated stones from the Gem Mountain, Missouri River, and Dry Cottonwood Creek areas are 4.0 mm in diameter. Photo by Dillon Sprague; courtesy of Columbia Gem House.

strong unattractive gray tones. He reports that there are plenty of irradiated Afghan spodumenes on the market in Peshawar with a very strong emerald green color, including on the c-axis. The color is very unstable and with exposure to UV or daylight will change rather quickly, often turning an undesirable yellow-gray color. Mr. Blauwet described once making the mistake of buying a faceted example of these treated stones at a gem show in Peshawar from a dealer he did not know. When he unwrapped it years later, it had changed to an unattractive gray color with no exposure to UV or sunlight.

Jennifer Stone-Sundberg

Eric Braunwart (Columbia Gem House). Eric Braunwart, founder of this gemstone mining, cutting, and wholesale marketing company, reported that they have stayed busy during the pandemic after the initial shock to business with the hard shutdown last spring. Columbia Gem House had already started transitioning three years ago to doing more business electronically. When the pandemic hit, they were well positioned to experience a less dramatic shift in how they interact with clients than some more traditionally run gem dealers. Mr. Braunwart sees the pandemic as having universally pushed people involved in all stages of the gem trade to do more of their business online.

Overall, Mr. Braunwart is happy with the way business is going but thinks that much of what he is experiencing has more to do with the clientele he has attracted and his move toward a strong digital platform. Currently, his customer base is part of what he considers the “new industry,” composed almost exclusively of women under 35 years old with independent stores, galleries, or studios. These buyers have grown up with smartphones and had already been doing business online but were pushed even further online with COVID-19. Columbia Gem House’s fair trade and responsibly sourced position in the marketplace resonates

with this “new industry,” where these factors are an important part of the business models and branding and their clients’ lifestyles. Additionally, these buyers tend to purchase more unusual items with respect to color, cut, shape, and presence of inclusions.

Mr. Braunwart noted that the biggest disruption to the supply chain with COVID-19 has been at the mines, where mining has slowed with less travel and demand—greatly restricting the supply to wholesalers. This has particularly been the case with small miners who have not had travelers coming out to purchase at the traditional venues. This has pushed some small miners to explore selling online to reach some of the market and realize some of the markup that traditional cutters and wholesalers see. Gem cutting has also slowed significantly, with less rough coming out of the mines and restricted flow of goods crossing borders, due both to the pandemic and political issues. On a very somber note, COVID-19 has personally hit many small businesses along the supply chain, with some longtime miners, cutters, and traders dying from the disease.

When asked what has been in high demand this past year, Mr. Braunwart stated that sapphire is still the king in terms of volume and dollars. A variety of North American stones are still doing well and sales continue to increase. The recent increase in the desire to buy American continues, and now these products are more recognized in the marketplace. Demand for teal and other nontraditional sapphire hues remains very strong (figure 10). About half of the customers pursuing these nontraditional colors popularized by the sapphire mines in Montana want American sapphire, but the other half are concerned only about obtaining the desired colors and are buying material coming from Africa and Asia.

A notable trend mentioned was the continued and increasing popularity of melee and smaller stones (baguettes, briolettes, trillions, kites, and hexagons; see figure 11). Both



Figure 11. A variety of popular small-stone shapes such as kites, hexagons, trillions, and briolettes. All are heated Missouri River sapphires. The kites are either 6.0×4.0 mm or 5.0×3.0 mm, the hexagons are 3.5 mm in diameter, the trillions are 4.0 mm wide, and the briolettes are 4.0×3.0 mm and side-drilled. Photo by Dillon Sprague; courtesy of Columbia Gem House.

saturated and pastel hues of these smaller stones are in strong demand (figure 12). They are being used not only as accent stones but also as the main stones in many jewelry pieces. This reflects a growing fashion direction where more affordable pieces can be made using both precious gemstones and precious metals. Mr. Braunwart mentioned a shortage in 1.0–1.3 mm melee, as this size is very difficult to cut and mines traditionally do not collect the small rough that would produce these sizes. This means that melee in these sizes are coming from larger rough and scraps.

Jennifer Stone-Sundberg

Gem Shopping Network: An online jewelry business during the pandemic. The COVID-19 pandemic has forced many sectors to adopt new work routines and move their

commerce online. This is also true for the gem and jewelry industry. However, some businesses have been on-air and online for quite a long time. One of the veterans is the Gem Shopping Network (GSN), headquartered near Atlanta.

Since 1997, GSN has grown from a weekend show to a network that reaches over 60 million U.S. households. From television to the web and more recently the mobile app, the network can livestream its gem and jewelry shows through all available channels. At the beginning of the pandemic early in 2020, GSN immediately adopted proper social distancing and regulations to keep its employees safe, which allowed the crew to operate without a pause. Show hosts continued livestreaming from the studios, entertaining and educating their audience (figure 13).

Because GSN carries a vast array of goods—from mineral specimens, faceted gemstones, and finished jewelry all

Figure 12. Melee and small sizes of fire opal and neon green beryl. The fire opals are from Mexico and range from 0.10 to 0.20 ct. The neon green beryl material is from Nigeria—the rounds are 3.0 mm in diameter and the baguettes are 4.0×2.0 mm. Photo by Dillon Sprague; courtesy of Columbia Gem House.





Figure 13. GSN show host Marvin Pierschbacher presents finished jewelry. Live shows are entertaining and educational, and therefore very well accepted by the audience. Courtesy of GSN.

the way to collectibles and estate jewelry—supply has been a critical component since its earliest days (figure 14). While some in-person sourcing was prohibited by the situation, the supply side of the business was not negatively impacted overall. Some suppliers who would normally provide goods through outlets such as the cruise ship industry were able to transfer them to online jewelry traders such as GSN.

The majority of GSN's customers are women ages 50 to 65, a demographic that has been quite stable over the past two decades. This customer base proved advantageous when "staying at home" became the new normal as more

time was available to watch the shows and purchase goods. Although international transportation was impacted by COVID-19, U.S. domestic shipping and delivery remained quite efficient. Steady supply, a stable customer base, and on-time delivery combined to make 2020 one of GSN's strongest years financially.

As both a seller and an educator, GSN has its own gemology content production team. The pandemic unexpectedly allowed more time for the team to produce content, which is shared over the multiple streaming channels. High-quality content is one of the key pillars for any online seller as it is the tool to attract and maintain customers. As the world gradually recovers from the pandemic, online jewelry trading is expected to see strong growth in the future.

Tao Hsu
GIA, Carlsbad

Jeff Hapeman (Earth's Treasury). How does one prepare for a global pandemic on a scale unlike anything seen in recent history? While it would have taken an extraordinary act of foresight to predict how significantly the world has changed since March 2020, one trend was set in motion several years ago. Increased online presence, especially with social media, proved enormously beneficial to many in the gem and jewelry industry. Jeff Hapeman of Earth's Treasury in Westtown, Pennsylvania, was at the forefront of this social media trend and shared his views on its impact on the trade since the pandemic and beyond. Mr. Hapeman got his start faceting gemstones (figure 15). However, he has grown his business over the last few years by hiring several designers and bench jewelers and



Figure 14. Finished jewelry featuring a broad range of colored gemstones, including some exotic varieties, is one pillar product carried by GSN. Courtesy of GSN.



Figure 15. A 2.04 ct blue brilliant-cut unheated Rock Creek sapphire. Photo by Jeff Hapeman.



Figure 16. A ring sourced, designed, and manufactured by Earth's Treasury displaying a 2.14 ct heated Rock Creek sapphire alongside melee-sized unheated sapphires from Rock Creek. Photo by Jeff Hapeman.

developing what he calls his “mine to finger” approach. By building close relationships with the people producing rough material at gem mines around the world and moving the jewelry-making process in-house, he is able to capture more of the value-added chain in getting rough stones to the end consumer (figure 16).

