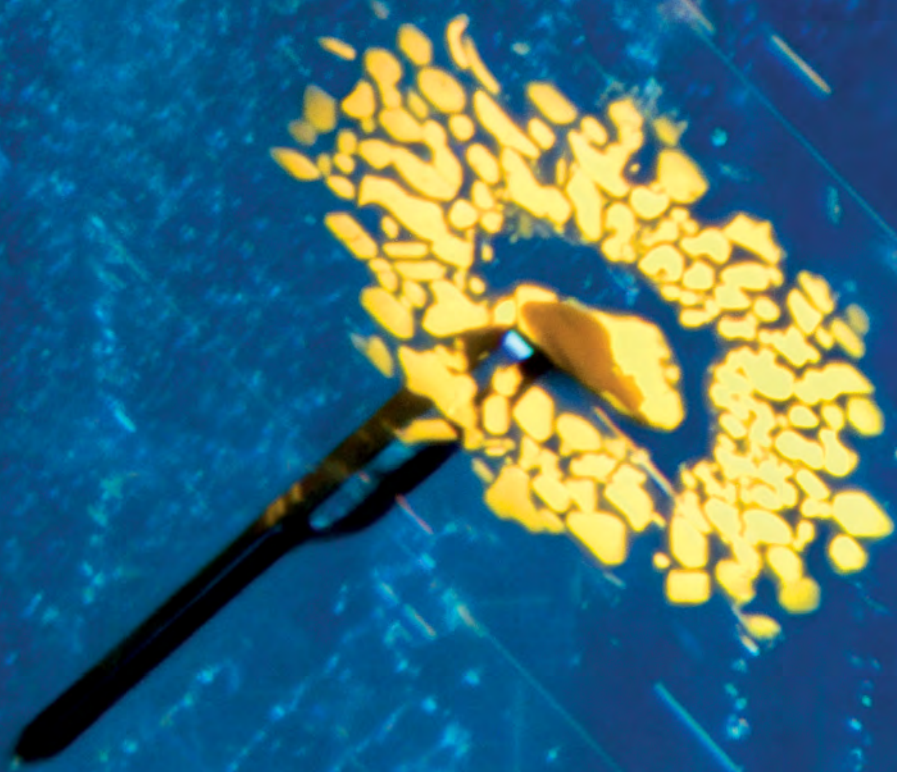


Gems & Jewellery

Winter 2017 / Volume 26 / No. 4



GEM-A CONFERENCE
HIGHLIGHTS

UPDATE ON ETHICS

GOLD FEVER
IN ARIZONA

GEMS OF THE
CORNISH COAST

GEMSTONE
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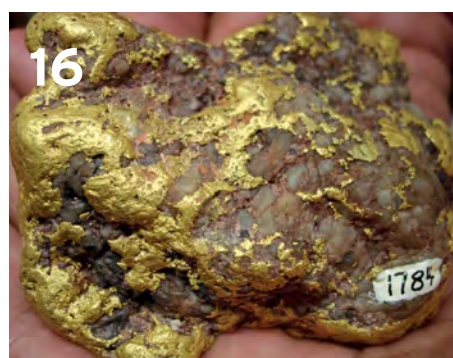
GEMFIELDS

Gems&Jewellery

WINTER 2017

GREENLAND RUBY IN FOCUS

International Women in Mining board member, Deborah Craig FGA DGA, explains why Greenland Ruby is set to become one of the industry's most influential suppliers of coloured gemstones.



GOING FOR GOLD IN ARIZONA

With a rich history of treasure hunters, Arizona has become a boomtown of gold seekers awash with plenty of myths and legends. Helen Serras-Herman FGA shares her findings.



GEM-A CONFERENCE 2017

If you missed this year's Conference, *Gems&Jewellery* relives some of the highlights and reveals the special award winners at this year's Gem-A Graduation Ceremony.

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COVER PICTURE

Gemstone Photographer of the Year 2017 – Overall Winner & Internal Category Winner – Jonathan Muyal FGA

Dandelion flower in sapphire. Growth blockage with thin film rosette in Sri Lankan sapphire using modified Rheinberg illumination, Field of view 1.34 mm. Image courtesy of Jonathan Muyal.

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The Gemmological Association of Great Britain (Gem-A)
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

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Deputy Editor:
Sarah-Jane Salmon

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



Gems & Jewellery

Winter 2017 featured contributors

1. HELEN SERRAS-HERMAN

Helen Serras-Herman FGA, a 2003 *National Lapidary Hall of Fame* inductee, is an acclaimed gem sculptor with over 34 years of experience in unique gem sculpture and jewellery art. Her award-winning artwork has been exhibited world-wide and published in over 200 trade magazine articles and books.

2. DEBORAH CRAIG

Deborah Craig FGA DGA is board member and head of Africa Group at International Women in Mining, which connects 9,600+ members and 40+ WiM associations worldwide.

3. VIVIEN JOHNSTON

A Glasgow School of Art graduate and fellow of the Royal Society of Arts, Vivien Johnston tirelessly supports the development of best practice standards in the jewellery and gemstone trades. She founded ethical jewellery brand Fifi Bijoux in 2006 and took on the role of Chairman of the Jewellery Ethics Committee from 2007-2015. Vivien has a particular interest in small scale mining and women and children in mining, with a strategic focus on balancing sustainability with economic opportunity and development.

4. MAGGIE CAMPBELL PEDERSEN

Maggie Campbell Pedersen FGA is president of Gem-A, and an associate of the British Institute of Professional Photography. She is an accredited lecturer for the Arts Society (formerly NADFAS) specialising in organics with two published books.

5. CALLY OLDERSHAW

Cally Oldershaw FGA, DGA, BSc (Hons), FGS, CGeol, CSci, is both a geologist and gemmologist. Former Curator of Gemstones at the Natural History Museum (London), Cally is a Gem-A examiner and was their first Lady Chair. Cally is a guest lecturer and has published 15 books, including the *Dorling Kindersley Eyewitness Guide to Gemstones*, the text book for many gemmologists worldwide, which she authored as Cally Hall.

6. SARAH STEELE

Sarah Steele FGA DGA is a geologist and professional lapidary. She is a specialist in Whitby Jet and natural thermoset and thermoplastic materials used in the production of 19th C. jewellery but much of her time is now dedicated to research into the Jet Group of gemstones in order to protect indigenous jet manufacturing communities from the threats posed by unpoliced simulants.

7. DEBORAH MAZZA

Deborah Mazza FGG FGA started her journey through the world of gemstones in Idar-Oberstein in 1984, where after attaining her gemmology and diamond diplomas she started working in the trade, buying and selling wholesale gems and diamonds, working as a gemmologist and teaching gemmology.

