

Gems & Jewellery

Summer 2023 / Volume 32 / No. 2



THE LOCALITIES ISSUE

AFRICAN GEM
COMMUNITY ROUND TABLE

SILICOSIS IN BAHIA, BRAZIL

BLUE JOHN
FROM DERBYSHIRE

TASMANIAN KANALARITJA



Gem-A
THE GEMMOLOGICAL ASSOCIATION
OF GREAT BRITAIN



Gem-A

THE GEMMOLOGICAL ASSOCIATION
OF GREAT BRITAIN

Save the date

05|11|23



Gem-A Conference 2023

Bringing together the greatest minds in Gemmology

November 5

etc.venues County Hall, London



Gems & Jewellery

SUMMER 2023

AFRICAN VOICES

Gem-mining representatives from Kenya, Malawi and Zambia discuss current challenges and hopes for the future.



14



32

MINING BLUE JOHN IN 2023

Elisabeth Turner's family has been running Treak Cliff Cavern since 1945, though the art of crafting with Blue John is over three hundred years old. Here she tells how members of the staff navigated the COVID-19 crisis and how the site fares today.

PROTECTING KANALARITJA

When the effects of climate change threatened the sacred practice of an indigenous community in Tasmania, Dr Andrew Gall worked for five years to keep *kanalaritja* – the act of shell-stringing and the jewellery created from it – alive.



40



COVER PICTURE

Our lead article features input from gem representatives from Kenya, Malawi and Zambia. All tsavorites and aquamarines on the cover, including Virtu Gem's Kenya National Gem Cut (set in necklace), were Kenya-mined and cut (where applicable). Photo by Steve Wagner, *WagnerPhotoGraf.com*; necklace courtesy of Susan Wheeler.

Published by

Gem-A (The Gemmological Association of Great Britain)
21 Ely Place, London EC1N 6TD
t: +44 (0)20 7404 3334
f: +44 (0)20 7404 8843
e: editor@gem-a.com
w: www.gem-a.com

Registered charity no. 1109555
Copyright 2023 ISSN 1746-8043
Gem-A is a company limited by guarantee, registered in England, number 01945780

Editor-in-Chief:

Jennifer-Lynn Archuleta

Contributing Editor: Olga González

Design and Production

Zest Design +44 (0)7768 233653

Editorial and Advertising

For editorial enquiries, media pack and advertising rates please contact editor@gem-a.com.

Any opinions expressed in *Gems & Jewellery* are understood to be the views of the contributors and are not necessarily those of the publishers.

Contributors	4	Fighting Silicosis in Brazil's Quartz Mines	24
CEO Comment	7	Japan's Cultured Pearl Farms	28
Gem-A News	8	Diamond Cutting in Sierra Leone	36
The Big Picture	12	Exhibition Review	44
Challenges Facing Australian Sapphire	20	Last Impression	48

Twitter @GemAofGB
Facebook Gem-A
LinkedIn Gem-A
WeChat @GemAofGB
Instagram @GemAofGB
YouTube Gem-A Official Channel

Gems & Jewellery

Summer 2023 Edition Featured Contributors

1. DIBYA J. BARAL

A geologist by training, Dibya Baral has worked in the gemstone industry for more than eleven years. He has worked with FURA since 2018 and manages Australian sapphires directly as managing director of that project. He is responsible for all the technical aspects of exploration, mining and processing, including gemstone prospect appraisal, resource assessment and mine feasibility studies. Mr Baral guides process automation at gemstone operations to improve productivity, efficiency and resource utilisation while protecting the environment. A geologist with 25 years of global experience in multi-commodity mining, Mr Baral has served as general manager at Gemfields' Kagem emerald mine in Zambia, and as a senior geologist with global mining majors like Vedanta and Tata Steel. He holds an MTech in applied geology from Indian Institute of Technology, Roorkee.

2. RACHEL CHURCH

Rachel Church writes and lectures widely on jewellery history and design. She is the author of *Rings* (V&A/Thames and Hudson 2011 and 2017) and *Brooches and Badges* (V&A/Thames and Hudson 2019), alongside many shorter articles and contributions to catalogues. She worked as a curator at the Victoria and Albert Museum for over 20 years and was part of the team which redeveloped the European Silver Galleries, the Sacred Silver and Stained Glass Galleries and in the

William and Judith Bollinger Jewellery Gallery. She is particularly interested in the social history of jewellery and is currently researching male jewellery. Since 2021, Ms Church has been a freelance lecturer and jewellery researcher, available for both private commissions and institutional projects. Her website, www.thelifeofjewels.com, looks at the stories and history behind jewellery.

3. BRIAN COOK

Brian Cook has been a geologist and purveyor of world-class minerals to top collectors and museums since 1983. His background – which includes the study of geology at California's Sonoma State University, and his involvement in new occurrences in the Brazilian gem world, such as the original Paraíba tourmaline and spessartine garnet – has positioned him as a consultant in the field of exploration geology and purveying for gems and minerals. Mr Cook is currently operating a golden rutiled quartz mine in Bahia, Brazil. With a California studio and a Brazilian studio, Mr Cook travels extensively to source gem materials and rare minerals for use in his own jewellery and lapidary creations with his wife, Kendra, and their company, Nature's Geometry. Mr Cook is passionately involved in leading initiatives that bring ethically sourced materials into the jewellery industry to benefit those communities at the source and usher sustainability to the jewellery industry at large.

4. MAARTEN DE WITTE

A Graduate Gemologist (Gemological Association of America) and Legacy Certified Gemologist (American Gem Society), Maarten de Witte has been intimately involved with cutting gem diamonds for over 50 years. Having learned his trade at the American School of Diamond Cutting, he eventually became its director. He is renowned as the Diamond Wizard. His master's thesis, written at the University of Illinois, is entitled *Diamonds and Development in Southern Africa: A Case Study of Botswana*. He was instrumental in building and growing the Hearts on Fire brand from initial start-up to international brand. Mr de Witte views the world of diamonds through a wide lens with a large field of vision. His scope of experience ranges from the solitary workbench to the global diamond industry. He is highly regarded for excellence as a craftsman, innovator and teacher – in wholesale, retail, branding, training, research and development. His current projects include designing and producing unique high-performance 'fancy-round' diamonds and building Root Studios, a design-led incubator for creating value-added in the diamond sector in Sierra Leone's Kono District that empowers youth to expand the market share of artisanal mined diamonds by producing 'storied diamonds'. Its ultimate goal is to create a unique Mine to Yours brand, with traceable, sustainable and ethical supply chain that benefits the aspirations of artisanal miners and small business enterprises within Sierra Leone.

5. ALANA GALL

Dr Alana Gall is a Pakana woman (Tasmanian Aboriginal) and a postdoctoral research fellow at Southern





Cross University. She is passionate about indigenous peoples' holistic health and wellbeing, believing that these are strongly centred around strong connections to Country/land, culture, spirituality and kin/community. Alana has over a decade of experience in research. Her masters, PhD and other research work has focused primarily on traditional medicines and wellbeing of Aboriginal and Torres Strait Islander peoples, but also Indigenous peoples in Canada, Aotearoa-New Zealand and the United States. Dr Gall's work is grounded in decolonising research approaches, including indigenist research methods with a strengths-based focus. She is developing a research program that centres around First Nations Australians traditional medicines and healing practices, aiming to protect and preserve these medicines for future generations and improve accessibility for all First Nations communities across Australia.

6. FAS LEBBIE

Born and raised in Sierra Leone before immigrating to the United States, Root Diamonds' cofounder Fas Lebbie is an entrepreneur, designer and technologist. His character and identity as an African-American immigrant from Sierra Leone have greatly influenced his design and entrepreneurship and philanthropic practices, as communicated through his memoir, *Souvenirs of My Awakening*. His work in human-centred design (HCD) and entrepreneurship as an undergraduate at the University of Utah earned him a scholarship at the Parsons School of Design. Mr Lebbie's not-for-profit, Fas Project, provides the basics for orphans in Sierra Leone while allowing them to show their creativity through



skateboarding and surfing. He is currently a teaching fellow and PhD candidate in transition design at Carnegie Mellon University, where his work focuses on unsustainable mineral resource systems and aims to reimagine and redesign better systems to ensure their extraction, production, and utilisation are restorative and regenerative. Furthermore, he collaborates with MIT/GOVLAB as a government innovation program mentor and a design advisor, providing thought leadership in experimental areas of design to build better governance innovation.

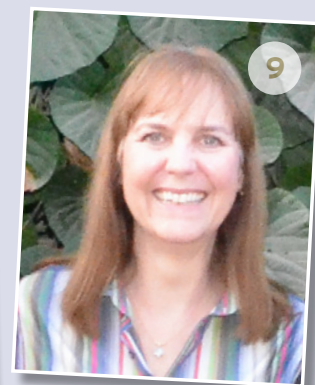
7. AYAKO NAITO

Ayako Naito FGA DGA is a gemmologist and educator in gems and jewellery in Tokyo. Ayako graduated university with a degree in developmental psychology and started her gemmological education with Gem-A in 2005. Her background includes interning at an auction company in London and working in antique jewellery retail, at a jewellery industrial magazine and a pearl-testing laboratory. She also acted as a Gem-A representative in Japan for many years.

Ms Naito is currently putting an emphasis on teaching gemmology while working as an ODL tutor and organising seminars and field trips for gem enthusiasts.

8. AARON PALKE

Dr Aaron Palke started his career in gemmology as a postdoctoral research associate at the Gemological Institute of America (GIA) after earning his PhD in geology from Stanford University. During this time, Dr Palke investigated the geological history of rubies and sapphires by studying minute inclusions



in these precious gems. In his position as senior manager of research at GIA, he helps lead coloured stone research efforts in order to provide more reliable country-of-origin determinations and treatment identification for rubies, sapphire, emeralds and other coloured stones.

9. SUSAN WHEELER

Susan Wheeler's career is grounded in more than twenty years of experience as a jewellery designer. She is the founder of the not-for-profit the Responsible Jewelry Transformative, the Chicago Responsible Jewelry Conference, co-founder of Virtu Gem and an advisor for the Fashion and Lifestyle Network, a joint initiative of the UN Office for Partnerships, the Division for Sustainable Development Goals (SDG) - UN Department of Economic and Social Affairs and the Fashion Impact Fund. Ms Wheeler believes that transparency and equity in the jewellery value change is necessary to achieve the SDG. She works with journalists, jewellery industry members, governments, universities, NGOs and civil society to amplify the voices of those impacted by the worldwide jewellery supply chain. This work is intended to create avenues for equality for the most vulnerable mining communities by expanding environmental awareness and developing transformative relationships with people globally through jewellery.

Special thanks to Alanna Archuleta, Jessica Hudson, Chico Manda, Caroline Muchira, Nathan Renfro, Ashley Simbeye, Lameck Thole, Elisabeth Turner and Elizabeth Wangui.



PERIDOT

The Gift of Hope



FULI GEMSTONES

fuligemstones.com



Straight from the heart

Opinion and comment from CEO Alan Hart FGA DGA

What a busy summer it has been for those of us at Gem-A headquarters! But then, our offices in London are always buzzing with activity, no matter what the time of year.

First, we held exams back in June, and while we know everyone who tested is keen to receive their grades, we are confident that everyone did their best. We wish all our Students luck as they wait for their results.

In the meantime, we have had some exciting projects in the pipeline, all of which we are eager to share with you. These include a new website and membership portal for the Association, both of which should be launched in the last months of the year. We think our Members will appreciate these new sites. More information about these two resources will be available in due course.

We are also planning once again for the annual Gem-A Conference, to be held on Sunday, 5 November at etc.venues County Hall. We look forward to welcoming all our Members, partners and friends to London to hear our six fascinating international speakers.

The articles in this special 'Localities' issue visits a different part of the world to discuss a topic that is relevant to the people living and working near those deposits.

The Conference will be followed by two days of exciting tours and workshops. The Gala Dinner, also on 5 November, will be held at the Tower of London; you will not want to miss this event! Our Graduation and Presentation of Awards will take place at Goldsmiths Hall on Monday, 6 November. We hope to see as many of you as possible during this time.

And now, back to summer... specifically, the Summer 2023 *Gems&Jewellery*. You may notice that the issue before you is a bit different than the *G&J* you are used to receiving each quarter. The articles in this special 'Localities' issue visits a different part of the world to discuss a topic that is relevant to the people living and working near those deposits. While we asked the same questions – What are some problems that the people at this source are facing? How have they tried to meet those challenges? How is that affecting the way they live and work? – of every contributor, the answers that they received from each location were very different.

Our opening article is a roundtable between Susan Wheeler of Virtu Gem and carefully chosen gem representatives from Kenya, Malawi and Zambia, who intercede between miners, dealers and other members of the supply chain in-country and those trade members who are interested in buying that country's production. They shared the challenges of doing business in their respective countries. Dinya Baral reported on how the COVID-19 pandemic has affected the artisanal and small-scale mining (ASM) of Australian sapphires. Brian Cook explained how he is working with a number of interested parties to help educate the gemstone miners of Brazil's Bahia State on the threat of silicosis. Ayako Naito FGA DGA provided information on the current culture of Mie Prefecture, Japan, the birthplace (and current site of) Japanese cultured pearl farming. Elisabeth Turner of Treak Cliff Cavern told us how the pandemic, along with the cost-of-living crisis, has changed the way the Blue



John source in Derbyshire conducts business. And Dr Alana Gall, a *Pakana* (Tasmanian Aboriginal) woman, recounted how her father, Dr Andrew Gall, began a process to save their community's sacred practice of *kanalaritja*, by replicating the mollusc shells – used in the jewellery of this practice – that are being impacted by ocean acidification.

Creating this issue was a labour of love for everyone involved, and we hope you feel that energy on every page.

We hope that your summer is going well, and that you enjoy this issue of *Gems&Jewellery*.

Alan Hart

Best Wishes,
Alan Hart FGA DGA

Gem-A News

A round-up of the latest industry news from Gem-A

BOTSWANA AND DE BEERS REACH AN AGREEMENT FOR CONTINUED PARTNERSHIP

On 1 July, the government of Botswana and De Beers announced that they have come to an agreement in the negotiation that have been ongoing since 2018. Under the new agreement, Botswana will immediately receive 30% of the rough stones it receives from their joint venture, Debswana, with the amount growing over the next decade to 50% (up from 25%). Additionally, the parties said they had agreed on a ten-year sales

deal for Debswana's rough diamond production through 2033, and on a 25-year Debswana mining licence that would remain valid until 2054. De Beers will also set aside \$75 million (£59 million) towards a diamond fund which would invest in 'additional value to the Botswana economy,' with contributions would growing ten times over the next ten years and will create an academy in-country to train locals in skills relevant to the diamond trade. "I must say with



The government of Botswana has come to an agreement with De Beers that allows the country to gradually receive 50% of rough stones produced from their joint venture over the next ten years, among other benefits. Photo by Tommy IX/iStock.

excitement that these are transformational agreements," Lefoko Fox Moagi, the minister of minerals and energy, said as he sat next to De Beers' chief executive, Al Cook. "These are talking to the aspirations of the people of Botswana."



ESTRELA DE FURA: 55.22 AND ETERNAL PINK DIAMOND AMONG PIECES SOLD IN RECORD-SETTING AUCTION FOR SOTHEBY'S NEW YORK

During the Magnificent Jewels auction held by Sotheby's New York on 8 June, the Mozambican ruby known as Estrela de Fura: 55.22 (due to its final cut weight of 55.22 ct) sold for \$34.8 million (£27.3 million), a world auction record not only for a ruby, but for any coloured gemstone. The discovery of the Estrela de Fura: 55.22, which was purchased by 'a private Middle Eastern collector', was first reported on in the Autumn 2022 issue of *G&J* (pp. 16-17).

At the same auction, the Eternal Pink diamond, produced from the Damtshaa mine in Botswana and fashioned into a 10.57 ct Internally Flawless cushion cut, also earned \$34.8 million, or \$3,292,763/ct (£2,592,721/ct). This set a world auction record for a Fancy Vivid Purplish-Pink Diamond and a new price-per-carat record for the colour grade. The Eternal Pink now ranks just behind the Williamson Pink Star (\$57.7 million/£45.4 million) as the second-highest price-per-carat cost for a pink diamond.