In March, when Pennsylvania went into strict lockdown, all employees of Earth's Treasury were sent home and asked to continue working on any projects they could. His bench jeweler sorted and graded melee stones, while his designer created new stock pieces. Fortunately, given Mr. Hapeman's heavy online involvement, Earth's Treasury was classified as an e-commerce retailer and allowed to open again after only about a month. Of course, there was an immediate plunge in sales in March and into April, but by May sales were picking up. In June, everything took off and business was much stronger than usual. This uptick in gem and jewelry sales is likely related to delayed purchases. As the uncertainty of the early days of the pandemic began to recede and the economy started coming out of the hard lockdown seen in much of the country, consumers had discretionary funds for jewelry purchases that would have ordinarily been set aside for travel or other luxuries. E-commerce jewelers did especially well last summer as the country slowly reopened with new safety restrictions that made in-person shopping at traditional brick-and-mortar shops more difficult.

Of course, this move to online jewelry sales did not happen in a vacuum. As social media continues to take an expanding role in our lives, modern consumers have become increasingly comfortable buying gemstones online at higher price points. Since the pandemic, Mr. Hapeman has noticed that customers are becoming more comfortable with the online purchasing process. Because Earth's Treasury offers free returns for gems and jewelry by FedEx or UPS, customers are willing to purchase and try some-

thing before settling on exactly what they want. In fact, he has stopped private showings at his offices for now and is moving more toward video consultations with potential clients.

The pandemic has dramatically affected not only the way we buy and sell gems but also the supply chains for the colored stone industry. While Mr. Hapeman deals a lot in domestically sourced Montana sapphire, it has become increasingly difficult to source gem rough internationally. In particular, rough exports from Africa have apparently dried up recently, given difficulties in exporting this material to locations such as Bangkok where it could be further distributed around the world. Some major gem cutting centers have also seen a decline in business as their international buyers can no longer visit. As a result, it has become much easier to purchase Sri Lankan stones for recutting. Interestingly, he has seen an enormous amount of tanzanite become available recently, which he speculates may be related to the material being rerouted from the badly stricken cruise industry.

The biggest potential impact of the COVID-19 pandemic on the industry concerns trade shows. While the rise of online sales had been felt by global gem and jewelry shows such as Tucson for several years, the ability of the industry to survive, and perhaps even thrive, for more than a year without a major gem show may cause many to question whether the events are crucial for their business. As we pull out of this pandemic world, it remains to be seen how major international gem shows will react and adapt.

*Aaron Palke
GIA, Carlsbad*

Josh Hyman (Philadelphia Jewelry Appraisers). Just over a block from Liberty Bell and Independence Hall, between 7th and 8th on Sansom Street, lies Philadelphia's bustling



Figure 17. A 19.56 ct boulder opal is surrounded by Montana sapphire and California spessartine garnet in this brooch commissioned by Josh Hyman. Photo by Laurie Seniuk.

Jewelers' Row. While other American jewelry districts like New York's Diamond District are more well-known, Philadelphia's Jewelers' Row carries the distinction of being the nation's oldest. It is home to many fourth- and fifth-generation jewelry families who took up business in converted row houses built in 1805. Those in need of valuation services can walk into the shop of Philadelphia Jewelry Appraisers and speak to Josh Hyman, the city's only full-time jewelry appraiser.

The Hyman family's jewelry tradition in Philadelphia began with his great grandfather Ruben Littman, a curb merchant who went door to door buying precious metals. Mr. Littman got to know the jewelers on Sansom Street, who purchased precious metals from him. Several generations later, Josh Hyman found himself working in his family's retail shop on Jewelers' Row. After pursuing his gemological education in Idar-Oberstein and then at GIA in Santa Monica, he worked in retail in Aruba before settling back in Philadelphia. There he found his niche as an appraiser serving the vibrant gem and jewelry industry on Jewelers' Row. One of the most rewarding aspects of his work as an appraiser is studying the gemstones submitted to him, which pushes him to tirelessly continue his gemological education. In fact, Mr. Hyman has become quite active in the gemological community online by creating the popular "Gemology Worldwide" Facebook page and pod-

cast series. He admits to having a somewhat ulterior motive, as he wanted to create an educational forum to not only inform others but also advance his own gemological knowledge.

At the beginning of the pandemic in March of 2020, Philadelphia Jewelry Appraisers was shut down for three months. Despite the dismal outlook at the onset, as soon as he reopened in June, demand came back at full strength. While reduced foot traffic on Jewelers' Row may have led to fewer walk-ins, Mr. Hyman had already been driving demand for his services through heavy online advertising, especially Google Reviews. As an appraiser, Mr. Hyman has his finger on the pulse of the trade and offered some insights on the jewelry industry's response to the pandemic crisis. The few months after reopening were a huge boon for the jewelry industry globally as well as in Philadelphia. He attributes this, in part, to the fact that people largely stopped spending discretionary money on experiences such as travel and eating out. Consumers realized that purchasing and gifting gems and jewelry could also become an experience, so the discretionary spending typically allocated to travel was diverted to jewelry. Throughout the pandemic, Mr. Hyman has seen increasing demand for sapphires over rubies and emeralds. In particular, the demand for pastel and teal sapphires has grown, especially for sapphires from Montana (figure 17). Although sales slowed into September and through the end of the year, the outlook is positive. However, it remains to be seen how this might change as the world navigates its way to some form of normalcy and people resume traveling again.

According to Mr. Hyman, one of the main factors keeping the gem and jewelry industry strong, despite the cancellation of major gem shows, is the consumer's increasing confidence in buying online over the last few years. Rough and cut gems and jewelry that would have ordinarily changed hands in Tucson or Hong Kong made their way to the end consumer anyway by being sold online. The next few years will show us how the major gem shows like Tucson will adapt to this drive toward online sales.

Aaron Palke

Adapting to the changes with Paula Crevoshay. With the cancellation of the 2021 Tucson AGTA show, this author's annual meeting with jewelry designer Paula Crevoshay went virtual. The conversation started with her 2020 AGTA Spectrum Award-winning piece, followed by how her business adapted to the new norm under the circumstances brought by the pandemic.

Ms. Crevoshay's "Brown-Eyed Susan" won the Gem DIVA Award for classical wear (figure 18). This bespoke 18K yellow gold pendant features a 5.30 ct orange Montana sapphire from the Rock Creek deposit, operated by Potentate Mining. Although this stone is heated, the color saturation and size still make it a significant sapphire from this location, according to the mine owner. The center stone is



Figure 18. This award-winning pendant featuring a 5.30 ct heated orange sapphire from Montana depicts a blooming brown-eyed Susan. Wildflowers are one of Paula Crevoshay's favorite themes. Courtesy of Paula Crevoshay.

accented with yellow and orange sapphires (8.69 carats total) in addition to black and cognac diamonds (1.98 carats total).

While Ms. Crevoshay has always blended the nature of the stones with her art, she also tells stories through her jewelry creations. This piece is no exception. It continues the story from her first-ever flower themed piece, inspired by the bitterroot wildflower, which thrives on the hillsides of the Rock Creek sapphire mine. By early June, the slopes are covered by bitterroot and brown-eyed Susans. Upon seeing this orange sapphire, she immediately thought to place it at the center of a brown-eyed Susan pendant. Creating these beautiful floral jewelry pieces is never easy be-

cause of the time it takes to find so many stones in specific colors. This is also why she has never reproduced any of her jewelry, unless as a replacement for a lost piece.

As a business owner, Ms. Crevoshay also felt the impact of the pandemic. With careful planning and quick adaptation, she was able to keep her employees safe so that they could continue to work. In fact, 2020 was a good year financially for her company due to the relationships built with the stone supply chain over the past several decades and the customer base she has carefully maintained. To help manufacturers downstream survive, she also intentionally diverted her work to different jewelry-making studios, most of them located in Asia.

Being able to talk face-to-face with customers and provide fashion suggestions even beyond jewelry wear is an asset; connecting with them virtually during the pandemic is also critical. Ms. Crevoshay hosts regular online gatherings with her clients, which have been quite successful in keeping people in the loop. During the 2020 holiday season, she created a digital flipbook for customers to explore at their convenience (<https://online.flipbuilder.com/dzrx/qrub/>; see figure 19). Ms. Crevoshay advises that staying connected at all times and adapting to unexpected circumstances are key for both industry veterans and newcomers.