8. CHRISTA VAN EERDE

Christa Van Eerde MA MLitt DGA FGA was thrilled to receive her Gemmology Diploma this past November and is now embarking on a career at Cartier. Her passion for gems was instilled from a young age by her father, Albert, whose own passion for geology led to her being named Christa Lynn, which combined makes 'crystalline'.

9. MICHAEL HOARE

Michael joined the jewellery industry in 2000 as CEO of the former National Association of Goldsmiths. A founding board member of the RJC, he worked with NGOs and others for over a decade to influence the practices and policies of miners, refineries, processors, wholesalers, retailers, and banks in their efforts to regulate and monitor the movement and provenance of gold and diamonds within the supply chain.

Straight from the heart

Opinion and comment from CEO, Alan Hart FGA DGA

It has been a little over a month since the Gem-A Conference 2017 and I hope you will agree that it was a fantastic event. Our inspiring line-up of speakers, many of whom had travelled thousands of miles to join us in London, highlighted some interesting facets of our diverse industry; from jewellery design of the 18th century to gem crystal formation and diamond artistry. There was a real buzz in the air on the morning of Saturday, November 4, despite the early start. It was abundantly clear that



Alan talking to guests at the Saturday evening drinks reception. Picture by Henry Mesa.

the Gem-A Conference is both a looked-forward-to opportunity for learning, but also an ideal chance to network, catch-up with old friends and, hopefully, make some new ones. Our event was kicked-off by the inimitable Adonis Pouroulis, chairman of Petra Diamonds. His first-hand experience of the diamond industry was a caffeine-like boost to the morning, providing glimpses into the often misunderstood world of large scale mining. Many fantastic talks later and we arrived at the Gem-A Conference Dinner, which was a welcome opportunity to digest the day's events and discuss this year's Gem-A Photographer of the Year competition winners.

On Sunday, we started the day with Patrick Dreher, who discussed his lifetime of gemstone carving expertise, followed by Dr John Rakovan, who delved into the complex subject of gem crystal formation and crystal growth. And, undeterred by the final slot in our two-day schedule, Vladyslav and Samanta Yavorsky delivered an impressive presentation on the magic of natural stones. It was certainly a vibrant end to an enjoyable two days.

As anyone who has been to the Gem-A Conference in the past will know, the fun and games don't end on Sunday evening. Our annual Graduation took place on Monday 6 November, as did



three hands-on workshops at Gem-A HQ. The next day we hosted our ever-popular field trip to visit the Natural History Museum's mineral collection and a private viewing of the Crown Jewels. Overall it was a busy few days, and I would like to thank all of our speakers, Members, students and, of course, the Gem-A staff, for bringing this anticipated portion of our annual calendar to life.

Of course, there is now another behemoth in front of us... the festive season. I hope you are all looking forward to spending quality time away from work with family and friends. After all, no matter how much we enjoy our chosen fields, there is only so much one can resist festive cheer. Finally, I would like to say Happy New Year to all our Members. I am confident that 2018 will be a fantastic year for Gem-A, especially as we continue to improve and expand. As always, your continued support for Gem-A and your unshakeable interest in our field is very much appreciated.

Best wishes

Alan Hart FGA DGA

Alan Hart



Gem-A Class of 2017 graduates. Photo by Tempest Photography.

Gem-A News

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

LIGHT UP YOUR WORLD

Are you struggling to take quality gemstone photographs? Are you short on space? Gem-A Instruments is pleased to present a new piece of kit that is sure to become an essential for gemmology professionals.

The UV LED Lightbox is a foldaway, lightweight and portable option for your photography needs, enabling easier viewing of internal gem features and fracture-filled diamonds and minerals. Its slimline structure houses three different light sources, including 16 365nm long wave UV LEDs for shooting fluorescent material and 20 white and yellow lights for all-round images and diamond grading. The UV LED Lightbox is equipped with a remote control for ease of use and a USB power cable that can be plugged into any power source, including

laptops and portable battery packs. With its easy-to-set-up magnetic sides, this handy piece of kit offers fantastic results with absolutely no-fuss. ■

This small-but-mighty lightbox is available from Gem-A Instruments for just £52 + VAT

To place an order or find out more, please contact instruments@gem-a.com



GEM-A MIDLANDS BRANCH REVEALS 2018 TALKS

Held at Fellows Auctioneers in Birmingham's Jewellery Quarter, the Gem-A Midlands Branch regularly hosts meetings and talks for gemmologists and jewellers in the area. Kicking off 2018 is the Branch's AGM and a quiz on January 26, followed by a discussion of diamond treatments, led by Gwyn Green on February 23. Later in the year, David Callaghan will explore the jewellery of René Lalique and Andrew Grima on March 23, while James Gosling FGA will share insights on cravat and tie pins on April 27. To find out more, contact louiseludlam@hotmail.com.



FORGED GIA INSCRIPTION FOUND ON SYNTHETIC DIAMOND

In November, gemmologists at the GIA's lab in Carlsbad, California, found a synthetic diamond with a forged GIA inscription, making it appear that the stone was the bearer of a natural diamond grading report. The engraving on the polished diamond's girdle linked to a genuine GIA report number for a mined diamond the institute graded in 2015. However, while the 'real' diamond was a 1.74 carat round brilliant-cut, the submitted diamond was 1.76 carats, with poorer colour and clarity characteristics. The stone was found to be a synthetic, created through the High Pressure High Temperature method.

THE HIGHS AND LOWS OF PINK DIAMONDS

An anonymous buyer paid \$12.8m for a 33.63 carat fancy light pink diamond at Sotheby's Geneva sale in November, setting a new world record for a fancy light pink. Yet despite this success, the high profile 37.3 carat Raj Pink failed to sell at the same sale. A \$20-\$30m pre-sale estimate was set for the diamond, but bidding stalled at 14m Swiss francs (approx. \$14.12m).

CORRECTION

In the article *Seeing Stars* on p.21 of *Gems&Jewellery* Autumn 2017/Volume 26/No.3, Carl A. Schütze was described as the research librarian and historical archivist at GIA, when he is in fact the managing director and designer at Emerald International. Carl Chilstrom is the research librarian and historical archivist at GIA, and we would like to apologise for this error.



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Head to the **News & Blogs** section of gem-a.com

GEM-A IN HONG KONG

Elaine Ruddle FGA DGA, marketing and events manager at Gem-A, shares insights from Hong Kong.

This year, the Hong Kong show celebrated its 35th anniversary. Gem-A haven't been exhibiting for that long but we have become a regular fixture at our booth, 3M044.

The fair sees 56,000 international visitors and around 3,700 exhibitors across two venues, Asia-World Expo and the Hong Kong Convention & Exhibition Centre. It showcases some of the world's finest jewellery and is home to Asia's biggest gem marketplace — it is the ideal opportunity for Gem-A to meet people, talk to new students and connect with our teaching centres and members.