Also sold were eleven pieces from American mother-and-daughter collectors Constance Prosser Mellon and Constance Barber Mellon, all of which sold, realising \$6.9 million (£4.9 million). Among these pieces was a magnificent sapphire-and-diamond necklace created by Cartier in the 1950s and belonging to Constance Prosser Mellon, which sold for \$2.8 million (£2.2 million). The necklace is mounted with five sapphires of Kashmir origin (~34.95 tcw), with round, baguette and square-cut diamond accents.

The Magnificent Jewels auction itself was a milestone, achieving total sales of \$95.9 million (£75.5 million), the highest total for a jewellery auction at Sotheby's New York. Ninety-one percent of all lots were sold, with more than two-thirds of sold lots achieving prices in excess of their high estimates. Over one-third of sales were made by online buyers. The total sales surpass the New York house's previous highest auction, of \$65.1 million (£51.2 million) in April 2015.



Significant pieces from Sotheby's New York's record-breaking Magnificent Jewels auction on 8 June 2023. Clockwise from top: The Estrela de Fura: 55.22 ruby sold to a private collector for \$34.8 million; the Kashmir sapphire-and-diamond necklace was auctioned for \$2.8 million; the 10.57 ct cushion-cut Eternal Pink diamond also sold for \$34.8 million. Photos courtesy of Sotheby's New York.

OBITUARY

Harry Levy FGA (1939-2023)

Gems&Jewellery is saddened to report that Harry Levy FGA, past President of Gem-A, passed away on 15 May at the age of 83. Mr Levy, who became significantly involved in gemstone nomenclature debates and helped formulate trade guidelines for mined, lab-grown and treated diamonds was known throughout the trade as an advocate for clear, consistent and ethical communication and education.



Born Hanukkah Levy in 1939 to a Persian-Jewish family in Turkey, he relocated to the UK as a child. Harry earned a master's degree in mathematics, with an additional degree in philosophy. He spent time as a mathematics lecturer, all while developing a greater interest in the gemstone industry, in which his family was active. After a time, he left academia to start his own business trading in loose diamonds and gemstones. His company, Levy Gems, remains open and active in London's historic Hatton Garden.

Harry earned his FGA in 1970, becoming an active and enthusiastic member of the Association and eventually serving as Gem-A President. As part of his service to Gem-A, he was a contributor to *Gems & Jewellery* from its very first issue in 1991 (then *Gems & Jewellery News*), writing on various topics relevant to the industry in a column called 'Around the Trade.' In 2011, the Association's then-CEO,

Jack Ogden FGA, reflecting on *G&J's* first twenty years, said that Harry had been "arguably the most consistent contributor over the years... Harry has hardly missed an issue." He continued 'Around the Trade' until he retired as President of Gem-A in 2016.

Throughout his career, Harry contributed significantly to the trade, both domestically and internationally. Within the UK and outside of his work with Gem-A, he chaired the British Jewellers Association and served the London Diamond Bourse for several terms as vice president and from 2011-2016 as president; he was named the bourse's honorary life chairman in 2016. He was honoured for this dedication when he received the Lifetime Achievement Award at the UK Jewellery Awards in 2015.

On the international stage, Mr Levy sat on the executive committee of the World Federation of Diamond Bourses (WFDB). He served as president of the International Diamond Council

– where, as president, he oversaw the development of the first set of International Organisation for Standardisation (ISO) guidelines for lab-grown and treated diamonds – and at the World Jewellery Confederation (CIBJO), alternating as president and vice president of the Coloured Stone Commission. He also presided over CIBJO's Diamond Commission.

Of Harry's passing, LDB president Alan Cohen said, "Harry was a truly all-round wonderful person, and he will be sorely missed by those that were fortunate enough to have known him."

Harry Levy's many contributions to the gem trade, during a career that spanned more than fifty years, will not be soon forgotten.

QUEEN ELIZABETH SCHOLARSHIP TRUST NOW OPEN FOR APPLICATIONS

The Queen Elizabeth Scholarship Trust (QUEST) has announced funding for education and training of craftspeople and associated workers, with the goal of sustaining vital skills in traditional and contemporary crafts that contribute to excellence in the British craft industry. There are scholarships of £18,000 available for artisans looking to enhance and improve their work through training, while those in an early stage of their career may apply for an Emerging Maker

Grant of up to £10,000. Any UK resident age 18 or older who would like to improve their craft skills is eligible to apply; applicants for the Emerging Maker Grant must have been practicing professionally for four years or less. Applications open



SUPPORTING
EXCELLENCE
IN BRITISH
CRAFTSMANSHIP

twice a year; for autumn, applications are open from 10 July to 14 August, with awards made in November.

Founded in 1990, to celebrate the 90th birthday of HM Queen Elizabeth, The Queen Mother, QUEST is dedicated to sustaining the cultural heritage of Britain through the training and education of craftspeople through education, apprenticeships, and direct training with a master craftsman. Since its creation QUEST has granted £5.5 million towards the training and education of almost 800 craftspeople. The not-for-profit organisation accepts donations and offers sponsorships to further their work.

Certain courses offered by Gem-A would be covered by the QUEST. For more information, go to www.quest.org.uk.



Photo courtesy of Gem Diamonds.

THE COMPANY OF MASTER JEWELLERS ENTERS FIVE-YEAR PARTNERSHIP WITH RIPPLE AFRICA

On 16 June, The Company of Master Jewellers announced a five-year collaboration with non-for-profit organisation Ripple Africa. This partnership focuses on the environmental charity's tree-planting and forest-conservation projects. Ripple Africa, which was founded in 2003, is dedicated to improving the environment and local education in Malawi. As part of the agreement, the Company of Master Jewellers will fund the planting of 10,000 trees per year in Malawi, to assist with carbon offsetting. They will also pay for the planting of 2,500 fruit trees each year, which will benefit farmers and their families while also benefiting local communities.

To learn more about Ripple Africa's work in Malawi, visit rippleafrica.org.

LETŠENG MINE PRODUCES 163.91 CT YELLOW DIAMOND

On 3 July, Gem Diamonds announced the extraction of an 'impressive' 163.91 ct yellow diamond from Lesotho's Letšeng diamond mine on 22 June. This is the UK-based company's second 100-carat-plus find this year; a 122-ct type II D-colour white diamond had been retrieved from the same mine in March of this year.

Diamonds were first discovered in Lesotho in 1957, with several large gems unearthed in the 1960s and 1970s. Currently Gem Diamonds owns 70% of the Letšeng mine, with the remaining thirty percent held by the Government of the Kingdom of Lesotho.

APOLLO GEMSTONE RING WITH POSSIBLE CONNECTION TO SNETTISHAM HOARD FOUND

In the spring of 2023, a metal detectorist found a Roman-era silver ring set with a carved carnelian in a field near the city of Chelmsford. The online portal of the Portable Antiquities Scheme (PAS) indicates that 'the form of the ring is very common and typical of the second century AD'. The dark orange-red, highly saturated carnelian is carved with an image of the god Apollo;

this gemstone would have been used as a seal to sign documents. According to the PAS, "apart from degradation of the metal in the form of discolouration it is in excellent condition." The style of the gem cutting may suggest this is the product of the same workshop, or a related engraver, to the person who owned the Snettisham Jeweller's Hoard. Discovered in 1985 buried in a single clay

pot, the Snettisham Jeweller's Hoard is a collection of Romano-British jewellery and materials, thought to be the stock of a working jeweller, that was found during the construction of a house. It is now housed in the British Museum.

While the Portable Antiquities Scheme has declared the ring as a Finding of Note, it is still under consideration for designation as Treasure.



A Roman-era silver-and-carnelian ring, discovered in Chelmsford, may be related to the Snettisham Jeweller's Hoard that was unearthed in Norfolk in 1985. The carnelian is engraved with a likeness of Apollo (far left, in purple); the silver band (shown from different angles on the left) weighs 10.8 g. Photo courtesy of the Colchester and Ipswich Museum Service.

OBITUARY

Gabi Tolkowsky (1939-2023)

G&J honours the memory of Gabriel 'Gabi' Tolkowsky, who passed away on 29 May at age 84. Industry analyst Russell Shor, who knew Mr Tolkowsky for four decades, shared some personal memories of the Belgian-based master diamond cutter.

When I first met Gabi Tolkowsky nearly 40 years ago, he was ensconced at a table in a De Beers meeting room holding a diamond between his fingers. Of course, I'd heard of Gabi before then, but seeing firsthand his love and passion for diamonds was an inspiration. He had a Father Christmas-like twinkle in his eye and a ready smile. He was anxious to explain the new set of diamond cuts he had created. He said that his diamond designs would give brown diamonds, mainly from Australia's Argyle mine, more light and more life, and thus more beauty – and he was all about beauty in diamonds. The twinkle in his eye grew even stronger as he talked about these plans.

We connected many times over the years. One notable encounter was in a hotel lobby where he was sitting by himself, a rare occurrence, and I stopped to say hello. He bade me to sit with him and told me of an idea he had: to create a musical composition by projecting diamond scintillation points onto a musical staff. "Intriguing" I answered, telling him I was imagining the crystalline sounds that would result from his idea. It would take a number of years, but Gabi's 'diamond music' would be performed at JCK Orlando in 2000 and

at a concert in Savannah, Georgia, later that year. Unfortunately, these performances are not available online.

Gabi Tolkowsky lived a very full life. Born in Tel Aviv in 1939 to a diamond-cutting family that included great-uncle Marcel Tolkowsky, creator of the modern round-brilliant cut, Gabriel Tolkowsky went to work as a diamond cutter in Antwerp in his twenties. By 1975, he was hired by De Beers as a diamond-cutting consultant; this relationship would last two decades. Over the years, Gabi made his own mark in gemmological history by cutting some of the world's largest diamonds – including the 273.85 ct Centenary Diamond and the 545.67 ct Golden Jubilee Diamond – and developing new types of brilliant cuts, notably the Gabrielle. Not all of Gabi's diamond designs found commercial success, but that was no reflection of his lack of imagination. In 2003, during a visit to GIA in Carlsbad, California, he told his audience, "Just like a computer, you file all what you learn from each diamond, you file it, you file it inside your brain. And then, you use your imagination, and one day, you compose – and a new cut, a new beauty is born!"

In the tributes that have poured forth since his death on 29 May, one essential part of him has largely been overlooked:



his extraordinary kindness. I remember vividly the occasion when we happened to be on the same flight from London to Brussels. The flight was severely delayed, and we did not arrive in Belgium until after midnight, well after the shuttle buses to Antwerp had stopped running. After we landed, Gabi bucked his way through the stream of departing passengers back to my row to tell me that he would drive me to Antwerp. When we arrived in the city, he asked me if it was all right if he dropped his wife, Lydia, off at their home before taking me to my hotel. I have never forgotten that act of kindness.

Gabi Tolkowsky was a master cutter, but he also travelled the world as an ambassador for diamonds, projecting the same love and passion for his craft, still with a twinkle in his eye, as when I first encountered him. Like many in the diamond industry, I had the great privilege – and joy – of knowing him.

CIBJO AND BIRMINGHAM ASSAY OFFICE ENTER INTO NEW PARTNERSHIP

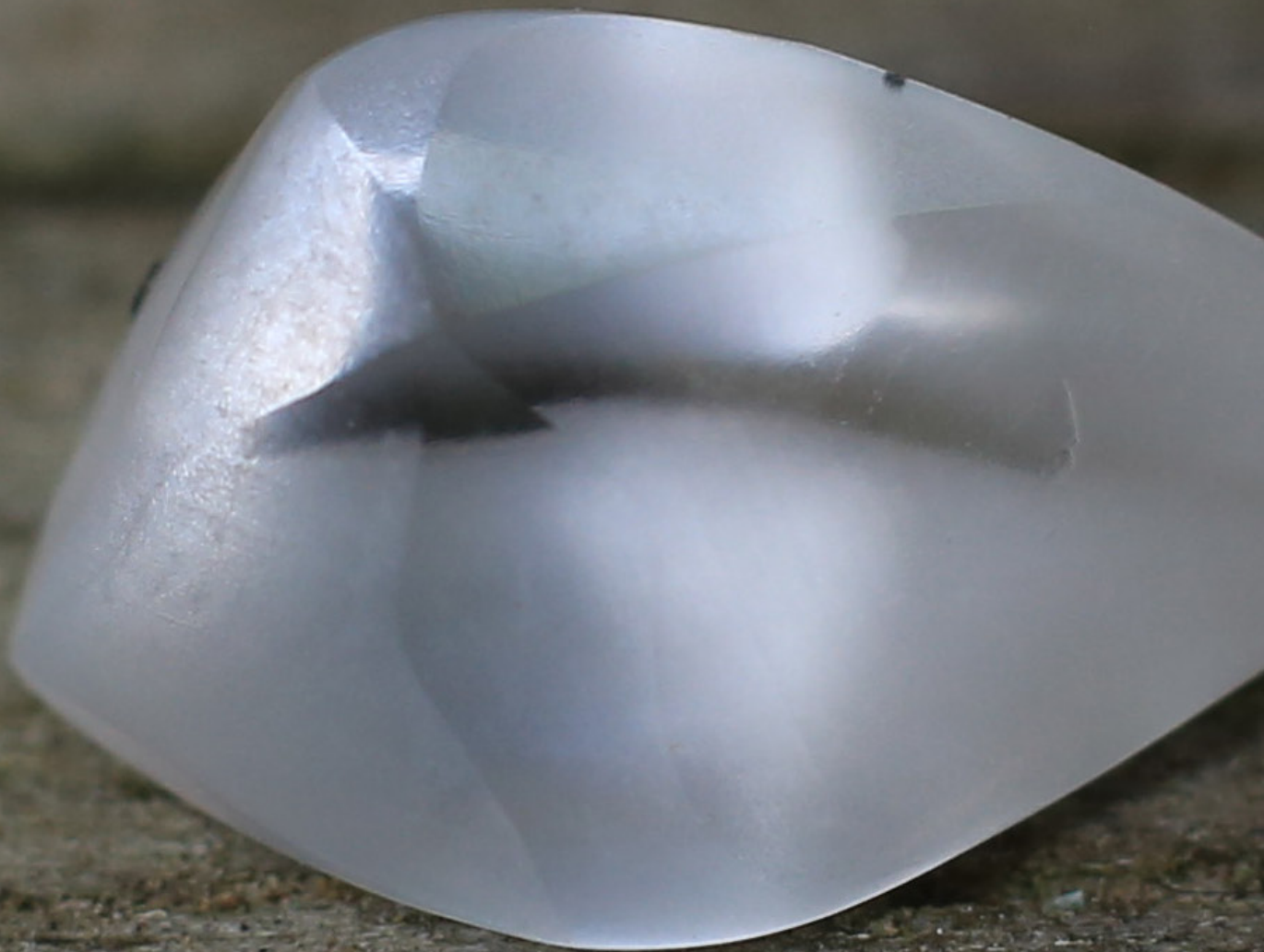
The World Jewellery Confederation (CIBJO) and the Birmingham Assay Office (BAO) began a partnership on 23 June that establishes a framework for technical cooperation between the two organisations to benefit the global jewellery industry. The agreement, which was signed by CIBJO president Dr Gaetano Cavalieri and BAO CEO and assay master Doug Henry, maps out a

programme that will focus on areas such as information exchange, joint research, technical assistance and initiatives promoting best practices, harmonisation of standards and consumer protection. They also discussed joint efforts in consumer education and tackling fraudulent practices, as well as the role of innovative technologies and the adoption of digital solutions in hallmarking, testing and certification processes.

"Today's agreement marks a significant step forward for our organisations and for the global jewellery industry as a whole. We look forward to working closely with BAO to enhance our collective knowledge, innovate and raise industry standards even further," said Dr Cavalieri. Mr Henry noted, "This agreement with CIBJO represents a natural alignment of our objectives and interests. We are thrilled to be embarking on this journey, working together to protect consumers and maintain the integrity of our industry."