Tao Hsu

Prida Tiasuwan (Pranda Jewelry Group). Thailand enjoys a strong reputation for jewelry manufacturing, employing a highly skilled workforce in its many factories. Although it was the second nation with confirmed COVID-19 cases, Thailand remained relatively unaffected by the virus. The government quickly imposed strong measures such as remote work, curfews, and closure of places where people gather in great numbers. The action that arguably had the greatest impact was the closure of its international borders. The government tightly controlled travel to the country and enforced a strict 14-day quarantine for everyone who



Figure 19. Paula Crevoshay's digital flipbook for the 2020 holiday season featured more than 50 jewelry creations. Courtesy of Paula Crevoshay.



Figure 20. COVID-19 safety measures in place at this Pranda facility include a disinfection tunnel at the entrance. Photo courtesy of Pranda Jewelry Public Company Limited.

entered. Today, more people are allowed to enter, but the two-week quarantine is still mandatory.

The travel ban had a devastating impact on the region, which relies heavily on tourism and business travel, but it also left its mark on the local jewelry manufacturing scene. We spoke with Prida Tiasuwan, chairman of the Pranda Jewelry Group, about the situation in Thailand. He confirmed that the proactive measures taken by the government affected business in the first months of COVID, but this period did not last very long. By June 2020, business was returning, and a few months later demand was high, most likely because of the upcoming holiday season. This positive outlook continued with the arrival of vaccines in early 2021.

The Pranda facilities operated at reduced capacity during the Thai lockdown, which allowed the company to save costs due to reduced salaries for all staff and selected furloughs in April and May. Mr. Tiasuwan personally headed a task force consisting of department managers to ensure that all 2,200 staff remained safe and production could return to a normal pace as soon as possible.

By temporarily reducing capacity, they were able to improve working conditions for staff, including social distancing measures. Employees quickly adopted these new principles, and many of them were able to work from home. Since August 2020, the facilities have been back at full capacity with all required precautions, including a "Safe and Clean" campaign to remind everyone of the simple steps they can take to prevent the spread of the virus (figure 20).

Still, Pranda encountered issues with the supply of raw materials such as diamonds and certain colored stones. These are typically sourced or cut in countries

such as India and China, where the impact on businesses was more severe during the first months of the pandemic. On the other end of the chain, physical retail was heavily impacted but was compensated by an increase in e-commerce.

The economic impact of the pandemic is also reflected in the demand for jewelry, according to Mr. Tiasuwan. The focus is on simple pieces in smaller sizes, with very few set stones or none at all. Customers have not been looking for fancy, colorful jewels during the pandemic, but Pranda expects this to change once the economic situation stabilizes.

*Wim Vertriest
GIA, Bangkok*

Rock Creek sapphire mining and marketing update. Sapphires were discovered in Montana on the West Fork of Rock Creek in 1892. The shiny pebbles were later identified as sapphire and featured at the Paris Exposition in 1900. Four deposits, one primary and three secondary, were discovered and developed across the western portion of the state. Among them, the secondary deposit at Rock Creek has always been the richest and the most productive. It is estimated that this deposit produced about 65.8 tons of rough sapphire until 2014, which is about 90% of the total sapphire production of all four deposits.

Since 2011, Potentate Mining has been gradually developing and expanding its sapphire mining concession in the Rock Creek area through a series of land purchases. With the latest deal done in 2020, the company now possesses more than 3,500 acres of private property over the sapphire-bearing land. Even with this large acreage, the mining operation works under a Small Miners Exclusion permit,



Figure 21. The newly equipped water clarifier at the West Fork property can nearly fully recycle the water used for mining. Courtesy of Potentate Mining.

which allows the miners to disturb no more than five acres of land at a time and requires them to rehabilitate the land right after mining is done.

In addition to the expansion, in 2019, the washing plant moved from Eureka Gulch to a new location at the West Fork property, where mining is done on the top of the hill (T. Hsu et al., "Big Sky Country sapphire: Visiting Montana's alluvial deposits," Summer 2017 *G&G*, pp. 215–

227). This new washing plant includes a water clarifier that, although not required by state mining regulations, can recycle nearly 80–90% of the water used for mining (figure 21). Before the wastewater reaches the clarifier, it goes through a centrifugal concentrator to recover fine gold and very small sapphires (figure 22). This washing plant is also extremely close to the mining site, which dramatically increases the efficiency of ore processing.



Figure 22. Left: Potentate Mining marketing director Warren Boyd (on the right), mine geologist and manager John Rae (in the back), and a client gather around the centrifugal concentrator. Right: The concentrator extracts fine gold and very small sapphire crystals from the water coming out of the jig before it enters the clarifier. Courtesy of Potentate Mining.



Figure 23. Gemstone trader Peter Ngumbi examines rough at the sapphire mining area near Garba Tula in northern Kenya. Photo courtesy of Vter Young.

Potentate Mining sells rough and faceted sapphire at the Tucson and JCK shows to retailers and jewelry designers. Since 2016, it also offers natural, heat-treated rough sapphire by lots to clients in North America, India, Sri Lanka, and Thailand. Most of these clients are cutting operations. The COVID-19 pandemic reduced the number of staff working onsite at the mine in 2020, but the production was not dramatically affected. Due to travel restrictions, stone viewing became extremely difficult. According

to marketing director Warren Boyd, lots have been shipped to clients since the start of the pandemic. While viewing ahead of receiving lots was impossible, the company expected and has accommodated a certain amount of returns from clients. With Potentate adapting to the unexpected, 2020 sales were about the same as the year before.

Tao Hsu

Peter Ngumbi (Vter Young). The pandemic has been felt throughout the entire jewelry industry, from the miners who are the first to see gems come out of the ground to the local traders and the end consumers. To get a better understanding of the situation in East Africa, we spoke to Peter Ngumbi, a third-generation Kenyan gemstone trader who sources rough from local markets and directly from the miners (figure 23). Mr. Ngumbi sells stones from his offices in Nairobi and Voi to visiting international merchants, as well as directly to consumers and hobby cutters via social media. The main focus of his business is garnet, primarily tsavorite. His broad perspective allows us to gain some insights into the East African gemstone scene during 2020.

The Kenyan government was quick to impose actions to contain the virus, such as a ban on interprovincial travel, which allowed for strong control of local outbreaks, and closed its borders to avoid importing cases while implementing a strict curfew. Mask wearing and contact tracing quickly became routine. While these measures affected daily life, they kept COVID-19 rates relatively low. Similar measures were enforced in Rwanda and Uganda with positive results.

The situation is vastly different in the neighboring country of Tanzania, where the existence of COVID-19 is officially denied and many people are losing friends and relatives. This has significantly impacted local production, which fluctuates heavily. Areas like Mahenge produce almost no material, while material is abundant in other areas because foreign buyers are no longer present.

Even though the local Kenyan restrictions were strong, Mr. Ngumbi notes some positive aspects. Most foreign buyers were forced to leave the country, and many of the local buyers were hesitant to invest large sums in the gem trade during these economically uncertain times. Suddenly he had access to larger volumes of stones with only a fraction of the usual buying public. On top of that, he returned from the 2020 Tucson shows and saw some exceptional tsavorite production, which allowed him to replenish depleted stock.

Normally, Mr. Ngumbi travels regularly to other countries in the region such as Rwanda, Malawi, Mozambique, and Tanzania to source rough. Since he has done this for many years, he has a strong network in these countries, which he relied on heavily during times of limited travel.

He feels that many traders have dramatically expanded their network into source countries over the last decade and are now relying on these established, trusted connections to supply them with rough remotely.