Gemmologists at work. Photo by Bill Scott.

I'd love to report back on the latest trends and developments from the show itself but one of the reasons that I enjoy the September Fair is because the Gem-A booth is always busy. It's a bustling hub for anyone connected to Gem-A, those that want to stop and take a photo with our CEO and this year with our London-themed booth complete with post box for posting membership renewals back to Gem-A HQ!

As we continue to expand in Asia we recognised a need to add two additional events to support our activities at the show. We held our first members gathering with around 60 attendees and we held an ATC breakfast meeting to share the direction of Gem-A and hear the experiences and feedback from our ATCs across Asia: two successful events that we will build upon and grow in 2018.

Thank you to Anne Carrol Marshall our Regional Head in Asia and members Daly Chung and Pamela Ball for help on the booth. ■



Gem-A members and ATCs gathered around the post box in Hong Kong.



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A miner after a hard day's work near Ilakaka, Madagascar

Following a sapphire rush in 1998, the demography of the once rural village of Ilakaka exploded. Today, this small town thrives on the trade of sapphires. Here, Jonathan Muyal FGA explains the story behind this fascinating photograph, which was named the Humanity in Gems category winner in this year's Gem-A Gemstone Photographer of the Year competition.

This picture was taken during a trip to sapphire mining areas surrounding the gem market town of Ilakaka in the south of Madagascar. It shows a Malagasy miner wearing his headlamp – his only source of light inside the pit – and an iron stick, his only mining tool used to dig the ground, which he uses here to hang his clean clothes. His bare chest, arms and legs covered in sand, surrounded by the dead bushes, branches and the sand on the ground illustrate the hot, dusty and arid environment. The miner's appearance, bare-chest with dirt, pants torn apart, simple iron stick tool, also reflects how mining is rudimentary, rough and difficult in this region. There is no working uniform, helmet and no jackhammer. Overall the miner, the landscape and the pale colours represent a very common environment scene near Ilakaka. However, the photo also evokes how the quest to find sapphires is a long and empty journey; the trees will have time to die, the ground to dry and clothes will be worn

several times before finding the precious stones. Looking at the photo, who would think colourful sapphires exist inside this unfertile dry land? The rarity, difficulty and hard work required to find these gems is also depicted.

FINAL THOUGHTS

Despite its hostile appearance, the vastness of the landscapes and infinite plains of southern Madagascar are really impressive and beautiful. Above all, the most precious gems I encountered during my travels were the Malagasy miners and Malagasy people in general. Human warmth is really present and perceptible there. If the Malagasy are to be considered poor and deprived of everything, they are certainly very rich with friendship, affection and hospitality. Ilakaka is like a surreal world directly from a western movie. While I was happy to return home, the incredible contrast between the Ilakaka plains and the urban jungle continues to make me wonder and reflect on our values in life. ■



Image courtesy of Jonathan Muya / FGA.

A MYSTICAL JOURNEY TO SRI LANKA

In October 2017, members of the National Association of Jewellers (NAJ) and Gem-A embarked on the trip of a lifetime to Sri Lanka. Here, Barbara Kolator, Charles Evans, Olga González and Patricia Campion report on their adventures.



1. Interior of Cave Temple at Dambulla.

Gem-A collection curator and ODL tutor, Barbara Kolator FGA DGA, describes the temples and tea factories that caught her eye in Sri Lanka.

We didn't just look at gemstones during this memorable trip; we also had a

chance to experience the culture and religions of the island. We visited a tea factory where we were shown how the leaves were sorted, fermented and dried and were then able to taste test many of the brews on offer. After gemstones, tea was the most frequently bought item!

We visited several temples, including the famous Temple of the Tooth in Kandy, but for me the most spectacular visit was to the Cave Temple at Dambulla, a World Heritage Site (1). The five cave temples are inside a massive rock which rises 160m above the surrounding plain. They date back to the 1st century BCE and are still in use as places of pilgrimage.

To get to the caves, we climbed up a steep stone staircase cut into the rock which was patrolled by the ubiquitous monkeys who try and steal anything in your hands — sunglasses in particular. We entered the magical temple compound and found a huge reclining Buddha within the first temple. I have rarely encountered such a spiritual and mystical place.

As we entered cave after cave we saw the walls and ceilings were covered in paintings. These are made with dry tempera and are mainly from the 14th Century, imbued with vibrant colours that are from natural plant and mineral dyes (2).

As we left the caves, we trekked down the hill in the twilight and encountered a magnificent Golden Buddha statue. The magical feeling of Dambulla stayed with us, even as the sun set. ■



2. Ceiling of temple at Dambulla, painted in dry tempera.

All photos credit John Baldwin.



3. Debbie Smith with Miners at Elahara.

Gem-A infrastructure and operations

Manager, Charles Evans FGA DGA, paints the picture of a destination awash with charming people, magnificent architecture and of course, enchanting gemstones.

If, as an enthusiastic gemmologist you were to write the specification for your perfect field trip, it would probably sound like something close to your perfect holiday: palm trees, long beaches, and delicious food, meals on a terrace

watching sunsets, wonderful hotels and smiling, friendly locals. For the perfect gemmological field trip you would have to add a few things that are a little more difficult to find — a destination that harbours an exciting geological cornucopia, rich in gems. You would get out into the beautiful countryside to stand among the men digging out the gem gravels and scan the resulting concentrate

with eagerness to find something valuable

(3). You would visit the markets where dealers push an astounding volume of stone packets at you and take no umbrage when you shake your head in dismissal.

Your journey to a new destination, another market or mine, would not involve interminable hours on a bus or a lost day flying to another province. It would be just long enough to enjoy the scenery. Another day might see your scruffy self in the most exclusive of retail outlets looking at the very best of the nation's finds (4).

Another stop leads to more hours in awe of the skill involved in every area of the industry, sorting, sawing, preforming, and faceting. Gracious hosts ensure you never feel you have overstayed your welcome; demonstrating casting, soldering, setting and polishing with engaging smiles. What else could one wish for? Some wild monkeys, elephants and a good cup of tea? No problem at all (5).

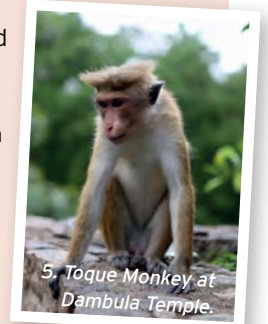
This perfect field trip could only happen in Sri Lanka. ■

Thank you to the NAJ, to Colin and Hilary Winter and to Gem-A for making it happen.



4. Necklace at Tiesh Gems.

All photos credit Charles Evans.