Digging Up Surprises in America's Heartland: Visiting Arkansas' Diamond Mine

More than one hundred years after an Arkansas hog farmer found diamonds on the ground, Dr Aaron Palke discovers that Crater of Diamonds State Park is still yielding unexpected finds.



When American hog farmer John Huddleston found diamonds on the ground near Murfreesboro, Arkansas in 1906, diamonds came from only a few sources. Many of the world's premier diamond deposits had yet to be unearthed, so the discovery in Arkansas created a great deal of excitement. While the deposit never lived up to initial expectations, the history of diamond mining in Arkansas is preserved today at Crater of Diamonds State Park (below), the only place in the world where anyone has the opportunity to try their hand at diamond mining. The state of Arkansas now manages the deposit as a fee-dig operation, with more than 100,000 visitors to the park every year.

Perhaps the most famous gemstone from Crater of Diamonds Park is the 40.32 ct Uncle Sam, found in 1924 and currently in the collection of the Smithsonian Institution. Since the site became a state park in 1972, over 35,000

diamonds have been found in the 37-acre field, though the gems tend to be small – often less than 10 points. Yet a number of larger diamonds have been found, such as the 4.25 ct Kahn Canary, the 8.52 ct Esperanza and the 1.96 ct specimen shown here. As a result, a dedicated community of 'craterheads' have feverishly devoted themselves to the hunt.

In May 2022, a team of GIA researchers was able to visit the park to document mining activities and collect samples. Through use of a mobile Fourier-transform infrared (FTIR) spectrometer, the team was able to document an unusually high frequency of type II samples from the deposit. While many of the world's largest diamonds (e.g., the Cullinan) are type II, only a small percentage of all the world's natural diamonds are classified as type II, adding to the geological complexity of the story of Arkansas diamonds. ■



Main image: This 1.96 ct diamond was mined from Crater of Diamonds Park on 6 March 2010 by David Anderson. Gemstone photo by Nathan Renfro, courtesy of Don Roeder. Inset photo by Aaron Palke.

Bringing African Voices to the Table

The benefits of gemstone mining and exporting often do not reach local miners and dealers who boost their nations' economies; this was especially problematic during the COVID-19 pandemic. In a round table, gem-mining representatives from Kenya, Malawi and Zambia discuss current challenges and hopes for the future.



A miner holds a piece of rock to the sky to examine the gem material within.

Africa is a continent that is rich in resources, and the gem materials found there are plentiful. Gem mining contributes heavily to the economies of many of the countries there. In 2021, during the COVID-19 pandemic, Zambia exported the equivalent of £213.6 million in gemstones, making it the world's eighth largest gemstone exporter. In the same year, Kenya exported roughly £5.5 million in gemstones, and Malawi about £296,000. The gemstones extracted from these countries (see box p. 16) are sought

around the world, yet so often the funds generated by these sales do not trickle down to the people who need them most: the miners who work to produce these materials for consumption.

Virtu Gem, formed by three women in the gem trade and mining industry, who are jewellers and ASM experts that are greatly concerned with the plight of miners and others across the supply chain, is an outgrowth of the pandemic. It was founded by Monica Gichihi, Jessica Hudson and Susan Wheeler after they sought to sustain members along the gemstone supply chain even as a global lockdown occurred and persisted. By leveraging their professional relationships, these women were able to create a new business model that used technology to connect mining communities to jewellers around the world. Virtu Gem charges a 10% premium on gems sold; this money is returned to the mining community for giveback initiatives. First launched in Zambia, the company later began working in Malawi and Kenya.

In Kenya, supplies of tsavorite, like this 3.68 ct specimen, can be hard to come by in today's market.



The company was first launched under the Responsible Jewelry Transformative (RJT), a not-for-profit organisation whose mission is to 'aid the jewellery industry into engaging... with the Sustainable Development Goals through education, initiatives and creating connections across the global supply chain'. The RJT also handles the processing and oversight of the 10% premium on gemstones sold, donations and any grants awarded to Virtu Gem. In 2021, the company was awarded a grant from the Extractives Global Programmatic Support, a part of the World Bank Group. With this support, Virtu Gem was not only able to build a strong business foundation, but it was also able to implement the CRAFT Code at eight mines and start the National Gem Cut workshop (see box p. 19), gem-cutting courses that led to a faceted design for each of the three countries in which Virtu Gem works.

In each of the countries where they work, Virtu Gem collaborates with miners and dealers' associations and cooperatives via country representatives, who are well-versed in the gem trade

This necklace features a 0.68 ct Zambian spessartine garnet, sourced via Virtu Gem, alongside dinosaur bone and set in 14K Fairmined yellow gold. Photo courtesy of Mercurius Jewelry.

in their regions and have excellent relationships with organisations in-country. These carefully selected people are in charge of operations within the country, managing and maintaining relationships with all stakeholders. In June 2023 Susan Wheeler, one of the founders of Virtu Gem, facilitated a round table with their country representatives from Kenya, Malawi and Zambia to find out how the gem trade was operating in each locale, and what challenges the small-scale miners in each country are still working to overcome.

Susan Wheeler: How is the gemstone trade in your own country?

Lameck Thola (Zambia): We have recovered from COVID quite alright; we've seen some activities return but not all are fully recovered as well as we would have loved to see. We are still struggling to get some of the gemstones we would want to cut and polish.

Caroline Muchira (Kenya): In Kenya we are still recovering from the effects of COVID, so business has not gone completely back to normal. Lots of people had stopped mining, but they have returned, so we are hoping to get more stones now. Getting capital to mine is a very big challenge.



SW: Lameck was pointing out that larger-scale mines were having an easier time recovering. Do you see something similar with larger mines or with different stones having a faster recovery?

Caroline: The large scale mines were not very affected, because they have the capital to continue, and many of these large-scale mines have their own markets. So when they mine, they have their own cutters and markets they export to. The rest of the market depends on the artisanal miners who were affected, so they are not producing as much.

Chikomeni Manda (Malawi): As with Zambia and Kenya, the impact of COVID is still being seen right now in Malawi. Most of the people are struggling to get back on their feet. With the current global situation, buyers are not buying as they used to because the middle class don't have disposable income like they used to. This has also contributed. Though it's improving; I hope maybe in the next twelve months you will see change.

SW: So would everyone here describe it as a scarcity of gems coming from artisanal and small-scale mining (ASM)? Or would you describe it as everyone seems to be talking about the challenges, so is it harder to get gems? What are the 'sticking points' in acquiring gems from ASM mines?

“Local dealers are not able to get as much gem material as they were before.”

Chikomeni: Rhodolite is usually very easy to mine. The other gems like aquamarine, sapphire and topaz... these you have to dig in the vents. So it needs areas to go in the direction of capital money. Most of the people who used to help the artisans they have also been hit economically; it was becoming a major problem for them. As much as they aren't finding material quickly, which can also be attributed to the capital, because if they invest money in the projects sometimes they mine faster, and the rate of work becomes faster.

SW: In Kenya, are there some gems that have more supplies than others?

Caroline: Yes, typically it is easier to get garnets like rhodolites. There is not as much supply in tsavorite, especially high-quality tsavorite; it is easier to get



Women miners working a rhodolite deposit in Malawi.



Some examples of the gem rough that Virtu Gem has sourced for cutting through their partnerships. The green grossular mint garnet (left) was produced from Kenya, while the aquamarine on the right came from Malawi.

high-quality rhodolites. As for sapphire, sapphire is a totally different area, so sapphire has been a bit constant throughout the period. But tsavorite dips, so at some points there's not much, and then we get supply.

Lameck: The production down here in Zambia not only has been affected by COVID, but by the general government. With all the suspensions of the mining systems and the licensing systems, some of the small-scale miners' licenses have expired and they aren't renewing. So we have seen some amethysts, which are supposed to be some of the easiest to get for the smaller operators, become an issue from that side. Aquamarine has also been difficult, though in a few months we will see some supplies of aquamarines. We haven't seen much garnet, but they are still there. Tourmalines are a problem to find these days; supply is patchy because of the government's intervention into the licensing system, everything was closed off. Then COVID affected the capacity for people to mine.

At this point most of these materials are not the easiest to find, including the citrine – which is supposed to be the easiest to retrieve from the north and central areas of Zambia – have been problematic to get. Slowly but surely, people are coming back to the mines; specifically, we have seen a rise in the supply of aquamarine. We have seen some small-scale miners are now able to produce in the emerald area. That is an intensive operation there. You have to go no less than 40 meters to see an appreciable production. Now they are able to get some support from other people to start mining.

SW: Are the processes now in place for the government for artisanal and small-scale miners to renew their permits?

James Mazimba (Zambia): This has been a major issue, the closing of mining because people are holding onto mines that are dormant, and licenses that haven't been renewed. Yes, to answer your last question, the government has started issuing licenses. Slowly they are going back on sites, but we have yet to see production. I've been in touch with a few sites, and they have started using machinery. The only other challenge they are having now is the cost of production, because of the cost of fuel. Since most of them aren't set up with electricity, they use fuel for both mining and to electrify their camps. Also, production is delayed when it's the rainy season, which is Zambia's farming season. But most of them will harvest and then when they are done, they will get back to mining,

especially now that the licenses have been issued.

SW: At Virtu Gem, we rely on and believe in the power of using source-country gem businesses, traders and dealers and to do it in a way that demands transparency. What challenges are the gemstone traders having? I know in Kenya has had a problem with foreign unlicensed traders coming in. Are there challenges with competition?

Caroline: Most of the traders here are used to dealing in rough. The challenge was getting the rough stones cut to specifications: cut properly, with good polish and proportions. But once they saw the price difference and the price jump from rough to cut, they became interested and comfortable in cutting the rough that they have. They are now comfortable cutting the rough they have. It is important to invest in cutting.

GEMS SOLD BY VIRTU GEMS

The three countries in this article produce many gems for the trade, but Virtu Gem procures specific material through their relationships in-country. These are the main gemstones that are currently sourced for sale by these miners through Virtu Gem:

Kenya

Aquamarine • Garnet (colour change) • Garnet (red) • Rhodolite • Sapphire (blue)
• Tourmaline (golden) • Tsavorite

Malawi

Amethyst (rutilated) • Aquamarine • Carnelian • Morganite • Quartz (rutilated)
• Rhodolite • Sodalite • Tourmaline (bicolour) • Tourmaline (green)
• Tourmaline (pink) • Tourmaline (tropical)

Zambia

Amethyst • Aquamarine • Citrine • Emerald • Garnet • Quartz (smoky) • Spessartine
• Tourmaline

Chikomeni: In Malawi, it's the matter of telling people to believe in themselves, that they can do the work, because they believe cutting rough is not for them. We just need to draw the people in and do something new. Let's send the stones to the market and maybe they can compete with Sri Lanka, India and Thailand. We keep on doing what we are doing, we need to reach out more and assure the people that this is the best way to do it, and we will see the benefits.

Ashley Simbeye (Malawi): I wanted to add onto to what Chiko said. It has been very challenging in Malawi. Right now, we are trying to mobilise women and make them understand the concept of 'adding value' to a stone. In Malawi, most of the time a stone is sold in its natural state, in the rough state. This is something we are trying to work on, though it's a little bit challenging for the cutters in Malawi to really cut according to international markets. We hope this will improve.



A gathering of Virtu Gem team members; those featured in this round table are marked with an asterisk. From left: Caroline Muchira, Virtu Gem Ambassador to Kenya; Ashley Simbeye*, Virtu Gem Ambassador to Malawi; Susan Wheeler*, Monica Gichuhi and Jessica Hudson, Virtu Gem Founders; Chicomeni Manda*, Virtu Gem Ambassador to Malawi; and Pauline Mundia, Virtu Gem Ambassador to Zambia.*

“We are still struggling to get some of the gemstones we would want to cut and polish.”

SW: What about the perspective of Zambia, competing with other dealers and also working to get cut gemstones and having dealers cut gemstones? Obviously with your affiliation with the Gemstone Processing and Lapidary Training Centre in Ndola, your perspective is a bit different as well.

Lameck: Speaking for Zambia, the traders want to make money quickly and to convince them we can make more money post-cutting, that is where the issue is. That is the number-one challenge we have. What we have been doing is to buy them out if we can, so that we can process our material on our

own, because we now have the capacity to cut gemstones and we have a lot of former students that we have taught to cut. But the traders are the biggest issue. Unfortunately, these people go to the miners, get the materials and then want to sell them off before they are processed. That is the biggest challenge as far as I'm concerned.

James: I think there is another challenge: people seem to already know that they are in the market for rough, or what is already cut and polished. The people who purchase cut and polished gemstones are jewellers. In Zambia, there are very few people doing this. We have people flying in to buy rough so they can process it elsewhere. If you are looking for rough, you look for the miners, and it's easy; customers already know where they are going to sell that rough. But if people want cut and polished gemstones, then they need to look for it.

We have been permitted to offer value addition by the government. The best way is to present ourselves as a ready market for the rough so that

Virtu Gem procures rhodolite, like this 1.89 ct gemstone, from both Kenya and Malawi. This particular garnet was mined from Kuranze, Kenya..

buyers know we are able to process the gems. People have been buying, and we are doing everything through the associations and the miners. Basically, we'll be getting emeralds, we will cut for buyers and then once they see the beauty and the value, they get incentivised to sell what we are cutting. It is encouraging and once they see the money they make from the sale of our finished gems, most of them are continuing to buy.

SW: You mentioned people flying in, so there is foreign competition from traders that were buying rough. Were you experiencing people who could sell rough



Mara Bragaglia's Bizantini N. 1 earrings use 22K Fairtrade gold, 0.61 g Tahiti keshi pearls and 0.22 g Virtu Gem rough emeralds. Photo courtesy of Mara Bragaglia.



immediately to foreign buyers? Where are the buyers from? What are some of the challenges in the competition for rough?

James: Those that are flying are bringing people from Tanzania, we have people coming from South Africa, coming in from Zimbabwe who are interested in our rough, as well as Sri Lanka, China and India. Most people coming from Asia are seeking emeralds; the big two companies that mine emeralds have a lot of people who apply for material. But you only get the gems if you are selected, so they come and see if they can salvage any of the rough. Also in the recent past, we had discoveries of new deposits in almost every province, like after every two or three months we are discovering new deposits. We had a situation with lithium, a situation with sugilite and also the metals that we discovered. So the ones that come may compete amongst themselves and then when there is competition, the locals are outbid. When one is buying rough, they will usually buy from the outside.

SW: Caroline, what about Kenya? Can you explain a little bit about the dynamics there affecting the source-country traders?

Caroline: A lot of South Asians in the mining areas are buying, especially tsavorite; lately they are also buying rhodolites. As a result, local dealers are not able to get as much gem material as they were before. Some dealers are

engaging the government to see what can be done because they feel some of the people are not paying royalties or taxes, and there needs to be better regulation.

SW: Is anyone else experiencing a similar problem Kenya is? How are all these factors affecting the communities and families in the mining areas?

Chikomeni: It has really disrupted the way of life, some people are back up and trying to do what they do, so I'm hoping there's going to be an improvement in the production.

Ashley: The aftermath of COVID in Malawi has really affected the miners. They are trying to pick up from where they left off. We don't have a lot of buyers coming in for the mines that are producing. Miners are selling stones that they consistently mine for very low prices to some local dealers that do not pay handsomely. It is really hard for a person emerging from the pandemic to really pick up on his own financial muscle, where he retains what he invested in the production. They are just starting to understand, so our motivation is to go on and still source and if they find good pieces, then they can sell them.

Chikomeni: Another challenge we face is that sometimes in the Malawi aquamarine region, you encounter traders that will not buy, no matter what, even though I am offering good prices for the stones I am selling.

“When you create relationships, eventually the miners will start showing you their stones.”



A woman miner carries gem material at a rhodolite deposit in Malawi.

NATIONAL GEM CUT

The National Gem Cut is gemstone facet design developed by gem cutters across the three countries in which Virtu Gem works. Through gemstone planning, design and cutting workshops with Dr Adriano Mol, a representation of Kenya (Cheetah Head), Malawi (Mbuna) and Zambia (Eagle) were created. These gemstone designs are a beautiful and tangible way for the cutters to express the pride they feel for their respective countries.