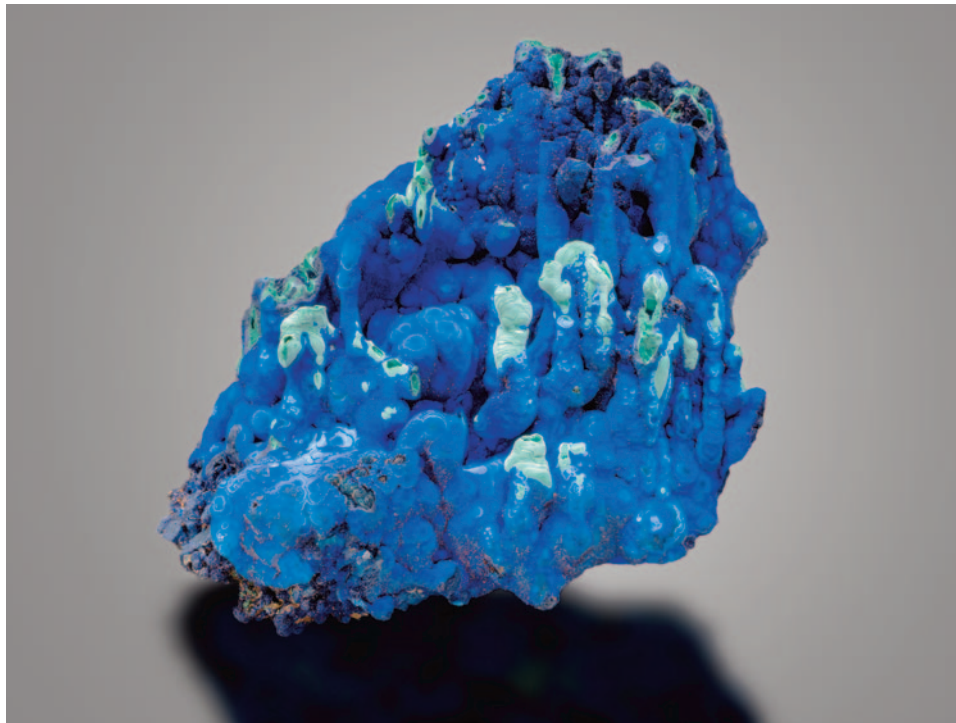


Figure 24. This 203 × 254 mm azurite mineral specimen from Bisbee, Arizona, is emblematic of the strong mineral representation of the Southwest at the Alfie Norville Gem and Mineral Museum. Photo by Jeff Scovil; courtesy of the Alfie Norville Gem and Mineral Museum.

While this was an excellent opportunity for African traders to buy rough, selling was not so rose-colored. No foreign traders came to the continent to source rough. Luckily, many of the African rough traders had established an online presence, which compensated for the decreased in-person sales. Mr. Ngumbi estimates that he sold more than three times the value he usually sells through social media, adding that the public has fully accepted this method of buying. In fact, customers in the United States were so hungry for rough that he could not keep up with orders. This includes some regular customers he sees at trade shows or in his Nairobi office, but a significant portion are unknown buyers he has never met in person. A growing number of online customers are independent jewelers who source their rough as close to the mine as possible and have it cut by contracted cutters.

Artisanal mining was also impacted by COVID-19. Kenyan authorities suspended mining operations where more than 20 people were working to avoid large gatherings. This only lasted for a few months, although it was strictly enforced by officials. These temporary suspensions affected the amount of material available in the market, but keep in mind that the number of buyers was also significantly reduced due to the absence of foreigners. Once the mining restrictions were lifted, there was an influx of artisanal miners trying their luck. This resulted in increased availability of rough in the local markets compared to other years. Availability was balanced out toward the end of the year by the reopening of international borders and the return of foreign buyers with a strong desire for rough.

In summary, the pandemic has had varying effects on the trading situation in East Africa, with local regulations

having a major impact on the local supply and access to that material. The absence of foreign buyers has augmented the supply of available rough in the markets, while COVID-19 has locally disrupted production by artisanal and small-scale miners. The combined effect of this could turn out positive in some regions, while other areas are adversely affected.

Wim Vertriest

Somewhere in the Rainbow finds a home at the Alfie Norville Gem and Mineral Museum. A decade ago, a private gemstone collection was established to celebrate their beauty and stimulate curiosity and gemological education. Today, the Somewhere in the Rainbow collection has found a prominent new home.

Somewhere in the Rainbow joins the University of Arizona's renowned mineral collection consisting of 20,000 global specimens, which is also noted for its strength in minerals from the southwestern United States and Mexico. Together with the Somewhere in the Rainbow collection (a large part of it exhibited under a five-year agreement), 6,000 of the finest mineral specimens will be on exhibit (figure 24) at the new Alfie Norville Gem and Mineral Museum, located at the historic Pima County Courthouse in downtown Tucson (figure 25). The museum is on the verge of reopening in 2021, says manager Eric Fritz. Its location in Tucson is apt, given that the city is a global destination for gemstones, minerals, and the visitors who trade in them.

The museum is named after the wife of noted Tucson real estate developer Allan Norville. In the 1990s, the



couple founded the Gem and Jewelry Exchange (GJX), which remains a major force among the many shows that come to Tucson every year. To date, more than 40 gem and mineral shows exhibit across the town every January

and February. The Norvilles are major patrons of the new museum.

At 1,600 pieces and counting, the Somewhere in the Rainbow collection consists mainly of finished gem mate-



rial complementing the mineral displays (figure 26). Its strength lies in gem carvings, loose gemstones, and jewelry. This collection has traveled across the United States in recent years, visiting AGS Guild stores and other high-end



Figure 26. An architectural rendering of the gem gallery at the museum includes build-out cases and exhibits costing almost US\$12 million. Courtesy of the Alfie Norville Gem and Mineral Museum.

retailers. Its mission is “to bring hands-on education and enjoyment of fine colored gems to museums, galleries, gemologists, and facilities dedicated to preserving the rarity, history, and beauty of the gems and articles of jewelry.”

Shelly Sergent, the Somewhere in the Rainbow collection’s manager, is credited with building it at the behest of unnamed patrons. She says that it offers the public, students, scientists, and educators a distinct snapshot of the gemstone supply chain. “Mother Nature gives us rocks. Cutters and carvers give us gemstones, and jewelry designers give us heirlooms,” Sergent explains.

The collection provides enthusiasts with a better understanding of the beauty and rarity—as well as the unique collaboration between nature and artists. “I realize truly that our mission is not only about education—it’s about community,” says Ms. Sergent. “In that regard, we have brought together more than 127 different people that have worked with us in some capacity on this collection, whether that be miners, stone chasers, lapidary artists, designers, jewelers, and the heads of different laboratories.”

Ahead of the Alfie Norville Gem and Mineral Museum’s 2021 reopening, GIA had the opportunity to visit with Sergent to examine, handle, and photograph some of the collection’s significant pieces. The accompanying photo gallery offers just some of the highlights.

Robert Weldon
GIA, Carlsbad

Figure 25. The Alfie Norville Gem and Mineral Museum will be housed at Tucson’s recently refurbished Pima County Courthouse. The building renovation cost over US\$30 million. Courtesy of the Alfie Norville Gem and Mineral Museum.

Photo Gallery: The Alfie Norville Gem and Mineral Museum



A: A rendering of the gem gallery at the Alfie Norville Gem and Mineral Museum in Tucson. B: A rare 1.92 ct cobalt blue spinel from Vietnam. C: This ring features a fine 5.17 ct ruby from Myanmar flanked by two yellow sapphires.

Photos by Robert Weldon/GIA; courtesy of Somewhere in the Rainbow.



D: "Da Vinci," a 177.8 mm tall green beryl from the Ural Mountains, carved by Alfred Zimmerman of Idar-Oberstein, Germany. The goldwork was crafted by American designer Henry Dunay. E: American gem carver and goldsmith Darryl Alexander fashioned this carved agate pen set in 18K gold and accented with sunstone and diamonds. The agate is approximately 203 mm long. F: A classic necklace featuring a 13.57 ct tsavorite garnet from Tanzania, including 4.27 carats of diamonds, designed by Shelly Sergent, Harry Tutunjian, and Evelyn Crommet.

G



G: A 34.34 ct Imperial topaz from the Ouro Preto region of Brazil is the centerpiece of this stunning pendant featuring 10.50 carats of diamonds and set in 18K gold and platinum by designer Eddie Sakamoto.