5. Toque Monkey at Dambulla Temple.

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Sigiriya, an ancient rock fortress located in the northern Matale District near the town of Dambulla in the Central Province, Sri Lanka.

experienced parts of it? We deal, work in sales, marketing, design, or tech... we may work in the trade our whole lives and never see what it is like to visit a working mine. Everyone who works in jewellery should visit at least one in his or her lifetime. It is one thing to love and appreciate the gemstones we promote and work with every day. It is quite another to see the faces of the hard labour that goes into it.

There is raw beauty at the source. While in Sri Lanka, we visited both the Elahera mines, and the Mhakumbura mine (6). Our group got the royal treatment with meals at the mine owners' homes, one-on-one buying sit-downs with wholesale prices at Zam Gems and Lakmini, and a half-day Sri Lankan gemmology lesson with industry guru, Gamini Zoysa. On the latter educational retreat, I enjoyed learning about the variety of gems and minerals the country produces. At the Elahera mine it was fun to watch the panning of sapphires and the delight of finding three little yellow sapphire gems emerging from the earthy mix.

We visited Ratnapura, the 'City of Gems', where dozens of dealers flocked to us in the streets with their wares, surrounding on all sides with crystal rough, as well as cut stones. We also visited two factories, learning the ins and outs of the jewellery manufacturing process. ■



6. The Mhakumbura mine.

Olga González FGA DGA, certified gemmologist and founder of Pietra PR, describes her experiences at Sri Lanka's mines.

This Sri Lanka trip was meant to be the perfect combination of business and pleasure. I could enjoy my gems, and buy them too. Aside from expanding my education, there was an opportunity to enjoy the sights and sounds of an exotic country, and relish in the culture and newness of it.

In our industry we often discuss the 'mine to market' process. Yet how many of us have only

All photos credit Olga González.

Gem-A member, Patricia Campion reminisces on the vivid land and culture of this gem of an island.

There were so many wonderful aspects of the Gem-A and NAJ trip to Sri Lanka, but seeing gem mining in practice was fascinating. The group visited mines both in Elahera and Ratnapura, the main gem mining areas of Sri Lanka (7).

While all mining is licenced, unlike the large scale industrial operations found in other areas of the world, artisan mining on a relatively small scale prevails in Sri Lanka, usually carried out in former rice fields.



7. View down the pit at Ratnapura.



8. Sifting through the illam yield at Elahera mine.

Mining we witnessed in Elahera consisted of an open cast pit or crater, several meters deep. Miners dug to the level of the gem bearing gravel or illam, which was then collected and washed in large woven circular pans. Washing took place in water collected in the bottom of the pit which separates the illam from the non-gem bearing gravel. Extracting the gems from the illam is done by hand (8). We were lucky enough to obtain a pan of washed illam and initial inspection revealed a multitude of coloured pebbles, most likely quartz and garnet as well as possible sapphires, chrysoberyl or spinels.

The mines we visited close to Ratnapura consisted of a series of pits a couple of meters in width and several meters deep (9). The pits may be connected at lower levels by a series of tunnels. With pit mining we witnessed the use of water pumps to control flooding.

In both areas basic huts are erected close to the mines in which miners take rest breaks and prepare food. Occasionally mining can become a 24/7 activity, at which time the huts also serve as miners' accommodation. We came away most impressed with a mining system which at first glance appears primitive, but, is a simple, sustainable and environmentally friendly method of gem extraction. ■



9. Washing the illam to reveal gemstones, Ratnapura.

All photos credit Patricia Campion.

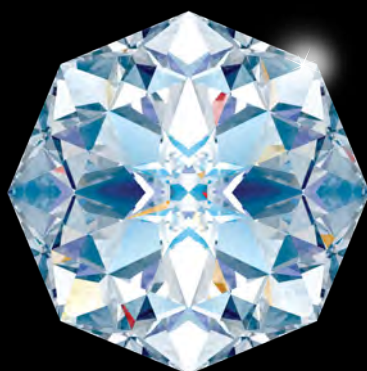


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(c) Michiel (Mike) Botha, Master Diamond Cutter

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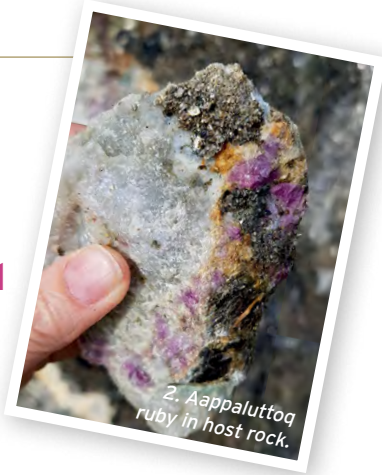
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1. The author and Jens Frederiksen, VP Security & Sales, Greenland Ruby. Helicopters are needed to reach the remote mine site.

With an opulent supply of rubies and pink sapphires, mining company Greenland Ruby is set to become an influential supplier of coloured gemstones. Here, International Women in Mining board member, Deborah Craig FGA DGA, shares her experiences in Greenland.



2. Aappaluttoq ruby in host rock.

Greenland Ruby: The Mighty Aappaluttoq Arises

Greenlanders call the buried treasure of blood red rubies and vivid pink sapphires Aappaluttoq or "Big Red". Mining has now begun, positioning Greenland Ruby to become one of the market's most important suppliers of coloured gemstones. The rubies and sapphires will have an ethical pedigree that is increasingly important to buyers: responsibly-mined, with a transparent chain of custody and fully-disclosed treatments.

The new mine is also important to the people of Greenland, who voted for self-rule in 2008 with increased independence from Denmark. This means taking control of the development of their mineral resources and diversifying the economy from fishing and tourism, while creating self-sustaining tax revenues. Aappaluttoq is one of the first new industrial mines to come on-stream since this change went into effect.

Aappaluttoq is nestled between sea and glacier, 150 km south of the capital Nuuk, and east of the fishing village of Qeqertarsuaat. The hilly, barren land is impassable, accessed only by small boat or helicopter (1). Geologists discovered significant ruby mineralisation in 2005; years of systematic exploration revealed the Fiskenaasset Anorthosite Complex. The metamorphic rocks that host the mineralisation are thought to be 2.9 billion years old, making Aappaluttoq one of the oldest coloured gemstone deposits worldwide.

A positive prefeasibility study was completed in 2011, after sufficient drilling



3. Aappaluttoq ore processing facility.

and resource modelling. The ore is estimated to contain 10% corundum, of which 5% is gem quality, 20% is near-gem quality (i.e. with inclusions), and 75% is commercial grade. The mine's profitability will depend on maintaining these robust grades, as well as efficiently extracting the gemstones from the ore.