The Kenyan design team chose the cheetah, the world's fastest land animal, as the look for their National Gem Cut. The Cheetah cut emphasises Kenya's connection to speed, not only through the cheetahs on the savannah, but through their Olympic gold medalists. The cheetah head is reflected in multiple facets across the gemstone design. Malawi is represented by the colourful Malawi cichlids, or *mbuna*, whose home environment is Lake Malawi. The shape is reminiscent of the fish, just as the colour variations of the cichlid can be seen in the gem's checkerboard facets. The faceting of Zambia's Eagle Cut combines the wingspan of the fish eagle – a symbol of freedom and the nation's hope for the future – with the power of Victoria Falls.

Virtu Gems has made several efforts to promote the cuts from each nation. Each year, they hold the National Gem Cut Jewelry Competition, which challenges jewellery designers to use the gemstones in their designs. The four categories to be judged are The People's Choice, chosen by calculating votes on social media; Most Virtuously Sourced, to the designer who explains the choices made for all the materials used in their submission; Best Use of Multiple National Gem Cuts, where a designer uses more than one of the gems from the national collections; and Best Story Told Through Jewelry, where the designer creates a narrative through their piece. Submissions via photograph for the next competition will be accepted before June 2024, with winners announced and awards presented at the 2024 Chicago Responsible Jewelry Conference.



The three National Gem Cuts. From left: Kenya's Cheetah cut in aquamarine, Malawi's Mbuna cut in rhodolite, and Zambia's Eagle cut in amethyst.

Lameck: In Zambia we used to have that problem; we would go out to buy in the mining area and they would prefer to sell to a foreigner, but as of late it has become competitive. It is not a question of who is buying, it is a matter of what you are getting from your end of the deal, so we have been fighting about that. When it comes to appreciating the value, most of the traders or the miners do not appreciate the value, whether it is coming from a local or a foreigner at the moment.

Caroline: I think the situation is similar in Kenya, because some miners assume that a foreigner will offer a better price, so they might not show a local what they



A woman holds rough emeralds that were just mined from a deposit in Kitwe, Zambia.



The *Bizantino II* ring by Mara Bragaglia uses a 0.51 g Virtu Gem spessartine garnet from Zambia, along with 0.57 g of Tahiti keshi cultured pearls set in 22K Fairtrade gold. Photo courtesy of Mara Bragaglia.

have, but they will show a foreigner. But when you create relationships, eventually they will start showing you their stones, that will happen in some regions.

SW: When we look beyond the gemstone situation itself with the ASM traders and we look at mouths they must feed and the challenges after COVID are we seeing any sort of recovery in the communities themselves? There has been a different problem where gemstone miners would leave to mine gold and not come back, but I am asking about how those issues have impacted the communities themselves. And I think we can close with that question.

Ashley: Actually, in Malawi I would say people are getting back on track, they have gone back to the mines and started working though the mines are not fully licensed. But we are talking over being able to feed their families and their day-to-day needs, so they have gone back to producing and getting the materials to be able to sell. They are able to get the money after that, so they can provide for their families. So yes, they are able to get good pieces and sell, and we hope this can continue to produce during the summer season. ■

To learn more about Virtu Gem's work, visit virtugem.com.

Nurturing Resilience: Overcoming Challenges in the Sapphire Fields of Australia

The gemstone and tourism industries support the towns built around small-scale sapphire miners in Queensland, Australia. Dinya J. Baral reviews how these miners, cutters and the surrounding communities are surviving the effects and aftermath of the COVID-19 pandemic.

Australia's gemstone-mining industry is widely recognised as one of the most advanced and well-regulated in the world, with a strong focus on environmental sustainability, ethical practices and human rights. Mining in Australia is governed by strict regulations and standards aligned for large-scale interests. These rules ensure that mining operations are conducted responsibly and sustainably, aiming to minimise environmental impacts and ensure the safety and well-being of workers and local communities. In turn, Australian gemstones are among the most sought after in the industry due to their

rigorous compliance to sustainability, community and environmental guidelines; they are a hall mark for ethically sourced gemstones. From an aesthetic point-of-view, Australian sapphires themselves captivate the world with their enchanting hues of blues, teals, greens and yellows, which make them celebrated as some of the most sought-after gemstones in the trade.

Artisanal mining is a vital source of income for millions of people around the world, and the COVID-19 pandemic has had a devastating impact on these communities, including that of Australian sapphire miners of the gem fields located in the Central

Highlands Region of Queensland (QLD). The decline in gem-mining-related activities due to COVID restrictions has deeply affected the local mining community, with buyers and tourists restricted from travelling to the mining sites. Also, like Australia, the central trading hub of Australian sapphires, Bangkok, was shut down and severely restricted for an extended period. The restrictions on movement and the closure of borders within Australia also made it challenging for people to visit the mining sites in Anakie, Rubyvale and Sapphire (often collectively called the Gemfields Region or Community). This has led to a decline in demand

Australian sapphires mined from the Anakie region of Queensland are shown here in blue, green, yellow, and teal.





This parti-colour sapphire displays several of the most sought-after Australian sapphire hues.

for sapphires and other livelihood-generating opportunities, while those who wish to remain in the trade seek other solutions, such as cutting and polishing skills, working in mining-adjacent businesses or partnering with larger-scale operations.

The COVID-19 pandemic significantly impacted the Australian tourism industry, and the sapphire-mining industries of Anakie, Rubyvale, and Sapphire, all towns which rely heavily on tourism for revenue, were no exception. The tourism season, from May to November, plays a crucial role in the community's income. The reduction in tourism has affected artisanal miners who would rely on fossicking-related

During the COVID-19 pandemic, some sapphire miners and cutters turned to social media platforms for promotion and sale, but this has yet to fully compensate for the loss of revenue experience during the past few years. Small-scale underground and hand-mining activities have survived, but medium-sized mining efforts that require equipment have struggled. While the miners always sell their gems locally, they could not stockpile or make sales during the travel restriction period. The situation has been difficult for the industry, and the pandemic's long-term impact on the economy of the region remains

Many small sapphire mining operations have been sold in the past two years due to the pandemic's economic impact.

activities and selling gemstones to supplement their earnings. Additionally, the cancellation in 2020 of Gemfest, a significant event for the local economy, worsened the situation. While some small new events have emerged, such as the Jewel of Gemfields, COVID restrictions, lack of cash and organisational capacities have hindered their success. Promoting tourism in the outback has not helped the situation, and many small sapphire mining operations have been sold in the past two years due to the pandemic's economic impact.

Further complicating the situation, in November 2021, the state government of Queensland released a draft of the Queensland Resources Industry Development Plan (QRIDP). These changes in the Mineral Resources Act (MRA) created a moratorium in mining activity, along with confusion, for one year. The government received considerable feedback rejecting this decision, specifically citing "the value that small-scale mining brings to regional communities, including mining-related

tourism, particularly in the Gemfields region in the Central Highlands." After consultation with stakeholders on options for small-scale mining reform, a decision was made to retain mining claims in the Act, while considering, in the words of the Queensland Government, 'changes to the existing regulatory framework to make it more effective'. Public consultation to seek feedback on proposals to enhance the regulatory framework for mining claims closed on 24 February 2023, and as of July 2023 are under consideration. Although the moratorium has been recalled, it has affected the community already struggling with COVID.



The Gemfields Lapidary & Craft Club provides training and other types of classes and support to the Anakie community members.

In response to these new challenges, some miners have sold their businesses and either shifted their focus to other type of employment opportunities, while others have migrated to different places and moved into other trades. Recently, there has been an increase in coal mining in the area, providing more job opportunities. However, this has had the effect of reducing sapphire mining operations, as skilled miners have left for the coal industry. Despite this, some old-timers are still surviving and carrying on the legacy of sapphire mining. Many people have focused on staying in the region and making changes that can impact the gem communities.

For instance, to increase revenue, value-added activities have been explored, such as gemstone cutting



FURA actively works with the Queensland Sapphire Miners Association (QSMA) as part of their community engagement; here, QSMA is receiving a donation of laptops for work on behalf of local miners.

and polishing, through the Gemfields Lapidary & Craft Club. The community has explored new markets and channels through social media to reach unique clients and boost demand for their products. Some miners have also focused on cutting sapphires from large operations; this is allowing them to stay in the sapphire trade and to concentrate on one specialised part of the value chain. Still, this has yet to compensate for the loss of revenue fully.

Australia is a gem-rich continent, and that consideration has not gone unnoticed. Besides sapphire mining, some in the community are exploring the possibility of mining other gemstones, such as zircon, as well as gold panning. To increase employment in the sector, there would be a need for training on various aspects such as treatment, polishing and cutting, which could be taught through the existing lapidary club. Marketing support would be required and access to markets in Southeast Asia via organised platforms would be necessary; training for these new divisions would be essential. To go one step further, if marketing and online platform training can be leveraged, establishing

This line of pairable, stackable rings by Sapphire Dreams comes in the varied range of colours found in Australian sapphires, from fiery yellow and deep blue to classic green. Photo courtesy of Sapphire Dreams.

a knowledge sharing hub for artisanal miners working in the Gemfields region of Australia – complete with guidance on branding and overseas promotion and with institutional backing from the state government – would be a tremendous boon to the local industry.

Many in the community have turned to work with large-scale operators to resolve these issues. Such companies can work with artisanal miners to create a win-win situation that benefits both parties. By providing resources that are unavailable or out-of-reach to smaller interests, large-scale mining companies can help improve artisanal miners' livelihoods. Large miners have the financial resources to invest in the branding and marketing of Australian sapphires, while



researching value-addition activities such as diversification, ore processing and gemstone treatment. Training and equipment can be made readily available, improving the miners' existing techniques and reducing health and safety risks. In addition, large-scale mining companies can create market opportunities for artisanal miners by purchasing their gemstones, thereby boosting the local economy. Working with larger mining companies can also provide artisanal miners access to essential services, such as access to health services and education, as these businesses often have the resources to develop social programs that benefit miners and their families. This, in turn, helps to improve the quality of life for the entire community.

FURA Gems, which started operations in 2018, acquired Capricorn Sapphire

The Gemfields community has explored new markets and channels through social media to reach unique clients and boost demand for their products.

Mines and Great Northern Mining in Queensland in 2020. The company began operating those deposits in September 2020 and worked there all through the pandemic. This created a steady supply of gems that will recapture the market and bring more people in the sapphire vertical, as FURA promises to create a continuous pipeline for Australian sapphires. Through their commitment to responsible mining practices, FURA Gems is working to create a transparent and assured mechanism for selling and marketing Australian sapphires. This helps diversify the gemstone market,



Fossicking and gem-hunting activities are among some of the tourist attractions that contribute to the Gemfields region's economy.

providing a valuable source of income for local communities and ensuring the industry's long-term profitability. FURA's gemstone auction process in Bangkok has been designed to encourage transparency and trust in the Australian sapphire industry. The auctioning of larger, graded parcels has also boosted the downstream sector and increased prices, benefiting the community. FURA's ability to invest in marketing will further contribute to this positive impact.

Through its social programs, FURA has supported the local community in various ways, and has plans for extensive community development and tourism support. It has helped to restart the popular Gemfest and has assured sponsorship for other gem-related community events. FURA has also invested in the Gemfields Lapidary & Craft Club by providing flexible shaft machines to carry out skin-polishing training classes and made regular supply of low-grade corundum available for fossicking and small-scale cutting training. These activities are useful both for people interested in entering the trade and for tourists, satisfying two of the area's great needs. Any money generated from training or fossicking activities goes back to the community. FURA has also helped to upgrade technical infrastructure through the donation of laptops to the Queensland Sapphire Miners Association (QSMA),

allowing for quicker and more efficient work on behalf of the mine workers.

FURA Gems has also provided support to the Anakie region through various corporate social responsibility efforts that are not related to gem mining. The company has sponsored the free Gemfields Community Newsletter, a free monthly publication with a circulation of 800 addresses that is centred around the towns of Anakie, Rubyvale, Sapphire, Willow and Tomahawk. The newsletter includes local job opportunities and business advertisements along with information about grants from Macquarie University and Caterpillar Foundation. FURA acknowledges the needs of local arts and athletics activities by donating supplies and uniforms to clubs in need in the region. The company also supports fifty percent of the local Meals on Wheels programme, through which it has delivered meals to nearly seventy disadvantaged families in the area.

There is an increasing demand for responsibly sourced gems as consumers

become more conscious of the social and environmental impacts of mining. This, combined with the unique appearance and exceptional quality of Australian sapphires, has created a massive opportunity for sapphire miners in the gem fields of Queensland, Australia. Unfortunately, the COVID-19 pandemic significantly hindered the ability of the (traditionally artisanal and small scale) Australian miners to showcase their sapphires and build upon the story behind their production. While some small miners turned to alternate forms of income generation, others teamed up with larger mining interests, such as FURA Gems, in order to stay in the mining world and keep producing through the COVID-19 pandemic and beyond. ■

To learn more about the work Fura Gems is doing in Queensland, Australia, go to www.furagems.com.



The Wildflower Fields collection from Sapphire Dreams shows the colour range of Australian sapphires within each piece. Both the pendant and ring feature a multicoloured cluster of round sapphires (pendant 2.06 tcw, ring 1.95 tcw) and baguette-cut diamonds set in 18K white and yellow gold. Photo courtesy of Sapphire Dreams.

Fighting Silicosis

in Bahia, Brazil

Brian Cook has spent the past few decades working with the mining community of Remedios, Bahia, Brazil, to form a sustainable mining collective. He tells Jennifer-Lynn Archuleta how he has recently shifted his attention to helping to educate Novo Horizonte miners about silicosis prevention.



In addition to the Pyramid mine (centre of photo), Chapada Diamantina is home to a golden rutilated quartz mining collective in the village of Remedios, as well as other gemstone deposits and mining communities.

In June 2023, Jill Urwin of She's Lost Control, which funds the social enterprise Crystal Clear, presented mine owner, jeweller and activist Brian Cook with a donation of \$1,500.00 (~£1,145.00). This money was earmarked for the rutilated quartz mine collective that Cook has helped establish in his area. In his thank you to Ms Urwin, Mr Cook explained that the money would be used for dust production personal protective equipment (PPE) in Novo Horizonte, Brazil, so miners may avoid breathing the dust that can cause the lung disease silicosis.

Chapada Diamantina, which is home to a number of gemstone deposits and

forms the northern expanse of the Espinhaço mountain range, is in the centre of Brazil's Bahia State. The city of Novo Horizonte, and the town of Remedios, falls within the Chapada Diamantina. The Pyramid mine, which Brian Cook has owned since 2000, sits in Remedios. The mine produces golden rutilated quartz, which is used in jewellery, mineral specimens and other objects.

Golden rutilated quartz is found in the far west of the Chapada Diamantina. It was first discovered in the early seventeenth century, when gold veins in quartz were discovered in the area. The village of Remedios, which is where the

Pyramid mine is located, had a water source – and therefore water flow for part of the year – around the gold mines. However, the primary search was for gold, and the abundant quartz was given little attention.

By the 1940s Brazilian quartz was needed for the electronics industry, and Brazilian quartz was considered suitable. Mining continued during World War II – over 2,400 metric tons was exported from Brazil in 1943 (U.S. Geological Society, 1946). After the war and through the 1950s and 1960s, more quartz was needed for the optical industry. Thus, in the post-WWII years there was a great deal of exploration into quartz-rich areas of Brazil. In those days, rutilated quartz was considered useless, because it could not be used for optical applications. Eventually some of the golden rutilated material made its

Of the twelve candidates selected for the study, nine were found to have silicosis. This was the impetus for a great deal of action.

way to the stone centres of Minas Gerais. There, gem merchants from overseas, in particular German merchants, bought it and began cutting it, creating a demand for the material. In the decades since, the popularity of rutilated quartz has increased. There are a number of sources of rutilated quartz in Brazil, including in Mato Grosso and Minas Gerais, and the rutile comes in assorted colours. But Brian Cook finds that people are drawn to the type that is exclusively found in his district, which shows hematite, rutile and the epitaxial star that forms together with them.