H: The "Buddha Blue," a 15 ct sapphire purportedly fashioned between 1400 and 1500 CE in Ceylon. I: An 18.55 ct Tanzanian red spinel. J: A bracelet by Megan Schmitt featuring a 20.06 ct blue Sri Lankan sapphire, with pink and yellow sapphires. K: A pair of grossular garnets: the 21.56 ct "Heart of Merelani" (left) from Tanzania and the 20.20 ct "Scorpion King" (right), mined by Campbell Bridges in Kenya. L: Pendant with a 15 ct pear-shaped Paraiba tourmaline from the original Brazilian mine. M: Necklace by Vlad Yavorsky with 129.93 carats of spinel from Myanmar, Sri Lanka, Afghanistan, and Madagascar.

REGULAR FEATURES

COLORED STONES AND ORGANIC MATERIALS

“C” is for cookie and “G” is for geode. Gemstones are well known for their ability to mimic familiar themes, but the rock that recently launched a thousand online posts resembled one of the most recognizable children’s characters, the Muppet known as the Cookie Monster (figure 27). The uncanny likeness set the internet ablaze with reports from news sources around the globe. A video of the geode featuring Cookie Monster’s signature tune, “C is for Cookie,” was uploaded to Facebook by its owner, gem collector Mike Bowers, on January 16, 2021. The viral clip reached more than one million views just a week later. All the attention left many wondering, “How could a rock like this form?”

The discovery of the Cookie Monster geode, reportedly from Brazil, is a combination of geologic design and pure luck. It is composed of banded layers of microcrystalline quartz, commonly known as agate. The scientific processes

Figure 27. A Brazilian geode shows a striking resemblance to the legendary Cookie Monster character. The intact geode measures 61 mm in length and 40 mm in diameter. Photo by Robert Weldon; courtesy of Mike Bowers.



Figure 28. This geode was serendipitously cut at a perfect angle, resulting in halves resembling the famous Cookie Monster (top). Coincidentally, the geode also showed blue fluorescence under long-wave ultraviolet light, reminiscent of the character’s blue fur (bottom). Photos by Robert Weldon; courtesy of Mike Bowers.

required are complex but can be simplified into some general steps (J.D. Winter, *Principles of Igneous and Metamorphic Petrology*, Pearson Prentice Hall, Upper Saddle River, New Jersey, 2013). This type of geode occurs as a secondary formation when gas bubbles trapped in volcanic rocks, known as vesicles, are filled with silica-rich fluids. Over time, the fluids deposit concentric layers of microcrystalline quartz along the interior of the vesicle. The accumulation of these layers reflects the variation in chemistry and changing conditions of the silica-rich fluid. These fluctuating conditions can result in a banded formation of the microcrystalline quartz, thus giving rise to an agate. The final siliceous fluid in the last stage of formation allowed for a large central druzy quartz-lined cavity that represents the “mouth” of the Cookie Monster (figure 28, top).

Cutting the rock at the perfect angle to reveal such a startling semblance was a matter of sheer chance, for the internal structure of a geode is not known until it is split open (<https://www.gia.edu/gems-gemology/spring-2021-gemnews-cookie-monster>). Any slight change in cutting direction might have resulted in viewers not experiencing the phenomenon of *pareidolia*, the tendency to assign familiar shapes or faces to abstract forms (Winter 2007 Lab Notes, pp. 363–364).



Figure 29. A small impurity of yellow limonite resembling a cookie crumb was found under the “mouth” of the Cookie Monster. Photomicrograph by Nathan Renfro; field of view 4.70 mm.

The color in blue agate is created by scattering of light; when the particles of silica are smaller than 400 nm, blue light is reflected back (G. Rossman, “Cause of color in agate and chalcedony,” Seventeenth Annual Sinkankas Symposium, April 24, 2021). When the rock was exposed to long-wave ultraviolet light, it revealed strong blue fluorescence (figure 28, bottom) consistent with the fur color of the famous Muppet. Also of gemological interest was a microscopic feature: Below the quartz-lined “mouth” was a small inclusion of yellowish limonite, a hydrous iron oxide, resembling a cookie crumb (figure 29).

While geodes can be millions of years old, the Cookie Monster character only emerged within the last century. The Cookie Monster, originally created as a prototype in 1966 by Jim Henson, debuted on the American educational children’s television series *Sesame Street* in 1969. The name was taken from his incessant obsession with the baked goods. With *Sesame Street* still on the air today, after 51 seasons, Cookie Monster’s fame is sealed in pop culture.

It was a fortuitous circumstance that the formation of the geode resulted in such a remarkable specimen. As GIA analytical microscopist John Koivula likes to say, “Mother Nature cooks in a dirty kitchen.” Who knows what she will cook up next, but one can hope it has us all cracking open a smile once more.

*Britni LeCroy and Nicole Ahline
GIA, Carlsbad*

DIAMONDS

Hole drilled by hand in briolette. Recently, a 6.19 ct briolette diamond was submitted to GIA’s Antwerp laboratory for examination. It had been in the family of Belgian diamond cleaver and Auschwitz survivor Philip Isidoor Frank, who died in 1982. Mr. Frank is known for his work on many important diamonds, such as the 69.42 ct D-color Internally Flawless pear-shaped Taylor-Burton diamond.

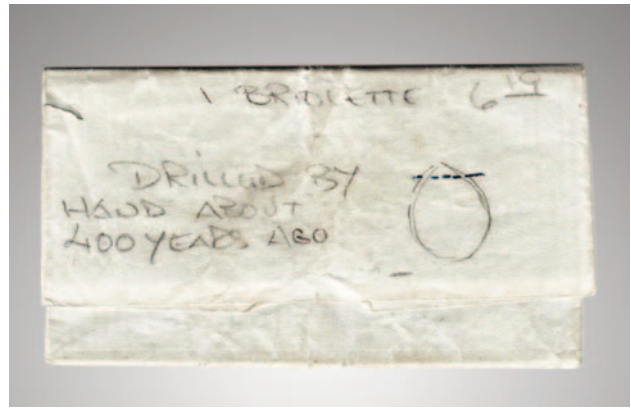


Figure 30. The diamond paper that held the 6.19 ct briolette diamond. Photo by Nathan Renfro.

The diamond paper containing the briolette had a note, presumably written by Mr. Frank: “drilled by hand about 400 years ago” (figure 30). Sadly, this cannot be substantiated, and Mr. Frank left no other record. It raises the question as to whether this age is theoretically possible.

The diamond (figure 31) loosely fits the briolette definition since the hole is at the very tip rather than through the central portion. In reference to Mr. Frank’s note on the diamond paper, this description seems appropriate, even though the stone lacks the appealing teardrop shape we think of with modern briolettes. The style of faceting for this diamond is reminiscent of early cutting from India (1550–1900), but it could have been cut at any time (figure 32). By the 1700s, Europeans were already moving toward

Figure 31. The facet arrangement of the 6.19 ct briolette. The horizontal drill hole is at the top. Photo by Jian Xin (Jae) Liao.





Figure 32. Early Indian cutting styles (ca. 1550–1900) feature a very thick girdle area with multiple facets, similar to the briolette’s plane that wraps around the stone. From Ogden (2018), p. 320.

variations of brilliant styles with good symmetry, thin girdles, and specific ratios of crown and pavilion. They did not typically care for the quality of Indian diamond cutting, and many stones were recut.

The briolette cutting style has a remarkably long history. Seventeenth-century French gem merchant Jean Baptiste Tavernier (1676, p. 336) sold four briolettes to the French king Louis XIV. The invoice described two stones as “round pendant with little facets” and “cut with facets on all sides” (Bapst, 1889, p. 404), respectively, and included illustrations. Two others, not illustrated, were “cut as round pendants with facets on all sides.” Tavernier’s drawings depict a briolette style, although that term was not used much before the nineteenth century.

However, Tavernier’s gems are not the earliest recorded briolettes. One had arrived in the royal court in England almost 20 years before his first voyage to India. On February 17, 1612, payment was arranged to the Flemish goldsmith Stephen le Gouche for a piece of jewelry with “one fair large pendant diamond, cut with fancies [facets] on all sides, and pierced at the top” that had been delivered to Queen Anne of Denmark (Green, 1858, p. 121), who was married to James VI and I (r. 1603–1625). The court accounts further describe the piercing at the top as lateral.