Larger stones are found in the deposit, but their recovery is variable and difficult to predict. Therefore, only melee-sized rough material (<4mm) was included in the study and will underpin the steady sale of gemstones to the market. In this way, an industrial mine can provide a reliable supply of stones to jewellery manufacturers, something small alluvial operators cannot do.

Construction began in 2015 at a capital cost of US\$ 25 million. Last fall, LNS Norway, parent company of Greenland Ruby, acquired the mine when previous owner True North Gems struggled to provide sufficient funding. LNS Norway has developed other projects in remote Polar Regions, including Antarctica and Svalbard. The mine is currently expected to operate for 9 years and produce 87 million carats of rough gemstones. Greenland Ruby is mapping and sampling its nearby

Siggartartulik and Kigutilik projects, hoping to expand the mine's resource base.

The mine site will operate year-round and is staffed by Greenlanders flown to the camp for 2-3 week shifts. When possible, mine supplies are sourced locally, including fresh catches from local fishermen and hunters.

Aappaluttoq is a primary, hard rock deposit, containing two ore types: phlogopite hosts the higher chromium ruby, and leucogabbro hosts the pink sapphire (2). The ore is excavated from the open pit, mixed with lake water, and sent via conveyor belt on its circuitous route through the processing plant (3).

A primary crusher reduces the size of the ore to below + 60mm; a cone crusher reduces it further to below +20mm. After being washed, the crushed ore is mixed with a ferro-silicon solution (SG 2.7) in the dense media separation circuit and spun in a DMS cyclone. The heavy corundum sinks, and the lighter, floating waste material is diverted to tailings.

The corundum is separated into three size categories, before passing through a dry magnetic separator and an optical sorter. The optical sorter uses white light, a series of cameras, and a computer to identify red and pink crystals, triggering

The hilly, barren land is impassable, accessed only by small boat or helicopter.

a pulse of pressurised air that separates the coloured material from the feed. The rough ruby and pink sapphire is transported from the processing plant to Nuuk, where any residual host rock is removed with hydrofluoric acid.

Greenland Ruby is currently calibrating its recovery process to reduce the amount of waste rock that makes its way through the system. This includes adjusting the conveyor belt speed so the optical sorter can work more effectively, and tweaking the hydrofluoric acid concentration and soak times.

The cleaned gemstones are sorted in Nuuk (4), against a customised master set of stones. First, the stones are divided into gem and near-gem qualities. Each of



4. Holly Noahsen of Greenland Ruby sorts gemstones at the Nuuk office.

these qualities is then divided into four colour categories, ranging from deep red to intense pink to light lilac pink (5, 6 & 7).

As noted by Christopher P. Smith, Andrew J. Fagan and Bryan Clark Craig in their article 'Ruby and Pink Sapphire from Aappaluttoq, Greenland' (*The Journal of Gemmology*, Volume 35/ No.4, 2016, pp.294-306), the stones have metamorphic-metasomatic type rubies and sapphires from other world deposits, including Montepuez.



5. Aappaluttoq ruby in matrix.



6. Ruby crystal with triangular growth marks.



7. The sorters separate the stones by colour and clarity using a customised master set.

They exhibit moderate to strong dichroism, have no visible colour-zoning, and are relatively high in chromium and iron and low in titanium, vanadium and gallium. Inclusions include clouds of minute rutile particles and some fine rutile needles, as well as arrowhead-shaped platelets.

As Aappaluttoq is a primary deposit, the gemstones have been subjected to intense pressure and are most likely fractured. Removing the stones from their host rock is also difficult. This means that the majority of stones will need to be treated to improve their transparency, a process that also reduces their purple undertone. Treatments will be fully disclosed and the chain of custody will be carefully tracked. At present, Greenland Ruby will sell the treated rough material; the feasibility of bringing lapidary in-house is being examined.

Greenland Ruby has begun a soft launch of their rough rubies and sapphires. The company believes their strength lies in their ability to provide a steady supply of quality gemstones to jewellery manufacturers. Greenland Ruby is also considering strategic partnerships with select jewellery houses, to collaborate on marketing campaigns that will highlight the extraordinary provenance of Greenland rubies.

And the Greenland government and Greenland Ruby have the opportunity to develop an origin certification scheme, like the one that made Canadian diamonds a success story in a market increasingly looking for ethical sourcing alternatives. ■

Deborah Craig FGA DGA would like to thank Greenland Ruby for sponsoring her field visit to Greenland.

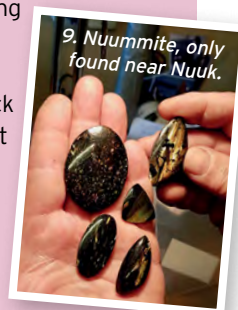


8. Tugtupite in matrix: the gemstone becomes redder in sunlight.

ALL THAT IS RED is not ruby on Greenland (8) — tugtupite, Greenlandic for "reindeer blood", is a silicate closely related to sodalite. Tugtupite is a much sought-after opaque to translucent gemstone that is tenebrescent, becoming redder in sunlight.

Nuummite, meaning "from Nuuk", is a black opaque gemstone that exhibits iridescent flashes of colour due to its lamellar, fibrous structure (9).

Greenlandite (10) combines quartz and



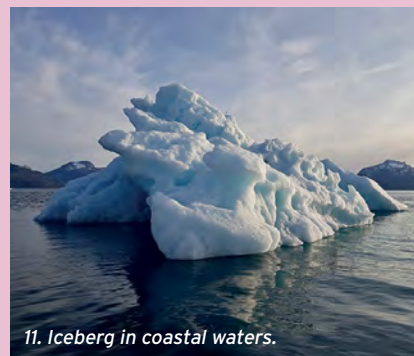
9. Nuummite, only found near Nuuk.



10. Greenlandite with a schlieren vein.

fuchsite to produce an opaque green stone that may be streaked with black schlieren or flecked with pyrite. Small scale miners extracting these stones have been supported by the

Ministry of Mineral Resources with workshops on mining best practices, gemstone pricing and lapidary. The Ministry maintains an ongoing gemstone mapping project, compiling data from historical reports and noting when geologists and small-scale miners make interesting discoveries in the field (11).



11. Iceberg in coastal waters.

GOLD FEVER IN ARIZONA

Goldfield Ghost town lies in the shadow of the legendary Superstition Mountains. It is an abandoned town, revived in 1988, filled with museums, shops, and an underground mine, all in authentic-looking buildings.

With its legends of gold seekers and treasure hunters, Arizona is still drawing the gaze of gemmologists and history enthusiasts to this day. Gem sculptor Helen Serras-Herman FGA takes us on a journey to this 'gold fever' state.

Living in a state where gold in abundance had been discovered in the nineteenth and early twentieth centuries, it was only inevitable that I would, at some point, find myself amidst gold fever.