Brian Cook first visited the village of Remedios in 1982, when a stonecutter friend in Salvador (the capital of Bahia State) invited him to go on a road trip that lasted for two days (a trip that today takes nine hours by car). Upon arrival in Remedios, Cook was the first foreigner who had ever visited the village. An elder brought Cook into his home, where there were some beautiful specimens in the cabinet. Cook continued to return to Remedios to forge a relationship with the local people, even bringing his wife and two small children. After twelve years, he was able to purchase the Pyramid mine, which he still owns. Cook has fostered strong relationship with the village of Remedios, and throughout



The rutilated quartz from the Pyramid mine has been used to excellent effect in jewellery. Left: The one-of-a-kind Viara earrings by Enji Jewelry feature 25 carats of golden rutilated quartz hand fabricated in 14K recycled gold. Right: Enji Jewelry's Garabina earrings use 34 carats of red rutilated quartz hand fabricated in 14K recycled rose gold. Photos courtesy of Enji Jewelry.

Novo Horizonte. He is involved with the mayor's office, the Secretary of Health and, of course, the mining cooperative he worked with to get their licensing and permits. Over the past two decades, he has developed several ideas to bring value-added endeavours to the region; however, those are currently on hold.

A geologist by training and a member of the gem trade, Brian Cook had been troubled about silicosis since his own early mining days in the 1980s. There is a lot of dust generated in mining, and so the threat of silicosis is always present. Through the 1980s and 1990s, he noticed the increase in dust as mechanisation changed the process from underground hand digging, which did not generate as much dust, to percussive hammering and drills generated by (mostly) diesel, electricity or from the grid. Cutting through rock and kicking up rock dust started in 2000, with increasing activity the past eighteen years as foreign demand for rutilated quartz grew, particularly in China. Over the past 10-15 years, as the mines become deeper, miners are almost exclusively dealing in hard rock, where the use of this percussive type of equipment is required. All these changes caused his trepidations to grow.



The Secretaries of Health of both Bahia (state) and Novo Horizonte (city) have created a presentation to educate miners on the dangers of silicosis and the importance of safety equipment, particularly masks. Presenters will bring the information to different mining communities throughout the local mountain range.



Brian Cook has noted that the golden rutiled quartz from his region may be popular because of the hematite that is often part of the specimens (left), along with the epitaxial star the rutile may form (right). Photos by Robert M. Lavinsky, courtesy of Wikimedia Commons.

Without proper safety equipment, the amount of dust a given miner could breathe in could result in tragedy and, in Novo Horizonte, it has.

"I was always concerned about the uptick in activity combined with the more mechanised tools," he said. "I got really concerned once my friends started dying."

According to the National Health Service, silicosis is a long-term illness that is caused by inhaling substantial amounts of crystalline silica dust, usually over many years. This dust is produced by working with certain stones, rocks, clay and sand, which are easily inhaled and causes swelling and inflammation. Gradually, this exposure to silica dust leads to areas of scarred and hardened lung tissue, called fibrosis, that does not

function properly. Symptoms include a persistent cough, shortness of breath and weakness/tiredness. Breathing becomes restricted and difficult.

Silicosis can develop as early as 5-10 years after exposure to silica dust, with the likelihood of contracting the disease increasing after 10-20 years of exposure. Currently there is no cure, and roughly 30% of gem cutters will die of silicosis. In January 2021 the *American Journal of Industrial Medicine* published a study, performed from 1980 to 2017, that estimated mortality rates and temporal trends for silicosis across Brazil and identified the areas with the highest related mortality. The highest mortality rate was in a municipality with small gem-mining operations. (Algranti *et al.*, 2021)

Even knowing this, Brian Cook was shocked when people he had known since he started visiting and then working in Remedios began dying from silicosis. "The time frame for the cumulative effect has reached the effect that a lot of the people who have been doing this for years and years are severely compromised." At this point, he said, silicosis is an emergency in the area. "I want to keep working on all the value-added activities we can bring to Novo Horizonte, but right now all my attention is focused on this crisis."

There are a few reasons for the silicosis crisis in Bahia State and in Novo Horizonte specifically.

- Lack of education: Until recently, almost no one talked about or taught locals about silicosis. Brian Cook remembers introducing dust masks (and other safety equipment) when he started mining in the area in 2000; prior to that, miners and others had used cloth (such as t-shirts or bandanas) to keep dust out of their mouths. It is only in the past five years, Cook noted, that the state and city's Secretaries of Health have become concerned with educating the miners about PPE.
- Resistance from the miners, who find the masks uncomfortable, or might think the masks were a mark against

"I was always concerned about the uptick in activity combined with the more mechanised tools," he said. "I got really concerned once my friends started dying."

- their traditionally 'tough' reputation.
- Prohibitive costs of proper dust protection. Cloth and paper masks, such as medical-grade masks, are largely useless for these purposes. The types of industrial masks that are required to protect a miner from breathing in silica dust, ones that are also comfortable and fit well, cost roughly £60-70 at cost within the local commerce, which is out of reach for most of the miners unless they have recently found and sold a gem.

In 2022 through the beginning of this year, Cook noted, a doctor from São Paulo had taken notice of the region's silicosis problem and performed a study in the area; of the twelve candidates selected for the study, nine were found to have silicosis. This was the impetus for a great deal of action, including a more in-depth study, monitoring from Bahia State's Secretary of Health and other ancillary activities. The last of these includes a programme, put together by doctors and nurses and sponsored by the state and city's Secretaries of Health. This presentation will travel to the different mining deposits within the mountain range to educate the miners and the surrounding community about silicosis. It will also emphasise the importance of using masks correctly to protect against the illness. This still requires the masks to be purchased, the



Agents from the Secretaries of Health of Novo Horizonte and Bahia State (top) present information about proper use of a respirator while working to a group of miners (bottom).



responsibility for which is the focus of discussions today. Does this fall to the mine owner? The owner of the equipment? The state?

As the owner and operator of his own mine, Brian Cook has always provided masks to his workers. Now, in addition to educating about the crisis, he is helping to raise funds for miners to purchase masks to forestall future cases of silicosis. Until the conversations of who provides these masks is resolved, this is an attempt to mitigate future cases of this devastating illness. Hence the donation from Crystal Clear in June 2023, which will go directly to the purchase of masks for Novo Horizonte miners. "This is so helpful," he said

Women with some of the rutilated quartz specimens found in Novo Horizonte.

in thanking Urwin, before telling her that he was going to send the video of him accepting the cheque to the team presenting the programme to the mining communities. "Even small steps like sending the video of receiving this cheque shows us that we are on the right track." ■

To find out how to donate so that Novo Horizonte miners can receive masks, please go to <https://crystalclear.life/minedful-donation>.

All photos are courtesy of Brian Cook unless otherwise indicated.

A list of references can be obtained by querying the Editor.

VISITING THE HOME OF JAPAN'S CULTURED PEARL FARMS

Ayako Naito FGA DGA introduces the world of pearl farming in Ago Bay, Mie Prefecture, Japan, where akoya cultured pearls were first successfully created.

Ago Bay is in the city of Shima in Mie Prefecture, Japan. It has been the home of cultured pearl farming in Japan for over one hundred years.

As an island nation, Japan has received many gifts from the sea. Among them are pearls, first in their natural form; then, after the efforts of Kokichi Mikimoto starting in the late nineteenth century, in their cultured form. Pearls are an important industry to Japan; according to the Ministry of Agriculture, Forestry and Fisheries, the country exported ¥23.8 billion (£103.9 million) in pearls to the rest of the world in 2022. But just as important to Japan is the pearl culture, which is briefly reviewed here.

HISTORY OF THE CULTURED PEARL

Entrepreneur, jeweller and one-time chairman of the Shima Marine Products Improvement Association Kokichi Mikimoto started the culturing of pearl oysters in 1888. Thereafter, he began exploring how to create round specimens. He sought to do this using the oysters of Ago Bay, in Mie Prefecture.

Ago Bay is located in the southern part of Shima Peninsula, and sixty islands exist there. This area is suitable for pearl cultivation because the rich sea receives nutrition from the forest, the local mountain and the Rias coast; the topography of the complicated gulf; and a warm climate throughout the year. It was here, after some trial-and-error, that Tatsuhei Mise, Tokichi Nishikawa and Kokichi Mikimoto succeeded in creating the world's first spherical cultured pearls.

Cultural Traditions

Women Divers and the Local Community. While Mikimoto is most often credited with developing the technique, it was in fact the women divers called *Ama* helped with the day-to-day care of the oysters in those days of cultured pearl farming. Today, the *Ama* divers take shellfish, seaweed and prawns in the sea to make a living. They no longer go deep into the sea to look for pearl oysters and they are not directly concerned

with pearls. Instead, they have become a symbol of the history of cultured pearls within the communities of Shima Peninsula.

Honouring the Oysters. Cultured pearl farmers have a sincere appreciation not only for their craft, but also for the akoya oysters that make their work possible. The Memorial Tower in Maruyama Park stands for the sacrificed akoya pearl oyster. Every 22 October since 1951, a Memorial Festival has been held where priests pray for the pearl oysters. They pray with thanks for the sacrificed oysters, and this is performed in conjunction with a feeling of hope in the development of the industry.

CULTURED PEARL FARMING

Cultivation. It takes four to five years to cultivate akoya cultured pearls from choosing mother oysters and the oysters for the mantle tissue. Once the pearl oysters grow, the cultivating

The women divers called *Ama* helped with the day-to-day care of the pearl oysters in those days of cultured pearl farming.

process is carried out accordingly. After restriction of the oysters, when the physiological activity of oysters are suppressed during winter, farmers insert a bead nucleus with a piece of mantle tissue into each oyster's body throughout the spring into the summer. The oysters need a recovery period after the operation in the calm sea because they are very weak. Pearl oysters will be moved to offshore after recuperation, and farmers work on cleaning and wintering with consideration for the state of the oysters as well as the environment of the sea from summer to winter. The pearl farmers continue working in this way every day, without taking a rest, through the year. In short, there are several processes to oyster farming and cultured pearl cultivation before a single specimen is removed from an oyster.

The farmers in Shima raise various sizes of akoya cultured pearls, including 'baby pearls' (3-4 mm) and sizes larger than 8 mm. Depending on the area, the farms specialise in certain sizes

to continue their best efforts in pearl cultivation. Each area has a study group; in the Katada area of Shima, farmers use akoya oysters grown under the same conditions to cultivate at different spots for experimental purposes. After picking the cultured pearls from the oysters, they discuss various conditions, techniques and improvements by comparing each specimen. While these pearl farmers exchange ideas, they do not usually discuss with the farmers working in the other area, because the cultivation technology varies with the size of the pearls.

Cultured Pearl Farmers.

The pearl cultivation business first started in Mie Prefecture, and cultured pearl farmers there originally worked among their families. This style of business continues even today in this area. Unfortunately, even with the rising demand for akoya material, there does not seem to be any interest in launching new pearl cultivation sites in Shima-City.

In many cases, cultured pearl farms are still family-run businesses. Ms Ruriko Sakaguchi is from Sakaguchi Pearl Farm in the Shinmei area of Shima; they cultivate pearls in sizes larger than 7 mm. Ms Sakaguchi is the third generation of the pearl farm; she is currently running it with her parents. Six brothers in the first generation improved their



Ruriko Sakaguchi harvests oysters from the sea in the Shinmei area.



An open akoya oyster revealing a cultured pearl.

techniques together through friendly rivalry. Their practices are the foundation for their business through to the present day. She explained, "My father and I feel that it is extremely natural to do this pearl cultivation business. The younger generation of the family takes over the business, and it allows us to carry on daily work and the cultivating technique that has been inherited from generation to generation in our family."

The younger generation of cultured pearl farmers are in their thirties and forties; however, there are not as many in this age range as there used to be. In Japan, cultured pearl farmers numbered around 4,500 in 1965-1975 – considered the Golden Age of the industry – but at present they number around 600. There are about 250 farmers now in Minami-ise-cho, Shima-city, with four or five

operating as companies. While in the past there were other pearl companies with many employees in the area, many discontinued their businesses after they were affected by an economic slump in 1991, which resulted in falling pearl prices.

How do those farms still in operation stay open? According to Ms Sakaguchi, "I have learned and received the details corresponding to the actual environment of my farm from my parents during daily work. There are farmers who think that technique or other information was never supposed to be shared outside of those who cultivate akoya pearls, but I think that it could make it difficult to produce high-quality pearls. Not only cultivation techniques, but other information on akoya cultured pearls, should be shared among farmers and distributors/dealers



An Ama (a woman diver) looking for a catch. In the past, they were responsible for the day-to-day care of the pearl oysters.



The Memorial Festival, held each October, is one of thanks for the oysters sacrificed to create the pearls that make the local industry possible.

and we should communicate each other, so that it will be able to find out solutions and ideas together." Although she used to rely on past experience and her perception when she worked on akoya oysters, she is now using data such as the results of regular testing of the quality of the sea water as part of the process at Sakaguchi Pearl Farm.

RECENT CRISES

In recent years, Japan's pearl cultivation industry had two major crises that have impacted its ability to do business.

Starting in 2019 and into 2020, the mass mortality of pearl oysters by an infectious agent occurred at farms throughout Japan. As a result, there was a crisis in the pearl industry. Ms Sakaguchi reported that "The difficulty which I experienced made us realise that I could not survive in the future just with using techniques, and the most important issue is to learn to adapt to these natural circumstances."

In addition to this, just after this problem Ms Sakaguchi pointed out that COVID-19 hit her farm, the industry and the world. "When a member of my family was infected, we could not carry out all cultivation activities. We had already suffered from increasing expenses, and then the slump in quantity and quality of cultured pearl production due to mortality, and at the same time the auction of newly harvested pearls was postponed because of COVID-19. This made our situation more difficult, and we had little spare financial capacity."

"We are hopeful about the future, little by little we have become hopeful

over the past one or two years, but we still have challenging situations corresponding to natural environments and circumstances, and often feel limited to manage it."

RECENT APPROACHES

New approaches are being attempted to circulate resources. In 2019, pearl farmers, Mie Prefecture and Shima City, supported by the Fisheries Agency, began making 'pearl compost' from the by-products of the pearl-harvesting process (the shells of growing oysters, along with the body meat of the processed oysters). This is very important, as it meets three of the United Nations Sustainable Development Goals (SDGs): Goal 12, which emphasises sustainable production and consumption patterns; Goal 14, which is concerned with conservation and sustainable use of oceans and marine resources; and Goal 17, which calls for strengthening the means of implementation and revitalisation of the Global Partnership for Sustainable Development.

In recent years, Japan's pearl cultivation industry had two major crises that have impacted its ability to do business.

The pathogen that caused the virus resulting in the ongoing oyster mortality has been identified. It is now understood that the problem is caused by the circumstances in which the pathogen can live. While the mortality issue persists, there are countermeasures being taken: oysters are being bred with a tolerance for the virus, and production of baby oysters has increased.

In addition to this work, in 2023, all pearl farming associations in Mie Prefecture began participating in cleaning the beaches. They are collecting drifting garbage in the inlet as part of environmental conservation. This activity does not just help to clean the water and surrounding land. Publicity of the activities have raised awareness of the environment for the sea and the land. This is of benefit not just to today's farms and oysters, but to future generations of cultured pearl farmers and their businesses.



The Kokichi Mikimoto statue located on Mikimoto Pearl Island in Aqa Bay.

Tourism is also a way that the pearl cultivation community maintains its way of life. Some pearl farmers have accepted visits, and they share information and insights into their precious experiments, including looking at the implantation operation and the harvest of a cultured pearl from an akoya oyster. Visitors also hear a story about an actual culture process and understand that it is a 'gem' that people create in conjunction with nature, and the result of the effort which a community brought about. ■

To find out more about touring the pearl farms in Shima-City, contact the Shima City Tourism Association, or email the author at galleryyhg@hotmail.com.

The author wishes to acknowledge Mr Yuichi Nakamura of PJ Nakamura International and Ms Ruriko Sakaguchi from Sakaguchi Pearl Farm for their cooperation.