Noël-Antoine Pluche’s extensive multivolume work on natural history, *Le Spectacle de la Nature*, features an illustrated briolette described as a pear-shaped diamond cut in the “*taille à l’Indienne*” or Indian style (1748, pp. 349–352). The comments by Pluche, along with the Indian examples traded by Tavernier, point to the briolette form as

being associated with India. Several later books specifically state this association and even mention lateral piercing. A French encyclopedia from 1859 (Guillaumin, pp. 980–981) explains that “In India, where the briolettes formerly came from, it was customary to pierce them with a very small hole in the upper part. Today a few lapidaries in Amsterdam cut briolettes very well, but they haven’t yet managed to pierce them.”

By 1600, Italian, German, Flemish, and Belgian cutters worked in India (Everaert, 2000, 2005), bringing along their techniques and cutting styles to higher-quality rough. These faceted stones would then be sent to Europe (Ogden, 2018, pp. 297–305). For example, the briolette shown in Tavernier’s book may have been cut by a European living in India rather than by a local Indian diamond cutter (there is no mention of a hole in the briolettes sold by Tavernier). Indian diamond cutters continued to follow their own styles, often cutting the lesser-quality rough destined for the Indian market. Short of documentation showing early briolettes with this specific facet arrangement by Indian cutters, dating the 6.19 ct briolette from Mr. Frank is impossible.

The drill hole at the tip of this briolette (figure 33) is consistent with sawing techniques used to make holes in diamonds from the seventeenth century through the 1970s. By the mid-1500s, iron wires coated with diamond dust and oil were used to saw through a diamond. By the early 1600s, lapidaries rotated a diamond-tipped iron point or iron drill with diamond powder to create a hole from each side. Once these two holes met and the opening was large enough, the wire was inserted and drawn back and forth, the apparent method used for this diamond.

In 1811, Napoleon Bonaparte presented a 263 ct diamond briolette necklace to his empress consort, Marie Louise. It featured 19 oval- and pear-shaped briolette-cut

Figure 33. The drill hole at the tip of the stone. Note the unique surface, a remnant of the process of drawing a wire coated with diamond dust and oil back and forth. Photomicrograph by Nathan Renfro; field of view 4.02 mm.



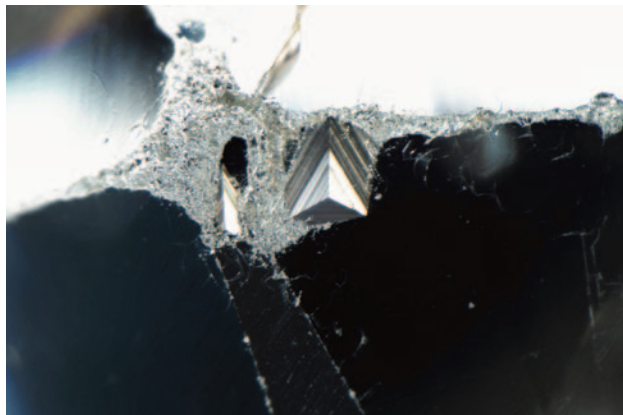


Figure 34. The trigon is a remnant of the original crystal's surface. Photomicrograph by Christopher Vendrell; field of view ~1.99 mm.

diamonds (probably of Indian origin but faceted by European cutters in India) with drill holes. The facet arrangements of the stones in the necklace are more symmetrical and quite different from the 6.19 ct briolette.

It is unclear when laser drilling for larger holes began, but General Electric researchers used a laser to drill 0.02-inch-diameter holes into an industrial diamond in the early 1960s (Overton, 2008, p. 46). As early as 1970, GIA's Robert Crowningshield reported that lasers were being used as part of a process to bleach or dissolve dark inclusions, and soon this treatment was widely available to members of the trade (Overton, 2008, p. 46). This means that sometime after the 1970s, lasers would have been employed for the process of drilling holes for beads and such. Older briolettes that came into GIA's laboratory would still have holes drilled by hand, but by the 1980s, this hand drilling process was mostly abandoned. Has GIA seen a handmade drill hole in diamonds in the past, and if so, how many? Uncovering records of hand-drilled diamonds submitted to the laboratory is quite difficult since records prior to the 1990s are not computerized for searching and briolettes are rarely seen. Notations about the surface of the drill hole are also uncommon in reports. Our research into past submissions did not yield any useful results.

From the above, it is impossible to date this diamond, although it was probably cut before 1920 in India, possibly much earlier, but not by highly skilled cutters.

The briolette is heavily abraded. One possible reason is that it was kept in a diamond parcel rubbing against other diamonds for a long time, though this seems unlikely. Why would any diamond merchant allow a diamond in their stock to become so excessively abraded? It was more likely worn in an item of jewelry, repeatedly wearing against other diamonds and being casually stored by the owner, suggesting an extended period of use.

Of final note, there are several naturals on the surface of the briolette, including a trigon (figure 34).

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SYNTHETICS AND SIMULANTS

Phenakite as a diamond imitation. In my gemological laboratory, I see some interesting imitations from time to time. The latest was quite unusual: a set of 12 loose stones submitted as diamond (figure 35) for certification. Testing their thermal conductivity with a Presidium Gem Tester and their electrical conductivity with a Ceres Secure II device indicated diamond and ruled out synthetic moissanite. The next property examined was fluorescence, and all the stones were completely inert to both short-wave and long-wave UV. It would be unusual for a group of 12 natural diamonds to all be inert, so the next step was determining whether they might be laboratory-grown diamonds. Working under the assumption that they were indeed diamonds as submitted, the stones were tested for short-wave UV transparency and all were very transparent, suggesting they could be type IIa (which would be consistent with laboratory-grown near-colorless diamonds). Finally, I performed Raman analysis; instead of a sharp diamond peak at 1332 cm^{-1} , it showed only a small peak at 878 cm^{-1} , indicating that these stones were not diamonds.

Only then did I remember a natural crystal of phenakite, sold as diamond, that I tested a few years ago. It was very similar to natural rough diamond, but instead



Figure 35. A set of phenakite gems ranging from 0.20 to 0.98 ct, with a total weight of 5.85 carats, sold as diamonds. Photo by J. Hyršl.

of typical trigons, it had a surface covered by many rhombs. But its thermal conductivity was the same as diamond's, and therefore it was a plausible diamond imitation for a mineral or gem dealer without knowledge of crystallography. When I remembered this, the identification was easy—the refractive index of the loose cut stones was 1.655–1.670, and the Raman line matched very well with phenakite. And upon further examination, the stones appeared doubly refractive in the microscope and polariscope.

Phenakite is trigonal Be_2SiO_4 , colorless, and similar to beryl. Normally it forms hexagonal prismatic crystals that look very different from diamond. Nevertheless, some crystals from Nigeria are irregularly developed (figure 36) and could be mistaken for a rough diamond without careful examination, especially if mixed with real diamonds. Cut stones are quite rare and well known only to collectors of rare gemstones. Distinguishing a cut phenakite from diamond is quite easy when one can measure refractive index, see a double refraction in the polariscope or microscope, or calculate weight from measurements. Much more difficult



Figure 36. Natural phenakite crystal from Nigeria, width 38 mm. Photo by J. Hyršl.

would be phenakite set in jewelry, where it can be very difficult to measure RI. Cut phenakite has much lower brilliance than diamond, of course, but can resemble low-quality cut diamonds.

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TREATMENTS

An unusual treated agate presented as “Shi Zi Hong” agate from Liangshan. “Nanhong” agate, an attractive form of agate, mainly ranges from orange-red to purplish red, and is colored by the presence of fine-grained hematite inclusions. *Nan* and *hong* mean “south” and “red,” respectively. The material has gained great popularity in China's domestic gem market in recent years. “Shi Zi Hong” agate, one of the most famous color varieties of “Nanhong” agate (Lin Li, “Analysis of gemological and petrological characteristics of Nanhong agate from Liangshan,” Chengdu University of Technology, China, pp. 17–18), usually has a more vibrant saturated orange-red color and fine texture, so its price is higher. *Shi zi* and *hong* mean “persimmon” and



Figure 37. This 5.74 ct treated agate sample (left) submitted to the lab resembled “Shi Zi Hong” agate (right). Photo by Su Xu.