Some incredible specimens of gold in quartz, found in central and southern Arizona, are part of splendid collections at the Arizona-Sonora Desert Museum as well as the University of Arizona (UA) Mineral Museum in Tucson.

A short time ago I finished carving two beautiful specimens of gold in quartz from an undisclosed location in southern Arizona, a commission work for the 'Arizona Lapidary & Gem Rough' store in Tucson. Today's gold miners are as secretive about locations as were the old timers.

My husband and I recently visited the Superstition Mountains, the centre of many gold legends and treasure hunts.



Two great specimens of gold in quartz from the Black Queen Mine in Goldfield mined several years ago.

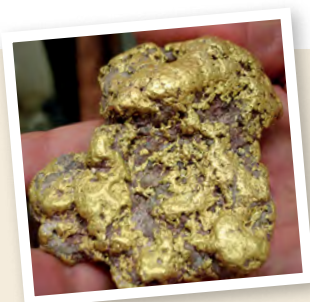
We brought back some great specimens of gold in quartz from the famous Black Queen Mine in Goldfield.

But how did Arizona become a 'gold fever' state? I looked to prominent Arizona historian Jim Turner, a retired

professor, author, and friend, for some historic perspective: "In the 1730s, Spanish prospectors worked deposits twenty miles north of the US-Mexico border in an area later called Oro Blanco (white gold) because silver in the ore gave it a whitish colour." Later, when miners (the '49ers as they are known) started coming back from California's gold rush in 1849, they came through Arizona and found placer gold and gold in quartz deposits. Placer gold, found in stream bed deposits, originates from ancient larger ore deposits, from which small gold flakes detach and roll downstream.

THE SUPERSTITION MOUNTAINS AND THEIR LEGENDS

The Superstition Mountains are located less than an hour's drive east of Phoenix, just past Apache Junction. It is an area of 160,000 acres of dangerous land filled with saguaros, gold legends and Apache curses, conquistador and Mexican miners' stories, Jesuits' hidden gold treasure legends, as well as over 250 mysterious deaths. Gold seekers and treasure hunters have been searching in vain for the mine that bore the legend of the Superstition Mountains, the Lost Dutchman Mine, named after Jacob Waltz, a German prospector known as the 'Dutchman'. It is believed that he had found the richest gold mine in the world, possibly an old Spanish mine, but took the secret to his grave in 1891, leaving behind only some riddle clues.



This stunning gold specimen (catalogue # 1784) from the Huachuca Mountains in Cochise County is part of the splendid mineral collection at the Arizona-Sonora Desert Museum in Tucson.



This beautifully formed gold specimen (catalogue # 423) from the Vulture Mine resides in the Arizona-Sonora Desert Museum's mineral collection in Tucson.



This is one of two beautiful specimens of gold in quartz from an undisclosed location in southern Arizona that I just finished carving.



The Superstition Mountain & Lost Dutchman Museum treasure maps.



Dutchman matchbox SM Museum. Rich gold in quartz ore, supposedly from the Lost Dutchman Mine.

The legend of the Lost Dutchman Mine still reels in treasure hunters, who follow those clues on old paper or stone maps that take them deep into the Superstition Wilderness, an area of 242 square miles that are filled with steep canyons, rocky outcroppings, cacti and thick brush.

Among the many that have lost their lives searching there, are three treasure hunters from Salt Lake City, Utah, lost forever as recent as July of 2010. The dangers from the Apaches, who killed many in the region protecting their sacred lands and igniting the legendary Apache curse, are now long over. However, the danger from the summer temperatures that soar well above 110 degrees, are real, and make it deadly to unprepared hikers.

Mineral prospecting has been banned since 1983 when the area became a national wilderness, yet every year many travellers hope that they will stumble across the fabled gold mine.

LOST DUTCHMAN MUSEUM

For a safe way to learn about gold in Arizona, its mining history and legends, head to the Superstition Mountain & Lost Dutchman Museum. With a variety of exhibits that allow the visitor to see what the Old West was really like, the museum provides a wealth of information about the old gold mines of the area. With stunning displays of treasure maps and over 40 books about the legend of the lost gold, many of them out-of-print, you truly understand the power of the legends and the quest for gold. After looking at that book display, one is very thankful that the museum offers an extensive bookshop!

THE SUPERSTITION MOUNTAIN

The Superstition Mountain & Lost Dutchman Museum is located on Hwy 88, the historic Apache Trail, now designated as Arizona's first historic road. The trail covers 47 miles from Apache Junction to Roosevelt Lake. The drive, at times very rough with steep grades, offers some fantastic views of the backside of the Superstition Mountains, as well as of the three lakes that dam the Salt River: Canyon Lake, Apache Lake and Roosevelt Lake.

Nobody else can describe the Apache Trail better than president Theodore Roosevelt, on his way in 1911 to the Roosevelt Dam dedication ceremony: "The Apache Trail combines the grandeur of the Alps, the glory of the Rockies, the magnificence of the Grand Canyon and then adds an indefinable something that none of the others have, to me, it is most awe-inspiring and most sublimely beautiful".

GOLDFIELD GHOST TOWN AND MINE

Following the Apache Trail north for only a short drive, you will reach Goldfield Ghost Town, which lies in the shadow of the legendary Superstition Mountains. This is a true 1890's boomtown that had 50 working mines in the district after rich high grade ore was found in the area in 1892.

The abandoned town was revived in 1988, and today you can ride a narrow gauge railroad that circles the town for a mile and a half, offering a narrated scenic ride of the historic buildings and the famous Black Queen, Bulldog and Mammoth Mines.

EXPLORING GOLDFIELD HISTORY

At the Goldfield Historic Museum, in the heart of the ghost town, you can learn more about the first very rich gold strike in 1892 and the 4,000 miners that lived there for five rich years. There are 13 treasure maps on display, from the so-called old Spanish maps, to more recent ones. A wonderful little museum with very friendly staff eager to share their knowledge!

Guided tours of the Goldfield Mine take you underground to a reconstructed mine very close to the original, now flooded, mine. It is always worth listening to the well-versed guides on the history of the local mine, discover the gold mining equipment that was moved there from the original nearby mines, and learn more about the mining procedures.

THE VULTURE GOLD MINE

The Dutchman, Jacob Waltz, also prospected in the Vulture Mine, and was employed there as a consultant. The mine is located northwest from Phoenix near the old historic town of Wickenburg, famous today for its Western flair.



Guided tours of the Goldfield Mine take you underground to a reconstructed mine very close to the original, now flooded mine.



Goldfield mine shaft. Goldfield Ghost Town is a true 1890's boomtown that had 50 working mines in the district, after rich high grade ore was found in the area in 1892.



Goldfield as it is today.