Ruriko Sakaguchi's parents clean oysters at the Sakaguchi Pearl Farm.

MINING BLUE JOHN IN 2023

Elisabeth Turner's family has been running Treak Cliff Cavern since 1945, though the art of crafting with Blue John is over three hundred years old. Ms Turner tells Jennifer-Lynn Archuleta how members of the staff navigated the COVID-19 crisis and how the site fares today.

Blue John, known to some as Derbyshire Spar, is a form of fluorite with characteristic bands of purple-blue and a yellowish colour. While blue-banded fluorite has been produced from other sources, the only two known deposits of the material are both found in Derbyshire, in the East Midlands of England. The name is thought to derive from 'bleu-jaune', the French for 'blue-yellow', although there are other legends associated with the name. However the term came about, it has been mined in Derbyshire and used for ornamental purposes for three centuries, with the material becoming extremely popular for ornamental purposes in the nineteenth century. During World War I, fluorspar was in demand for blast furnaces; Blue John, as a rare form of calcium fluorite, was mined only for this purpose. Commercial mining ended in 1926, and the caves and the 'old series' mine were opened to the public in 1935, the same year Treak Cliff Cavern opened.

In the Harrison and Turner families since 1945, Treak Cliff Cavern is the only location where Blue John is mined in Derbyshire. Today it is a tourist attraction employing seventeen people. Some stone is mined for use in jewellery and other small objects, though considerably less than in the past.

Mineral collectors are among those who look for Blue John, coming to Treak Cliff Cavern to find specimens like the ones to the right or larger, more natural-looking pieces (opposite page, top).

A deposit that had been discovered but lost when the miner died, and a brand-new vein of Blue John, were located in 2013 and 2015, respectively, making fifteen Blue John veins for mining at Treak Cliff Cavern.

G&J spoke to Elisabeth Turner, director and fourth-generation family member at Treak Cliff Cavern, to find out how they have managed the challenges of the last few years.

Tell me a bit about your family's business.

Treak Cliff Cavern has been under the ownership of the Harrison and Turner families for four generations. We are carrying on the tradition of Blue John mining and crafts, which were

established over three hundred years ago. Since the deposit is a designated Site of Special Scientific Interest (SSSI) we are acting as trustees, looking after the cavern and maintaining it for future generations.

What is currently the largest part of your business?

The Cavern as a tourist attraction. Within that, the Blue John Dragon is incredibly popular, particularly with children who visit. It was created in 2014 by master craftsman Peter Sharp and took around 65 hours to complete — just over eight 'normal' working days. This includes the selection of stone and resining, a process which normally takes a couple of days. Ninety percent of the dragon was

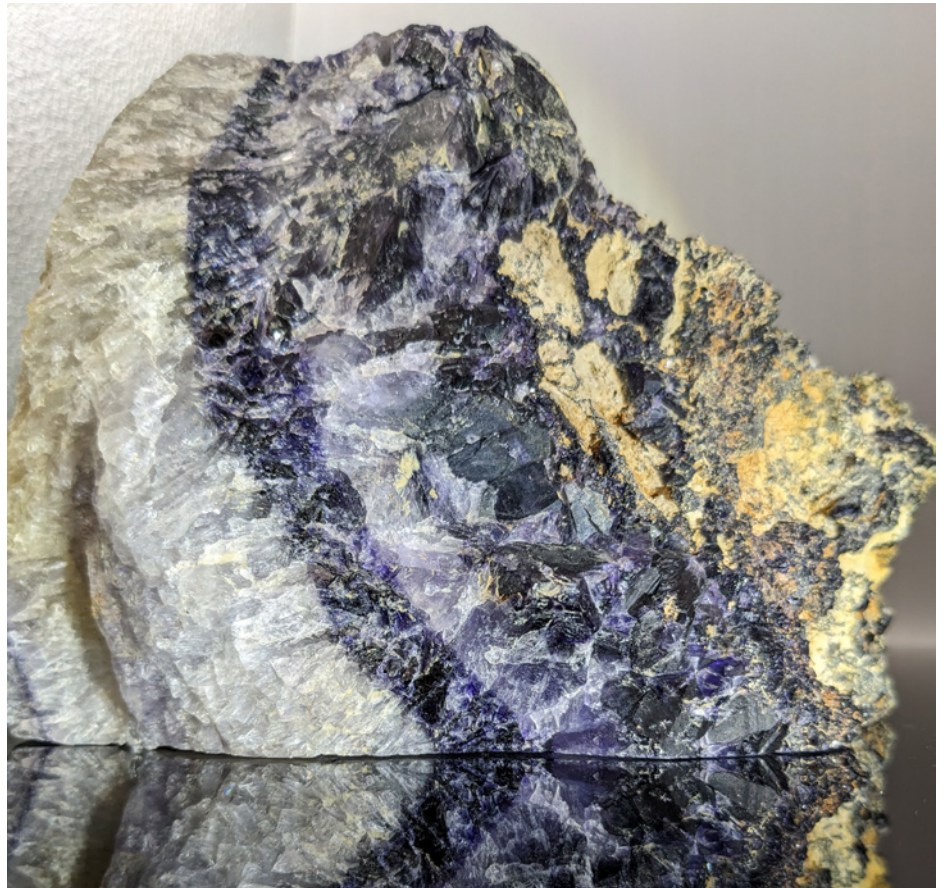


cut using a large circular saw, with the remaining ten percent using a Dremel saw (electric hand tool), for grinding. Most of the dragon is made from Treak Cliff Blue vein, with odd bits of Twelve, Five and One veins. The spines are white onyx, and the eyes are marcasite. Acrylic pins and glue have fixed it together and it sits a quartz cluster base.

Over the past five years, what has been the biggest challenge to the Blue John industry? How did you address them?

The most significant challenges over the past five years have been the COVID-19 pandemic and the rise in the cost of living.

The closure of the site and mine for almost twelve months during COVID hit hard, as all mining and manufacturing stopped. When allowed to return to work but not reopen to the public, the time was spent manufacturing ornaments and jewellery to be ready for reopening and also to maintain the online shopping market, which blossomed during this time. We also used this time for upgrades to the



Now that there are self-guided tours at Treak Cliff, a change made during the COVID-19 pandemic, people can spend all day in the cavern looking at veins such as this one.

cavern lighting system; it is difficult to do electrical work in the cavern when we are open as normal, because we have to turn all the power off.

We also moved forward with the change from a guided tour to a self-guided tour using an app easily downloaded to a visitor's phone. This change also brought on the need for closed-caption television (CCTV) throughout the cavern and additional protection for the natural cave formations. Having this system has helped us save on our running costs. We have been able to pass these

savings onto the staff in higher wages; we have also passed on the saving to the visitors by keeping our entrance fee as low as possible, helping both sides with the cost-of-living crisis.

We have found the self-guided tours to be extremely popular with new and returning customers alike. There is no rushing around the cavern or trying to keep up with a larger group of people; you can go at your own speed and spend longer in your favourite chamber. You can even spend all day in the cavern if you wish.

What do you wish the gem trade most knew about your site, your production, and the challenges you face?

We are a small family-run business, and all stages of our manufacturing are done on site by our craftspeople, most of whom live within ten miles of the site. Almost all of them have been trained at Treak Cliff Cavern by previous craftspeople who have retired.

Treak Cliff Cavern is located in a SSSI area; unfortunately, this does not deter thieves from helping themselves to the

Blue John is quite a difficult mineral to work with; before it can be made into jewellery or bowls, it must first be dried and boiled in resin. When making a bowl or ornament it needs to be done several times throughout the bowl-turning process.



Cavern director Elisabeth Turner says they hope to be mining Treak Cliff for a few hundred years.

old open-mine workings higher on the hillside. We work closely with Derbyshire rural crime policing unit and the national trust to keep this to minimum.

What does your current mining activity look like? Did you add any value-added services to the mining activity to adjust to the challenge? If so, describe.

Previous mining activities at Treak Cliff Cavern have used a large drill to extract the stone from the cave; this is very bulky and heavy, making it difficult to get into the smaller areas. A few years ago, we invested in a stone chainsaw with diamond-tipped chain; this is much lighter and easier to use. The mining operation is much cleaner and less wasteful.

Our jewellery is made on site in our workshops by our craftspeople. We have a range of bespoke jewellery made by Jack Mosley and Andrew Elliott, and a broad range of cast-silver jewellery with the Blue John set into it. The bowls are made by my brother, John Turner. Blue John is quite a difficult mineral to work with; before it can be made into jewellery or bowls, it must first be dried and boiled in resin. For jewellery it only needs to be coated with resin once, as the resin permeates through a thin slice of stone. When making a bowl or ornament this needs to be done several times throughout the bowl-turning process.

We have also teamed up with Intrepid Brew Company, a microbrewery approximately five miles from Treak Cliff Cavern, they use water from the cavern to create a beer exclusively for us.

We have been able to pass these savings onto the staff in higher wages and to the visitors by keeping our entrance fee as low as possible, helping both sides with the cost-of-living crisis.



Ornamental bowls made from Blue John were fashionable during the nineteenth century. Today, family member John Turner makes these objects, such as those shown here, on site.

What is the outlook for Blue John mining at your site as a whole?

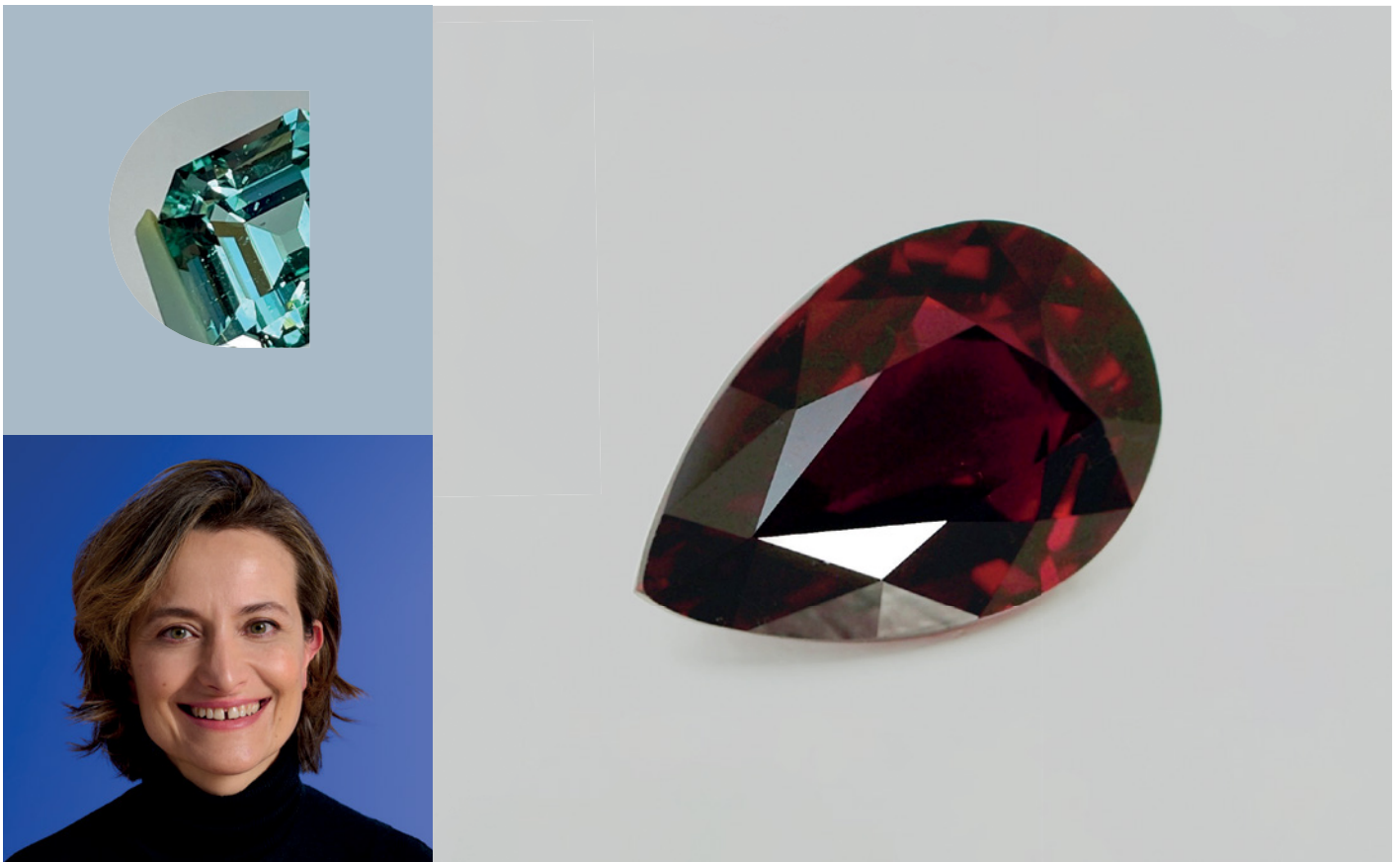
We hope to be mining Blue John for a few hundred years yet! Our miners, Jack and Gary, are constantly looking for new areas to mine and are faced with the challenges of setting up the mining platforms in natural uneven caves so they can safely extract the stone. We extract approximately 500 kg a year. ■

To find out more about visiting Treak Cliff Cavern, visit bluejohnstone.com.

All photos courtesy of Treak Cliff Cavern.

Bid on exceptional gemstones, **selected by** **Catawiki experts**

Every day, our in-house experts carefully select a wide range of gemstones from around the world for every collector.



Purificacion Aquino Garcia
Expert Gemstones

Buy and sell on catawiki.com





PEACE, HOPE and PROSPERITY through diamond cutting in Sierra Leone

Diamonds produced from the alluvial deposit in Kono District, Sierra Leone. Photo by Parker Gibbons.

Two master cutters and a PhD candidate who immigrated to the U.S. from Sierra Leone have created an initiative to teach youths in Sierra Leone's Kono District to cut and market their diamonds for added value. Maarten de Witte and Fas Lebbie outline the plans Root Studios has for this artisanal mining community.

In January 2002, a lasting peace agreement finally ended eleven years of the bloody civil war in Sierra Leone.

Since that time, change has come to the diamond industry. The Kimberley Process and the subsequent System of Warranties from the World Diamond Council began the process of ensuring the 'clean' origins of rough diamonds. However, Sierra Leone, so rich in diamonds and other minerals, which would so benefit from the demand for ethically sourced gems, still ranks as the second-poorest country in the world per capita. Extracting exhaustible minerals like diamonds is unsustainable, yet relied upon by many African communities, including those in Sierra Leone. Dwindling production, high unemployment rates among African youth and poor infrastructure pose pressing challenges for future economic development. What can be done to remedy this disparity

between the mineral wealth and the poverty of the people?

This story has been played out in multiple countries in Africa with deep-level mining, most notably Botswana and Namibia. The intent has rarely been to create viable and sustainable manufacturing for the benefit of the host country or its people. Instead, the goal of most major players in the diamond industry has been to gain more access to rough supply. Once this directive is achieved, initial investments are written off and most factories are deemed to be inefficient and subsequently decommissioned.

This plan was notably put into play in Sierra Leone. People who had made efforts to invest in the country's development – including Mickey Brookshire, who had purchased the assets of a factory known as 'Sierra Leone Diamonds LTD' in 1983 – had

typically focused on processing rough obtained from outside the country. It became clear that the sole purpose behind this endeavour had been mainly to receive a quota percentage of rough from National Diamond Mining Company (NDMC). "My hope was to rebuild by dealing more directly with the local trade — actually cutting rough from Sierra Leone," Mr Brookshire explained. "After buying the equipment from Sierra Leone Diamonds LTD, I began interviewing their cutters. As has now become the norm, all had been trained as assembly-line pieceworkers. They didn't possess the skills needed to individually finish a piece of rough completely into a polished gem, let alone use their training at any other entrepreneurial level."