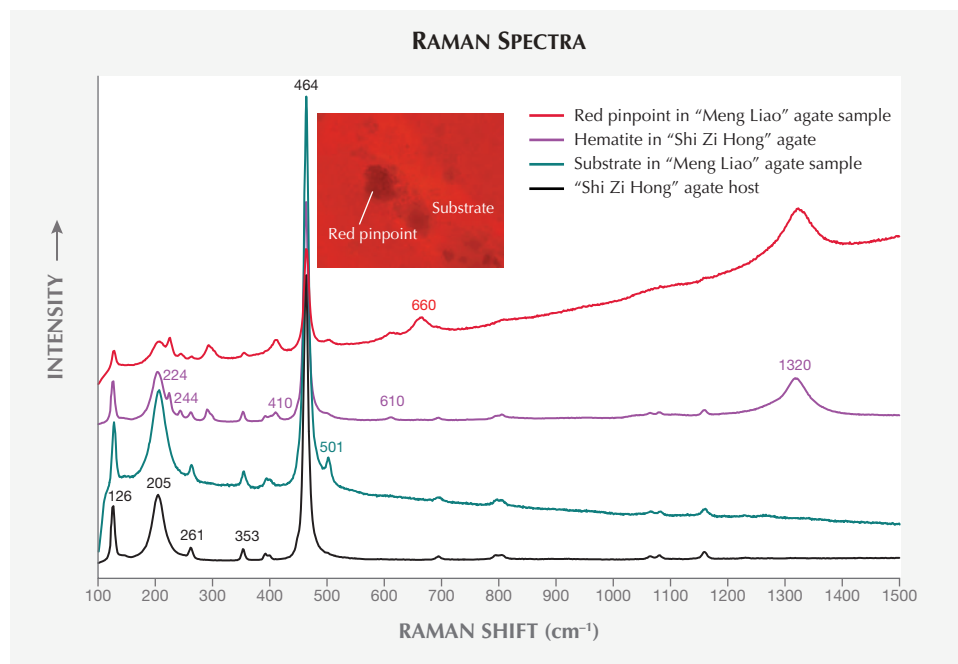


Figure 38. Under magnification and using fiber-optic illumination, some fine pinpoints were distributed as hazy clouds in the rough agate. Raman spectroscopy identified the main constituent of substrate in the sample as quartz (green trace) and red pinpoint as hematite (red trace), both consistent with “Shi Zi Hong” agate (indicated by the purple trace and the black trace). The sample also showed a sharp peak at 501 cm^{-1} and a broad band at 660 cm^{-1} , neither of which are seen in genuine “Shi Zi Hong” agate. Photomicrograph by Su Xu; field of view 0.22 mm. Spectra offset for clarity.

“red.” The majority of fine-quality Shi Zi Hong agate on the market has come from Liangshan Yi Autonomous Prefecture in Sichuan Province, China.

In October 2020, an orange-red cabochon sample was presented to the National Gold-Silver Gem & Jewelry Quality Supervision & Inspection Center (Sichuan) by a client who claimed it was a new type of Shi Zi Hong agate. The trader referred to it as “Meng Liao” agate (figure 37, left).

The sample weighed 5.74 ct, and the appearance was similar to Shi Zi Hong agate (example shown in figure 37, right). The spot RI reading was around 1.54, and the sample was inert to UV radiation. Microscopic examination showed cryptocrystalline texture with red pinpoint-like inclusions scattered throughout, most of which were sufficiently fine to appear as hazy clouds under 40 \times magnification.

Raman spectra of the substrate and red pinpoints were obtained using 532 nm laser excitation. According to the RRUFF online database, peaks at 126, 205, 261, 353, and 464 cm^{-1} indicated that the main constituent of the substrate was quartz, while the red pinpoints matched that of hematite, with peaks at 224, 244, 291, 410, 610, and 1320 cm^{-1} (figure 38). Both were consistent with Shi Zi Hong agate. A sharp peak at 501 cm^{-1} , seldom observed in Shi Zi Hong agate, appeared in the spectra of the sample. This significant peak was assigned to stretching vibrations of $(\text{SiO}_4)^{4-}$ in the moganite structure. Based on a negative correlation between the relative content of moganite and the crystallinity of agate (Zhou Dan-yi et al., “Study on the relationship between the relative content of moganite and the crystallinity of quartzite jade by Raman scattering spectroscopy, infrared absorption spectroscopy and X-ray diffraction techniques,” *Rock and Mineral Analysis*, Vol. 3-4, No. 6, 2016, pp. 652–658), we concluded that the crystallinity of natural Shi Zi Hong agate was much higher than that of

the sample. Another obvious anomaly was the broad band at 660 cm^{-1} , which was found in the spectrum of the sample but was seldom observed in Shi Zi Hong agate, and this deserved further investigation.

The client admitted that the “Meng Liao” agate was actually a normal brownish yellow agate heated by a low-temperature process. Meanwhile, he loaned us an untreated rough stone (figure 39) for Raman analysis of its body and very fine yellow pinpoint inclusions.

The substrate of the untreated rough stone and the “Meng Liao” agate sample submitted to the lab showed almost the same peaks in the region of 1000–100 cm^{-1} , suggesting that they might be homologous with each

Figure 39. The untreated brownish yellow rough stone, approximately 17.0 \times 22.0 \times 1.5 mm, loaned by the client for analysis. Photo by Xiaoping Shi.



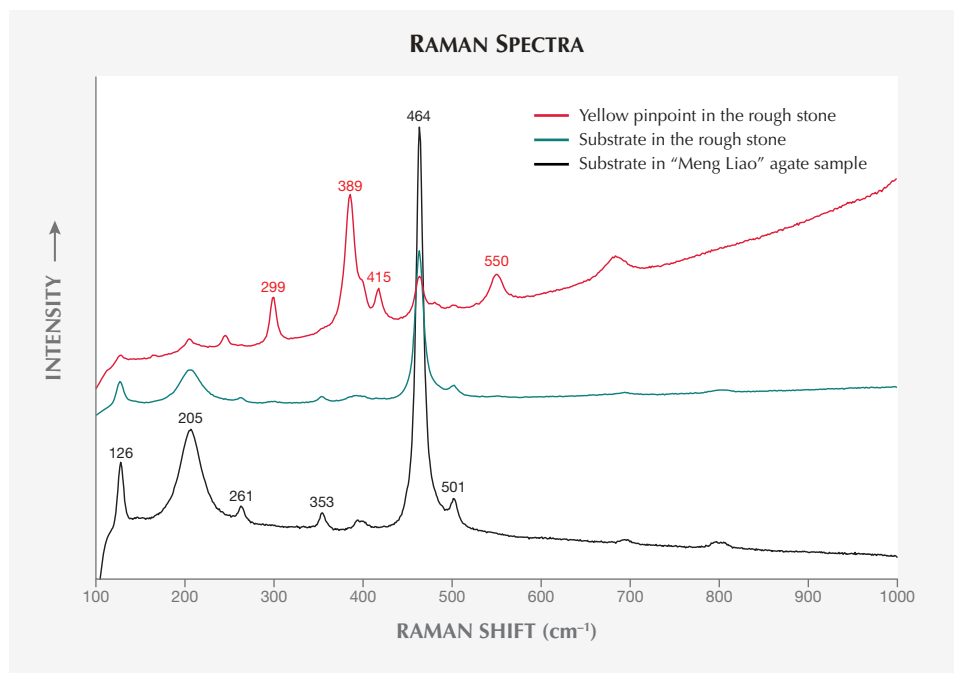


Figure 40. Raman spectra of the brownish yellow rough stone: Peaks at 299, 389, 415, and 550 cm^{-1} indicated goethite. Peaks at 126, 205, 261, 353, 464, and 501 cm^{-1} were consistent with the treated agate sample submitted to the lab. Spectra are offset for clarity.

other. The spectrum of the yellow pinpoint, exhibiting peaks at 299, 389, 415, and 550 cm^{-1} and lacking a 660 cm^{-1} band, matched the Raman spectrum for goethite and was related to the formation of color in the rough, as shown in figure 40. According to a previous report (D.L.A. de Faria and F.N. Lopes, "Heated goethite and natural hematite: Can Raman spectroscopy be used to differentiate them?" *Vibrational Spectroscopy*, Vol. 45, No. 2, 2007, pp. 117–121), the disordered hematite structure was initially formed by dehydration and caused the relative intense band at 660 cm^{-1} by heating goethite at a low temperature (~140°C to 360°C). The natural hematite in Shi Zi Hong agate, by contrast, has features including a very weak 660 cm^{-1} band and a high degree of order, by which genuine Shi Zi Hong agate can be distinguished from the brownish yellow agate that acquired an orange-red color by artificially heating goethite. These results show that the agate submitted by the trader as "Meng Liao" agate, resembling Shi Zi Hong agate, can be readily detected by its unique Raman spectrum displaying an obvious broad band at 660 cm^{-1} and a sharp peak at 501 cm^{-1} . Consumers in the market for Shi Zi Hong agate should watch out for this treated material.