There, in 1863 Austrian immigrant Henry Wickenburg, discovered gold. Legend has it that he was trying to retrieve a vulture that he had shot, when he found the quartz outcropping. Although Wickenburg sold the mine after a few years, it became one of the most productive gold mines in the history of Arizona, producing gold worth more than 200 million dollars. The gold is embedded in the quartz ore, and requires hard rock mining. President Franklin Roosevelt closed the mine in 1942, during World War II. The miners left, believing they would return in 6 months, but the mine never re-opened.

The Vulture mine used to be open daily for self-guided tours when we last visited in 2011, but now it is accessible only via a two hour guided walking mine tour on Saturday mornings 8:30-10:30am. It is a great place to visit and walk the trails that take you by the 'Glory Hole', the Blacksmith's Shop and the Main Shaft, the Assay Office, and the 80-Stamp Mill. At the Power Plant, which served as the Machine Shop, time almost stood still. All the equipment is still there, just a bit dusty and rusty, waiting for miners. This is a rarely seen sight, eerie and awe-inspiring. All the tools are left in place, as if the workers are just out for lunch.

PROSPECTING FOR GOLD TODAY IN ARIZONA

According to stats from Gold Maps Online™ their maps show currently 46,199 active gold claims and 364,629 abandoned claims in the state of Arizona on public lands.

A great resource for information about gold in Arizona is the 'Gold Prospecting'

ALL THE EQUIPMENT IS STILL THERE, JUST A BIT DUSTY AND RUSTY, WAITING FOR MINERS. THIS IS A RARELY SEEN SIGHT, EERIE AND AWE-INSPIRING.



Gold in quartz from the Black Queen Mine. This site was one of three major mines, along with the Bulldog and Mammoth Mine that made Goldfield famous in the 1890s.

page of the Arizona Geological Survey's (AZGS) website.

Several associations in Arizona promote recreational gold panning and mining. Members of the Arizona Association of Gold Prospectors (AAGP) Phoenix Chapter usually go prospecting within one to two hours' drive from Phoenix, Mesa or Tucson. The Gold Prospectors Association of America (GPAA) is a national organization. With five chapters in Arizona, there are plenty of locations and options to follow your gold fever.

For a two hour gold panning adventure join Apache Trail Tours, an award-winning tour company based in Goldfield Ghost Town offering guided tours from one to eight hours.

If by now, you are sweltering from gold fever, besides going out prospecting with any of the local gold clubs or purchasing

gold specimens, you can buy your own gold mine in Arizona. My husband is already checking his wallet!!

Next time you visit Arizona, please take a trip to these wonderful historic sites, museums and mines; they will enhance your knowledge about the difficulties of gold hard rock mining, the thrill of placer gold panning, as well as the successes and failures of gold-seeking. You may be inspired to go gold prospecting, or simply enjoy all the legends disseminated for over a century. ■

goldmapsonline.com/arizona-gold-map.html
azgs.az.gov/minerals_gold.shtml
arizonagoldprospectors.org
goldprospectors.org
apachetrailtours.com
goldrushexpeditions.com/state/arizona/ for currently available claims.



Vulture Gold Mine Power House.



Gem-A
INSTRUMENTS

**Don't forget! Gem-A
Members get a
5%
discount**

Just in time for CHRISTMAS!

Gem-A Gemmological Instruments manager, Samantha Lloyd FGA EG, explains why Gübelin and Koivula's Photoatlases should be on your Christmas list.

As Gemmologists, we may have slightly less conventional things on our Christmas lists: fewer socks and more fancy loupes and unparalleled reference books. Many of you for example will have all three *Photoatlases* on your wish list (Why wouldn't you? They are must-have books in our field), but what if Santa isn't feeling so generous... and makes you choose just one? This guide will take the guesswork out of choosing which to have first, meaning you don't have to make a blind decision.

Photoatlas of Inclusions in Gemstones Volume 1 was the first written by Gübelin and Koivula, and inspired a much wider use of photomicrography when it was released in the 1980s. Everything in it is still relevant, but bear in mind, anything discovered or created after 1986 is not included. It has been organised, with a handy contents page at the front, by inclusion type rather than by host material, which is great for learning about the inclusions themselves, how they compare to each other in different stones and also for understanding geology a little more. For the photomicrography beginner, this book is a lifeline and reveals how to set up your microscope and accessories to achieve the best out of each inclusion photograph you take.

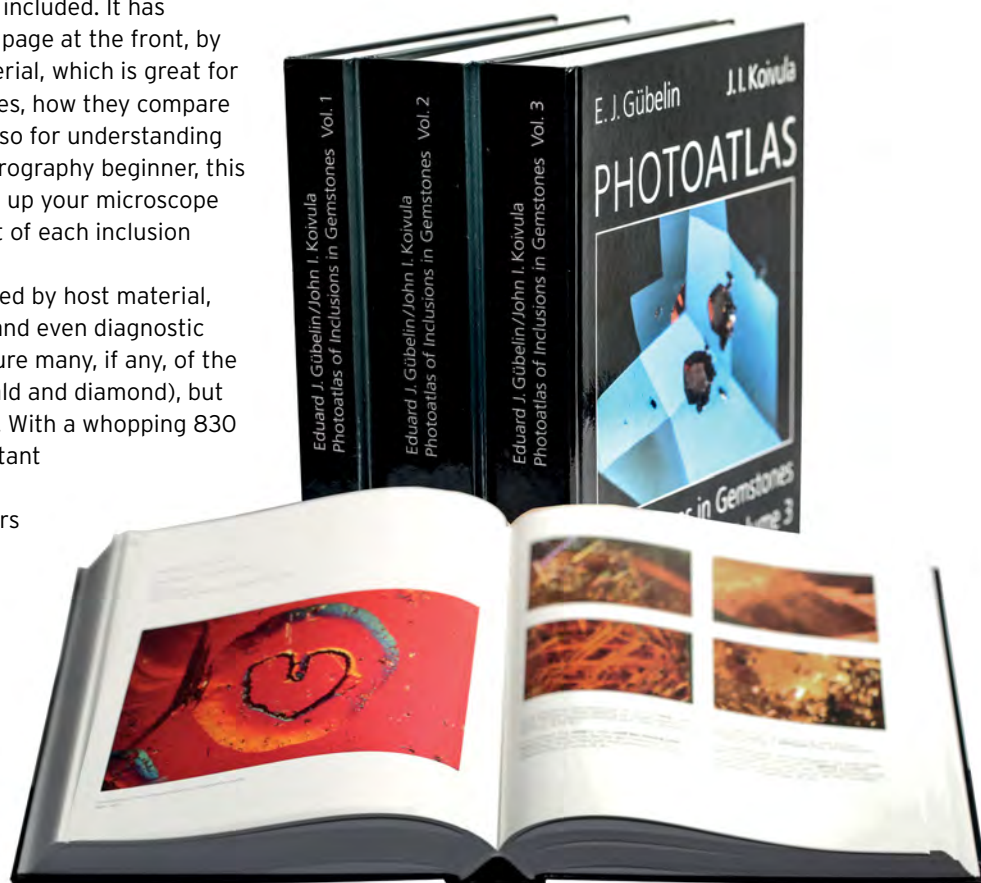
Volume 2 features inclusions organised by host material, so that you can look up characteristic and even diagnostic inclusions by gemstone. It doesn't feature many, if any, of the commercial four (ruby, sapphire, emerald and diamond), but it is almost double the size of *Volume 1*. With a whopping 830 pages full of other commercially important stones, it begins with a heart shaped inclusion in a morganite that the authors have lovingly dedicated to their wives.