Root Studios is looking to change this practise. It is a not-for-profit, design-led incubator with a mission to provide

agency to Sierra Leone's people by teaching them value-added artisanal and digital skills. In this way, Sierra Leoneans develop a greater connection to the global economy, creating a platform for them to achieve their own societal needs and aspirations. Root Studios offers classes including diamond cutting and grading, jewellery design, mineral design, product or user experience/ user interface (UX/UI) design, impact entrepreneurship and land reclamation. They target youth, women and people with disabilities. This initiative starts within artisanal mining communities and challenges the very notion of what Fas Lebbie calls "sacrifice zones and bodies – places and people that the current supply chains treat as expendable."

With community-scale training and development, instead of mega-factories, Root Studios will begin with the establishment of cutting shops that are sponsored either by the government, nongovernmental organisations (NGOs) or private means. These shops will be locally built, owned and operated and use small-scale, yet state-of-the-art technology. The selection of locally mined special stones for manufacture will offer a higher degree of success. Direct participation by local miners, dealers and tradesmen will result in pride of ownership. The ability to direct their own activities also ensures that the goals of, and benefits to, all concerned are achieved. Using local stones to cut and market will most surely capture the added value of telling a powerful documented story of a real diamond's journey from local miner to individual consumer.

The timing, resources and people are now perfectly poised for this innovative approach to succeed. There is already a



The image on the left shows a miner named Sia with her baby, Kumba. They met Fas Lebbie at the mines during his ethnographic research. On the right is Root Studios' first 'storied diamond' purchase, made from Sia. This gem is not for sale; it is an artefact of their model to bring real stories to the world and reveal the 'roots' of each diamond. Photos by Sage Bennet (left) and Parker Gibbons (right).



This initiative starts within artisanal mining communities and challenges the very notion of places and people that the current supply chains treat as expendable.

vibrant and growing fair-trade market emerging in the global jewellery industry for responsibly sourced gold, diamonds and other minerals. The appeal of such products is most notable among millennials, particularly in the United States. Sierra Leone is in a strategic position to capitalise on this. Sierra Leone's president, Julius Maada Bio, has previously expressed to industry leaders his desire to bring diamond cutting back to his country. And at the June 2018 JCK Show in Las Vegas, Sierra Leone's minister of mines and mineral resources, Dr Morie Manyeh, encouraged attendees of the annual Rapaport Breakfast to invigorate his nation's local trade. Dr Manyeh explained, "We want to make sure as a government that the communities where these diamonds come from benefit directly from the sale of diamonds... and so Koidu is



The three founders of Root Studios (from left): Fas Lebbie, Maarten de Witte and Mickey Brookshire. Photos courtesy of Root Studios.



A Sierra Leonean dealer examining a diamond that is available for purchase under a loupe. Photo by Parker Gibbons.

going to get a whole lot of attention from the new government... we want to put a human face on diamonds... I am inviting you to come to Sierra Leone... we are ready to partner with you to help us grow, help us develop as a country, to provide a higher quality of life for our people."

With these ideas in mind, Root Studios was founded by Fas Lebbie, Mickey Brookshire, and Maarten de Witte, after Mr Lebbie reached out to Mr de Witte via the latter's website. After their initial meeting, Mr de Witte involved Mr Brookshire in their plans. The three men consider Root Studios a lifetime legacy project. Their goal is to sell significant diamonds and enable Sierra Leonean cutters to develop their own unique diamond cuts. It is not necessary to simply compete with the round brilliant. Not all the stones coming from Sierra Leone are white and flawless; the run of the mine contains all kinds of colours. In fact, different colours best represent the entire community and that is their real story. According to Mr Lebbie, "Our 'storied' diamonds act as an artifact of reconciliation between the industry and artisanal mining communities. It facilitates a discourse of listening to the voices of artisanal miners, who have been victims of extractive capitalism in the industry." The end goal for Root Studios is to enable the sale of diamonds and gold sourced by artisans in Sierra Leone, made into jewellery designed by Sierra Leoneans, and marketed with its own West African story to the African diaspora around the world.

Fas Lebbie was born in Sierra Leone and immigrated with his family to the United States during the Sierra Leone Civil War over twenty years ago. He is pursuing a PhD in Transition Design at Carnegie Mellon University in Pittsburgh, Pennsylvania, focusing on unsustainable mineral resource systems and aiming to reimagine and redesign better systems to ensure their extraction, production, and utilisation are restorative and regenerative. He is also a design technologist working as a design manager at Meta. He has an all-encompassing vision for developing added value to diamonds from Sierra Leone by tracking those diamonds from individual artisanal miners in the Kono District – the country's largest diamond producer – to the end-consumer, using blockchain technology and by utilising the power of nonfungible tokens (NFTs) to ensure traceability. Mr Lebbie has already

interviewed a large cohort of individual artisanal miners and potential students in the Kono District. He has extensively recorded their stories and discussed their aspirations and plans for the money they earn from the value-added activities related to diamonds. His hope is to connect the workers in the district to the people who actually buy their diamonds.

Mickey Brookshire has spent half his career in Sierra Leone, living upcountry part of each year, while working side-by-side with both gold and diamond miners. Maarten de Witte, who was the sole proprietor of the American School of Diamond Cutting, is renowned as the Diamond Wizard. As a global trainer and research director, he was instrumental in growing Hearts on Fire branded diamonds. Both Mr Brookshire and Mr de Witte are master cutters who are experienced in teaching their art. Their combined skills cover the breadth of the diamond industry. Mickey Brookshire's career spans the mining of rough through to producing finished gemstones, and Maarten de Witte's career spans the production of finished gemstones to branding and selling those specimens to retailers as well as the final consumer. In the words of Mr de Witte, "Over the years we've taught many people to cut diamonds. There is no doubt that this trade can be easily learned and mastered by anyone with the proper motivation and dexterity. This skill set can be successfully used on many levels of the diamond trade, including self-employment, downstream grading, buying and selling of rough, and upstream manufacturing, jewellery making, wholesaling and retail."

Thus far, a few hundred carats of stones have been cut by de Witte and Brookshire, with the revenue from those sales rolled back into financing the

Mr Lebbie has already interviewed a large cohort of individual artisanal miners and potential students in the Kono District, extensively recorded their stories and discussed their aspirations.



Scenes of diamond mining in Sierra Leone. Top: Sia, an Artisanal miner, after a ten-hour day working at the mines in Kono District. Centre: Two miners washing their gravel from a one-week intensive small-scale mining effort. Bottom: A miner searches through the gravel. Despite its complex challenges, artisanal mining is one of the only ways the communities benefit from its natural resources. Photos by Sage Bennet.



Root Studios startup. The next step is to set up an artisanal diamond-cutting shop in Sierra Leone, where cutters will be trained as artisans, taught to finish diamonds from rough crystals to polished gems, allowing these miner/cutters to take the gems from their grinding wheels to the final consumers.

Like many startups, they are looking for funding from partnerships with businesses, governments and NGOs. Root Studios recognises that their model must progress beyond factory work which, even in its most benevolent form, is a colonial model of making money by taking those raw materials away from their source and adding value elsewhere. The artisanal miners, and their communities, do not fully benefit because they are not getting a penny of that value added.

Root Studios' timing could not be better. Younger jewellery buyers are looking for responsibly and ethically sourced products in all walks of life. Millennials want to do business with authentic players, someone they can trust, who has a story with verifiable provenance. The story must resonate with the customer's ideals and desires. Price is not nearly the obstacle people consider it to be. In fact, many jewellery shoppers are willing and eager to own a gemstone with a story that no one else can tell, even if it costs more.

The Root Studios team will head to Sierra Leone again in the fall of 2023 to begin the process of setting up their artisanal diamond-cutting apprenticeship program and begin the construction of the Root Studios facility. ■



To learn more about Root Studios, visit www.rootstudios.org.



PROTECTING KANALARITJA

When the effects of climate change threatened the sacred practice of an indigenous community in Tasmania, one member began a long and creative journey to preserve it. Dr Alana Gall recounts how Dr Andrew Gall worked for five years to keep *kanalaritja* – both the act of shell-stringing and the jewellery created from it – alive for future generations of Pakana.

The Pakana women of Tasmania (Lutruwita) partake in a sacred practice called *kanalaritja*, passed down through the women of the culture, which translates to 'shell stringing' in English and has been a sacred practice for untold generations. Due to climate change, the shells of the molluscs used to make the jewellery for *kanalaritja* are becoming brittle and thin, rendering them unusable. Learning this pushed Dr Andrew Gall to find a method to replicate the shells so that this sacred practice could continue. Importantly, he first gained approval from the shell stringers to do this work, as *kanalaritja* is a sacred women's practice, ensuring he followed cultural protocol. Then, after much trial-and-error, he finally established that the best adaptation to climate change was to use 3D printing to create 'shells' to be used in *kanalaritja*.

Andrew Gall's granddaughter, Zyana, modelling the 'Crown of Shells', his first 3D printed resin necklace. Photo by Alana Gall.

THE PROBLEM: CLIMATE CHANGE AND KANALARITJA

Our world is changing; there is a 'strong, credible body of evidence, based on multiple lines of research, documenting that the climate is changing and that the changes are in large part caused by



human activities' (Schlingmann *et al.*, 2021). These shifts in our climate have resulted in increases in catastrophic events such as floods, droughts and wildfires. As the ocean levels increase, so too does the level of its acidity, changing the underwater environment in ways that drastically impact marine life and plants. These environmental changes are being felt acutely by indigenous peoples across the world. As the traditional custodians of the lands, they mediate these place-specific impacts through local economies and their cultures, as the real threat to their way of life and collective wellbeing is palpable.

This is no different on the island state of Australia, now called Tasmania, where the Indigenous people are grappling with the significant impact that climate change is having on their culture. These people are known as *Pakana* (also spelt *Palawa*), and they are the traditional custodians of *Lutruwita* (the Palawa kani name for Tasmania). Pakana women partake in a sacred practice called *kanalaritja*, which translates to 'shell stringing' in English;

kanalaritja is also the name given to pieces of jewellery that the Pakana 'shell stringers' make. This practice has been passed down the Pakana matriarchal line since time immemorial and remains an integral part of Pakana culture today. As the name suggests, this practice traditionally uses varied shells found in the oceans surrounding Lutruwita. But with the rising acidity levels of the oceans, the help the molluscs live on is not able to grow; the molluscs that manage to survive develop brittle, thin shells. This directly impacts the Pakana shell stringer's ability to partake in this sacred practice, as the numbers of shells that can be used for kanalaritja are declining, and the few shells that are available are so fragile they often break while working with them. It was learning about this, and the realisation that this could lead to the extinction of kanalaritja, that jolted Dr Andrew Gall into action, eager to find a solution.

ADAPTATION VS MITIGATION

For those with environmental concerns, *mitigation* of climate change is *of course* the best option. But what if mitigation efforts do not work? What if climate change takes a drastic turn for the worst? What if it is too late? It was these questions that fuelled the fire in Andrew's spirit. He knew he needed to find an *adaptation* to climate change before it was too late. This saw Andrew enrol in a Doctor of Visual Arts programme at Griffith University



Oversized 3D printed shells that highlight the details of the prints.

in Queensland, Australia. His goal was to find an appropriate adaptation for his community to replicate the natural mollusc shells and ensure the continuation of kanalaritja for many Pakana women to come. He worked with the Pakana shell stringers on a set of criteria for the shells to ensure they looked, felt and acted like the real shells. He would later use these criteria to produce a shell that would enable Pakana shell stringers to continue kanalaritja even if all mitigation efforts failed.

Andrew was finally able to produce 3D-printed shells... However, the shells were off-white and so looked nothing like the natural shell colours.



A scattering of resin test shells of Lutruwita.

Having a Bachelor of Contemporary Australian Indigenous Art with Honours under his belt, Andrew first set out using tried-and-tested jewellery-construction methods, including the lost-wax casting method and rubber molds. He realised very quickly that these techniques were not going to produce a shell with anywhere near the level of detail needed for kanalaritja. It was then that he drew on his four-plus decades of experience in the information technology (IT) sector, and hypothesised 3D printing, a rapidly growing technology, would have the highest potential to answer his



An original natural cultural shell, Kanalaritja, made by Maikuten Vicki-Laine Green.

adaptation question. This is when he focused on 3D printing for his doctoral project to find a suitable adaptation to climate change that would protect and preserve kanalaritja for future generations.

THE PROCESS OF 3D PRINTING

The Challenges. Andrew spent the next five years dedicated to this work. The project required extensive testing of every aspect of 3D printing, and the process was riddled with setbacks across those five years. While Andrew expected to spend years testing different scanning methods, 3D printers and 3D printing resins, what he did not expect was a worldwide pandemic and extensive local flooding. The novel

coronavirus pandemic had serious impacts on the health and wellbeing of people around the world, and Andrew and his community were no exceptions (Alana Gall *et al.*, 2021). Australia saw extensive lockdowns, with closed borders and significant strains on food and household goods. On top of this, true to the underpinning driver of his research, Andrew also endured three floods around his home that disrupted life significantly in the small rural town where he lives. There were fears his family home could go under multiple times, but he trusted in the Creator of his people – *Muyini* – to ensure the safety of him, his family and that of all his kin. Despite these setbacks, the fire in Andrew's spirit remained strong and he pushed through them all.



Scattering of raw and polished cast shells of Lutruwita.

Testing, Testing and MORE Testing...

Central to Andrew's practice was patience... patience to test, then test again, then keep on testing. Without undertaking this painstaking work to ensure each step of the 3D printing process was fit-for-purpose, Andrew would not have been able to achieve this groundbreaking work. After being gifted a set of the natural shells used in kanalaritja by his community in Lutruwita, Andrew first needed to secure a set of scans of these shells. These scans needed to be of extremely high resolution to capture the intricate mathematical patterns that molluscs create as they grow (Moulton, Goriely, and Chirat, 2018). They secrete a substance rich in calcium carbonate at the aperture of the shell, building the shell layer upon layer. The physics associated with this determine the overall shape of the shell, and this layering technique produces the fine



Top: Crown of Shells and a scatter of loose 3D-printed resin shells. Below: Expanding Tradition and Coming Together, 3D-printed porcelain shell necklaces strung by Qila and Zyana Gall, Andrew's granddaughters.

striations evident on the shell surface. For the 3D-printed shells to have any chance of looking like the natural shells, these scans would need to include all these intricate details. After many failed attempts to get these scans, including early scans that were solid inside, Andrew secured successful scans and could move onto the next phase of testing.

With the scans in tow, Andrew then needed to test 3D printers. As the whole purpose of this adaptation was to make the shells available to Andrew's



Real to Facsimile, a progression from (L - R), Natural shell, .925 sterling silver, 3D-printed resin and 3D porcelain.

Pakana community, it was important that the 3D printer could both print the detailed shells and was also affordable to improve accessibility. This meant procuring multiple 3D printers himself; he purchased and tested five different printers while testing the different 3D print mediums as well. Indeed, Andrew ended up testing over twenty different types and brands of resins, from plant-based eco-resins through to the most sophisticated natural resins used in modern dentistry. However, it was not until he tested a ceramic-based resin that he found a winner. This resin, when combined with the detailed scans and the right 3D printer, produced the most realistic shells.

Andrew was finally able to produce 3D-printed shells that looked, felt and acted like natural shells when worn. Yet one very big issue remained: the shells were off-white and so looked nothing like the natural shell colours. Further, the shells are considered 'greenware' and true ceramic. This called for the testing of bisque-firing techniques in a kiln, followed by the testing of different glazes and methods of application, to end up with shells that truly look, feel and act

like the natural shells. Andrew purchased a kiln and several different types of glazes and application tools and began yet a new testing process.

CONCLUSION... ALMOST

With each failed test, along with the pandemic and the multiple floods, it took sheer determination and a pure love for his community, culture and kin, that gave Andrew the strength to keep going. Against all odds, Andrew had finally found a combination that worked! While it was not perfect, he knew this was the solution he had been working tirelessly to find over the past five years. Today, Andrew continues this work to refine and perfect his adaptation. He is confident that soon he will have the appropriate combination of scans, 3D printer, ceramic-based resin, bisque firing and glazing techniques to achieve his initial aims. Only then will he be able to gift this knowledge to his Pakana community, so they have an adaptation to climate change that ensures the survival of kanalaritja for future generations. Finally, Andrew envisions that his method can be translated to other indigenous cultures as well, to provide them with the tools to develop their own adaptations to climate change to ensure the survival of their own sacred cultural practices. ■



Scatter of natural shells of Lutruwita.