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Unusual fluorescence of a color-enhanced amber bracelet. Heat treatment is commonly applied to amber, mainly to improve its color or transparency. The method of heat

treatment to enhance the color of amber is informally called a "baking process," which refers to the process of heating while applying pressure and adding oxygen (Y. Wang et al., "Experimental studies on the heat treatment of Baltic amber," Summer 2014 *G&G*, pp. 142–150). Usually, the light yellow amber will be darkened and turned brownish yellow or brownish red by such a process to increase its market value. Amber may also be heated to produce sun spangles and sold as "flower amber" for its popular demand in the market.

A bracelet recently sent to Taiwan Union Lab of Gem Research (TULAB) for identification services contained amber that was pale brownish yellow, transparent, and slightly included (figure 41). Raman spectroscopy and microscopy confirmed the gems to be natural amber with an abundance of sun spangles, which were discoidal fractures caused by heat treatment.

Color enhancement of amber is generally not detectable unless the amber itself has cracks or pores extending to the surface during the baking process, in which case the color usually concentrates in these cracks and pores. Apart from that, amber that is color-enhanced by the baking process mostly shows inert or faint yellow fluorescence under long-wave ultraviolet light; however, such fluorescence may also occur in natural untreated amber.

Microscopic observation of the amber bracelet revealed that the dark brown color was concentrated in all the surface-reaching fractures or sun spangles, but the sun spangles wrapped inside all appeared in a lighter tone of yellow (figure 42). Thus, it was suspected that this amber bracelet had been baked to enhance color.

In addition to the inclusion evidence, the amber bracelet's long-wave ultraviolet fluorescence reaction unexpectedly presented a relatively bright blue along the



Figure 41. This bracelet contained amber (approximately 10 mm each) that was color-enhanced by a baking process. Photo by Yu-Shan Chou.

ridgelines and inert to faint yellow on the rest of the stone (figure 43). This abnormal fluorescence strongly indicated that the amber had indeed been baked to enhance its color and that the ridgelines were worn due to grinding or wearing, which removed the brown surface layer. This case is worthy of attention because a series of similar items have subsequently been submitted for identification. Traditionally, the color enhancement of amber has been confirmed only by inclusion evidence; however, the abnormal fluorescence of this object offered supporting evidence.

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Figure 42. Magnification revealed that the dark brown color was concentrated in the surface-reaching fractures or sun spangles, yet the sun spangles or fractures wrapped inside the amber were all yellow. Photomicrograph by Shu-Hong Lin.

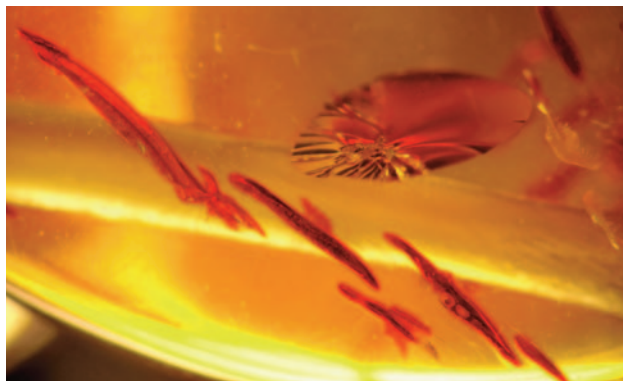


Figure 43. Under long-wave ultraviolet light, the amber bracelet presented a surprising bright blue fluorescence on the ridgelines and inert or faint yellow fluorescence on the other parts. Photo by Kai-Yun Huang.

ANNOUNCEMENTS

Fourth annual Gianmaria Buccellati Foundation Award.

Belle Sin Ting Wong, a graduate of GIA's Jewelry Design program in Hong Kong, received the fourth annual Gianmaria Buccellati Foundation Award for Excellence in Jewelry Design. This year, the prestigious award was announced virtually due to the global pandemic shuttering the Tucson gem shows. Sin Ting Wong (figure 44) was one of nine finalists selected from a competing group of more than 100 students from GIA's seven campuses. Her winning design was inspired by the Siamese fighting fish and features diamond, sapphire, pearl, jadeite, and enamel set in 18K yellow and white gold.

Sin Ting Wong hopes to raise environmental awareness through this brooch design and advocates the use of sustainable products or "we might be very close to losing these beautiful creatures and quicken the pace of global warming."

She will travel to Italy, where she will have the opportunity to meet Rosa Maria Bresciani Buccellati, the president of the foundation.

Laurie Bailyn, GIA senior manager of jewelry manufacturing arts, said, "It is incredible that so many students managed to complete their Jewelry Design studies in 2020, despite the challenges of the global pandemic. Many of the beautiful, original designs that students created this year were inspired by themes of connection and community."

The 2021 Gianmaria Buccellati Foundation Award for Excellence in Jewelry Design competition is currently open to GIA Jewelry Design students who meet the eligibility requirements. For more information on entering the competition, visit gia.edu/buccellati-foundation-award-jewelry-design



Figure 44. Belle Sin Ting Wong received the Gianmaria Buccellati Foundation Award for Excellence in Jewelry Design for her diamond, sapphire, pearl, jadeite, and enamel brooch, inspired by the Siamese fighting fish. Photo by Johnny Leung and Tony Leung.

IN MEMORIAM

Jean Claude Michelou. The colored stone industry lost one of its true leaders with the passing of Jean Claude Michelou (figure 45) on May 3 at the age of 72. Mr. Michelou graduated from the London School of International Business and began selling emeralds in Colombia in 1977. The business he later established, Imperial Colors Ltd., specializes in rough buying, grading, and cutting of emerald, tourmaline, beryl, and sapphire. He relocated the company to Bangkok in 2018.

Mr. Michelou was active with the International Colored Gemstone Association (ICA), serving as a board member for 18 years and as vice president for 10 years. In 2004, he founded ICA's quarterly magazine, *InColor*, and was its editor-in-chief until his retirement earlier this year. He was also a consultant for the United States Agency for International Development (USAID), the World Bank, and other agencies on developing standards for the colored stone industry. In addition, he served on the advisory board for the University of Delaware's Gemstones and Sustainable Development Knowledge Hub and organized the World Emerald Symposiums held in Bogotá since 2015.

For more than a decade before his passing, Mr. Michelou had been deeply involved in several beneficiation projects in source countries, including the Swat Valley emerald deposits of Pakistan and a Nigerian sapphire mining venture. He shared his insights on supply chain transparency and beneficiation with *G&G* in the Spring 2018 issue (*Gem News International*, pp. 93–94). Over the years, Mr. Michelou was a valuable source of knowledge for this journal and a mentor to many young industry professionals. We extend our condolences to his family and friends.

ERRATUM

In the Winter 2020 article by Sudarat Saeseaw et al. (“Low-temperature heat treatment of pink sapphires from Ilakaka, Madagascar,” pp. 448–457), the photo of sample PS11 after heating was incorrectly presented in table 1. The correct photo is shown in the online version of the article, available at <https://www.gia.edu/gems-gemology/winter-2020-ilakaka-pink-sapphires-heat-treatment>

Figure 45. Colored stone industry veteran Jean Claude Michelou was founder and longtime editor-in-chief of ICA's quarterly, *InColor*. Photo by Vincent Pardieu.