For the list of references used in this article, please contact the Editor.

All photos © Dr Andrew Gall unless otherwise noted.

Pakana women partake in a sacred practice called kanalaritja that has been passed down the Pakana matriarchal line since time immemorial and remains an integral part of Pakana culture today.



Crown to Couture is an exciting new show that draws parallels between the eighteenth-century Georgian Royal Court and modern celebrity through fashion and jewellery. The King's Gallery featuring an Oscar de la Renta gown worn by Billie Eilish at the Met Gala, amongst many others. © Historic Royal Palaces.

Crown to Couture

THE FASHION SHOW OF THE CENTURIES

Kensington Palace, set right in the heart of London, may be best known as the birthplace of Queen Victoria. It is also the site of a sparkling-new exhibition of fashion and jewellery called *Crown to Couture: The Fashion Show of the Centuries*. The artefacts on display cover a timespan ranging from the

court of George III and his consort, Queen Charlotte, to its current incarnation: the contemporary red carpet. The exhibition is centred on the idea that a person's fortune can change through a carefully calibrated display of personal fashion. Wearing the right eye-catching fashion and jewellery could propel one up the ranks of the British

court; today, it could garner front-page coverage and the adoration of fans.

It is fundamentally a fashion exhibition, definitely more couture than crowns, and acts as an exploration of the way in which dress and personal appearance are used in the pursuit of social and political success. Costumes from the eighteenth century are juxtaposed with amazing creations made for today's most famous actors and singers. The displays begin at the top of the stairs where Queen Victoria first saw her future husband, Prince Albert, and wind their way through a series of private and state apartments.

Jewellery is a key part of self-presentation and is incorporated into the exhibition, which is sponsored by the royal jewellers Garrard. The right jewels can elevate an outfit and a fine display, whether authentic or imitation is essential in some circles. Until the late eighteenth century, the royal court was open to anyone who was appropriately dressed; fine clothes and jewels were the only invitation needed. A finely dressed nobody with good jewels and a charming manner could attend court and make their



A closeup of the Feather Headdress tiara made by Duke Fulco di Verdura. It was worn at court by Betsey Whitney, the wife of the U.S. Ambassador to the UK, in 1957, and by Hamish Bowles to the Met Gala in 2022. Photo © Historic Royal Palaces / From the Verdura Museum Collection, courtesy of Verdura.

way up through society. Access to court was a vital way to receive preferment such as a court post or an honour.

Making a good appearance was the vital thing – it wasn't necessary to actually own the jewels you wore. Even royalty borrowed jewels to make a good show. In 1742, Princess Augusta – granddaughter of George II and sister of future King George III – borrowed £40,000 of jewels to wear at a court masquerade on the condition that she told everyone who had supplied them, just as the red carpet stars of the Oscars or the Met Gala are outfitted by contemporary designers and jewellery houses for publicity. For the Georgian court goer, a glittering appearance could also be obtained through cheaper means. The displays entitled 'Getting Ready' give a behind-the-scenes look at the preparations made by a Georgian courtier as well as a current celebrity.



Sharon Stone at the 2021 amfAR Cannes Gala, wearing Chopard's orchid earrings. Photo courtesy of Sipa USA/Alamy.

A selection of jewels and dress accessories have been collected together to show the final touches necessary to complete an outfit. A rock-crystal-and-paste (glass) stomacher from 1760 displays a fashionable but low-cost version of the diamond original,



A replica Amazonia necklace and earrings from the Garrard Couture collection 2023. Photo © Historic RoyalPalaces/ Lent by Garrard.

made in the form of a bow from which hang two detachable ornaments and, finally, a pendant cross. This is an imitation of a jewel which was worn at the highest levels of society. Queen Charlotte was famous for her gems and owned a diamond stomacher valued at £60,000, a fabulous sum in the mid-eighteenth century. Elizabeth Percy, Duchess of Northumberland, described it as 'the finest piece of magnificence and workmanship I ever saw'. Such magnificent jewels rarely survive unaltered, but their paste imitations can give us an insight into their design. And, for the paste stomacher's original owner, it was a way to copy court fashions at a more agreeable price point.

Many jewels, particularly those worn by men, had a practical function. The exhibition includes a range of decorative shoe buckles as well as brightly embroidered Georgian shoes. Shoe buckles could be enormously expensive, like the pair worth £5,000 worn by the Honourable John Spencer to court

in 1736. The exhibition does not have anything as fabulous as John Spencer's diamond buckles, but it does offer a good representation of buckles in silver, pastes and enamels which copied the styles chosen for gem-set buckles. Three buttons surrounded by small pearls are survivors of a set once worn on George III's state coat. These expensive buttons were removable and could be put on different coats as desired. George III had a particular liking for fancy buttons. According to *The Lady's Magazine*, the king wore 'an elegant set of mother of pearl buttons, set round with small brilliant diamonds' at his Birthday Court of 1779. Buckles and buttons were a mainstay for jewellers and a key part of male fashion until the nineteenth century, but are much less known now.

The jewellery enthusiast has to wait until they reach the end of the exhibition in the Jewel Room to receive their real fix. Displaying jewellery requires high-security cases and careful lighting, so making the decision to group the

A finely dressed nobody with good jewels and a charming manner could attend court and make their way up through society.



Queen Victoria's diamond-and-emerald diadem. Designed by her husband Prince Albert and created by the Queen's Jeweller, Joseph Kitching, the tiara is set with cushion-shaped diamonds and step-cut emeralds and surmounted by a graduated row of 19 inverted pear-shaped emeralds. The largest of the emeralds weighs 15 carats. Victoria was given the tiara in 1845, five years after she married Albert. Photo © Historic Royal Palaces/SWNS.

more expensive jewels together an understandable one. Two showcases are set on either side of the Jewel Room, flanking a central display of tiaras, including the emerald tiara made for Queen Victoria by Joseph Kitching. They combine eighteenth-century jewellery pieces with those made for recent Academy Awards and Met Galas.

One of the prettiest inclusions, harking back to the eighteenth-century passion for flowers that is evident in the embroidered garments of the exhibition,

is a pair of orchid earrings from Chopard. They are made of delicate pink-and-white ceramic petals and set with opals to add a touch of brilliancy. The earrings were worn by Sharon Stone at the 2021 amfAR Cannes Gala, held during the annual film festival. The largest gem in the show can be found in the Rebel Black ring, designed by Thelma West and set with a five-carat pear-shaped diamond from Botswana. It was recently featured in Sotheby's *Brilliant and Black: A Jewelry Renaissance*

Exhibition, and it was also worn by Rihanna to the 2021 Met Gala.

American glamour is linked to British court life by the Verdura Feather Headdress, a gold circle set with naturalistic feathers, brought to sparkling life by 1,223 diamonds. It was commissioned for Betsey Cushing Whitney, wife of John Hay Whitney, the U.S. ambassador to the United Kingdom under President Dwight D. Eisenhower, for her 1957 presentation to the Court of St James. The feather design is a nod to the 'court plume' or set of three ostrich feathers traditionally worn by young women who were presented at court.

Show-stopping jewellery is a way to create a spectacle now, just as it was in

The importance of dress as a way to attract attention and make a political or personal statement is clear by the end of the exhibition.



the Georgian court. Helen Mirren wore a fantastic diamond-and-opal bib necklace to the 2019 premiere of her film, *Catherine the Great*. It was designed by Chopard, whose creative director Caroline Scheufele makes an annual collection for the Cannes Film Festival. Just like her eighteenth-century predecessors, Mirren arrived at the premiere fabulously jewelled and carried in a sedan chair. Actor Blake Lively's arrival at the 2022 Met Gala was even more eye-catching. Her bronze and green Versace gown

A display from the exhibition shows attire from the Georgian court and the Oscars red carpet. © Historic Royal Palaces / Fashion Museum Bath / Courtesy of E-Land Museum / Courtesy of the Academy of Motion Pictures Arts and Sciences.

included a large fabric bow and train. When the bow was untied, it revealed a second train coloured to reflect the patina of the Statue of Liberty. This concept was continued in the 'Ode to Lady Liberty' crown and earrings, designed by Lorraine Schwartz, which complemented the dress and which are included in the exhibition. The crown is set with 25 nude diamonds and Paraíba tourmalines in a patinated copper framework. The number of diamonds was chosen to match the windows in the monument.

These jewels are joined by a surprisingly modern pearl-and-diamond necklace worn by Lady Mary Rockingham around 1760, along with a pair of diamond bow earrings. The necklace is made up of three strands of pearls joined by ten diamond-set rosettes. Just as Blake Lively's crown and earrings matched her gown, Lady Mary wore a glittering court mantua made of fabric woven with silver thread. Her silver dress and diamond jewellery must have looked beautiful in the candlelight at court.

In 1737, the *Stamford Mercury* newspaper printed that no one would be admitted to court but 'people of Fashion, and those are to come in full Dress.' The importance of dress as a way to attract attention and make a political or personal statement is clear by the end of the exhibition. It collects together dress and jewels from two points in history in which a spectacular appearance, aided by designers, jewellers and stylists, can make a person into a star and allows us a closer look at the celebrities of today and of the Georgian court. ■



The Jewel Room of the exhibition has a selection of pieces on display, amongst which is the Feather Headdress tiara made by Duke Fulco di Verdura. Photo © Historic Royal Palaces.

Crown to Couture: The Fashion Show of the Centuries is on view at Kensington Palace until 29 October 2023. Admission is £28.00 (including donation) for adults; £22.40 (including donation) for seniors, disabled attendees and full-time students/ages 16-17 (students must

show valid ID); children under 5 and disabled carers attend free. Historic Royal Palace members are admitted free, but must pre-book tickets. Tickets for the exhibition may be booked at <https://www.hrp.org.uk/kensington-palace/>.



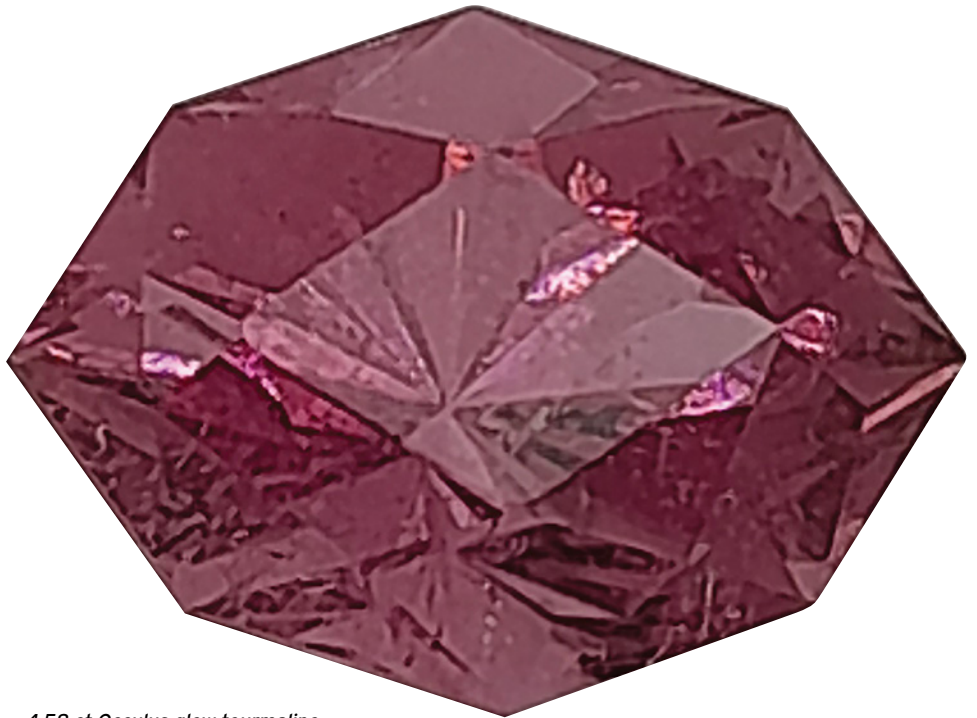
Another case in the exhibition, with sumptuous jewels on display. Photo © Historic Royal Palaces.

A Gemstone Cutter's Story

Elizabeth Wangui, whose faceted tsavorite is mounted in the aquamarine-and-tsavorite pendant on our cover, is a gemstone cutter living and working in Kenya. She shared some of her thoughts on her cutting process, along with some photos of her recent work.

I was introduced to gemstone faceting by Caroline of Virtu Gem. In late 2017, I underwent a ten-day intensive faceting training in Tanzania, after which I became a gemstone cutter. I was fascinated by the entire process of gem cutting, during which one can take a rough gemstone – something which on first glance looks like a common garden rock – and through faceting turn it into a brilliant, sparkling stone fit to grace any piece of jewellery.

I get my inspiration from the gemstones themselves. Every gemstone is different, and each rough is like a blank canvas onto which someone can cut the facets of their 'painting'.



4.58 ct *Occulus glow tourmaline*

to polish. Of the three gemstones shown here, I think that the Barion-cut rhodolite is the best showcase of my talents. It was a good execution and gave great sparkle to the finished gemstone.

The tourmaline I have shared here is included, however, and many jewellers dislike included stones. There are, however, a few gemstone lovers who do not mind inclusions, especially when they present in a beautiful

pattern, as in the 4.85 ct tourmaline. This gem was the most difficult of the three for me to cut, because oval cuts are usually challenging to begin with, and Occulus glow is one of the fancier style of oval cut. But it was a beautiful way to facet this gemstone.

As for the scapolite, which weighs 3.61 ct, some jewellers and clients like more 'sculpted' pieces, rather than the commonly found rectangle, square, oval or round designs. In that case, a freeform cut will be required, like the one I have included.

My choice of cut, therefore, depends on a number of factors including the state of the rough when I receive it, as well as the intended recipient of the faceted gemstone.

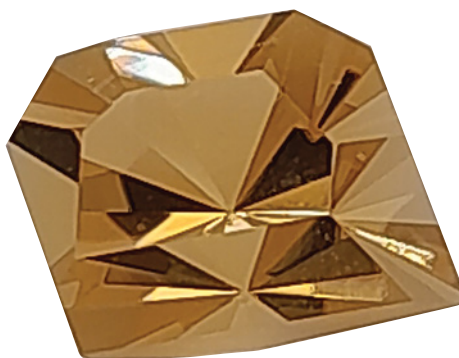
In the future, I hope to continue building on my craft, cutting more complex designs and providing satisfaction to different clients. ■



3.98 ct *Barion-cut rectangle rhodolite*

When choosing a design, I look at the overall shape of the rough stone. If it is naturally rectangular, then I pick a rectangular design and cut. Most of my gemstones are sold to jewellers for use in their pieces; therefore, most of the designs I use are more commercial, focusing on weight retention as well as maximum sparkle. The 3.89 ct Barion-cut rectangle rhodolite is one such example.

Rhodolite is probably my favourite gemstone to work with, because it is very forgiving. It is not very hard, so takes less effort and time to cut. It is also easy



3.61 ct *Freeform scapolite*

All photos courtesy of Elizabeth Wangui.

Over 110 years of experience in gemmology education

Our FGA and DGA Members are located around
the world – join them by studying with Gem-A.

STUDY IN ONE OF THREE WAYS

At Gem-A
HQ London



Worldwide at
one of our ATCs



Online with
practical lab
classes in your area



Find out more by contacting
education@gem-a.com



Gem-A

THE GEMMOLOGICAL ASSOCIATION
OF GREAT BRITAIN





REGISTER NOW!



GemINTRO

GemIntro is a Level 2, online, entry-level course which will introduce you to the fascinating world of gemmology and the enormous variety of beautiful gems available. You can discover the basics of gemmology at your own pace - perfect for anyone looking to start or grow their career in the gems and jewellery trade, or for those completely new to gemmology and with an interest in gems.

Register now at gem-a.com/gemintro



Gem-A
THE GEMMOLOGICAL ASSOCIATION
OF GREAT BRITAIN