Volume 3 is the last of the trilogy, published a short time after Eduard Gübelin sadly passed away in 2005. This smaller, but stunning book contains mostly diamond, ruby, sapphire and emerald inclusions. The pictures are much crisper, the techniques had improved even more (if that's possible) and of course, for most of us, 90% of what we

test on a day-to-day basis is these 'big four'. This volume is commercially practical, containing heaps of information about treatments, synthetics and natural gems, grouped by geographic location.

All three are a must-have; they go hand in hand. If you have to make the tough decision of which to have first, you'll now know which one will be most useful to you first!

Volume 1 is priced at £230, *Volume 2* at £240 and *Volume 3* at £250. ■





Taking place on Guy Fawkes weekend at a venue boasting spectacular views of the House of Parliament, the annual Gem-A Conference wowed the world of gemmology with science, creativity, art, expertise and plenty of unique characters. Here, the Gems&Jewellery team reveal some of the highlights from the packed, four-day affair...

DAY ONE

This year's Gem-A Conference offered the perfect opportunity to learn, network and discover something new. Delegates arrived to the Central London venue on the rain soaked morning of November 4, with the atmosphere remarkably upbeat considering the early start. The first day was skilfully kicked off by Petra Diamonds chairman, Adonis Pouroulis, who shared his insider knowledge of diamond mining. What shone through in his talk is the amount of good the diamond mining industry does for communities across the globe; five million people have access to healthcare thanks to diamond revenues, while 10 million directly or indirectly secure their livelihoods from diamond mining, according to Pouroulis. And despite the myths that permeate among consumers, Pouroulis highlighted just how rare diamonds are compared to other commodities. In 2016, for example, 27 tonnes of diamonds were mined compared to 2,952 tonnes of gold.

After a quick coffee break, John Benjamin FGA DGA lit up the stage with his signature blend of humour, knowledge and showmanship. His whistle-stop guided tour through Georgian jewellery covered highway robberies, the popularity of paste, mourning jewels, cut steel, fire gilding and everything in between. His fabulous presentation of pictures also kept the audience guessing. Next up, Klemens Link of Gübelin Gem Lab discussed issues of origin and age

"What a great start to the Conference! Adonis Pouroulis was certainly a great speaker to start the event. He came across as an incredibly personable individual who is truly passionate about the ethical provenance and development of diamonds that he advocates."

Rosemary Ross, Gem-A examiner.

determination in gemstones, followed by a fascinating reveal of Gübelin's 'Emerald Paternity Test' technique. This technique capitalises on the natural fissures in emeralds to insert nano-particles of silicon-encased DNA into gems, allowing for the emerald to be 'marked' with its



Guests tackle the 2017 gemstone challenge



Gem-A president, Maggie Campbell Pedersen closing the 2017 Conference

"I FOUND THE CONFERENCE AND THE GRADUATION MOST ENJOYABLE — WHAT A GREAT MIX OF SPEAKERS AND AN EXCELLENT VENUE" *Maggie Campbell Pedersen, president, Gem-A.*

the Dreher family have produced between 600 and 1,000 carvings so, to avoid issues of forgery, their initials are carved into each creation in a way that is near impossible to polish away.

Next, Dr John Rakovan, professor of Mineralogy at Miami University, took to the podium to deliver an introduction to the multifaceted world of morphologic crystallography and growth rate. Say

the word 'crystallography' to a room full of students – or even a room full of expert gemmologists – and the nervous shudders will be hard to miss. Dr Rakovan's talk not only explored the complexities of homogenous and heterogeneous growth mediums in a fashion that could be understood by all, but radiated a passion for crystals that captured the imagination of all

mine-to-market origin. To uncover its story, the DNA within each emerald must be extracted and decoded. Now, Gübelin has created the brand name Provenance Proof to market its technology.

Saturday afternoon began with a talk by gem dealer, Evan Caplan, who shared his obsession with alexandrite. His talk covered issues of colour grading, lab reports, pricing and supply, as well as some of his own personal stories from decades working with gemstones. Artist, award-winning designer and jewellery insider, Reena Ahluwalia, concluded the day by sharing her journey from India to Canada and outlining her design inspirations. Attendees were particularly taken with her highly-detailed technical drawings and diamond paintings that can take more than 300 hours to complete.

DAY TWO

It is always a challenge to keep an audience engaged, especially when it happens to be early on a Sunday morning! Fortunately, master gem carver Patrick Dreher kept the room wide awake with his stunning array of photography, making everyone covet his new book, *Gemstone Animals from Idar-Oberstein*. From researching the movement and shape of the subject, sourcing the right gemstone, pre-forming the finer details and carving realistic eyes from bi-colour agate, Dreher revealed how a single carving can take roughly 350 hours or three months to complete. Dreher entertained the room with his extraordinary creations, noting that his favourite stones to work with are citrine and smokey quartz due to the clarity and colour. Three generations of

Gemstone Identification Competition Winner

Gem-A collection curator, Barbara Kolator FGA DGA, designed a gemmology competition that challenged Conference attendees to identify materials using only observation and their own knowledge. Here are some of the gemstones and organic materials that participants were asked to identify with the correct answers:

Gem-A graduate, Bin Wu, from Montreal, was announced as the competition winner and was presented with the book, *Jewel* by Dorling Kindersley by Gem-A CEO, Alan Hart, on stage. Commenting upon the success of the Gem-A Gemstone Identification competition, Barbara Kolator FGA DGA, commented: "I was very impressed by the entries from the students although it was a bit of a shame that so many resorted to Googling the stones! Most of the stones were from the decorative stones box with a few tricky ones added in - like benitoite in matrix and chrysocolla. I don't think anyone got the nickel containing magnesite either. What did surprise me was how many people struggled to tell differentiate between topaz and aquamarine and tourmaline and kyanite."



Benitoite



Charoite



Chrysocolla



Rhodochrosite



Gem-A CEO Alan Hart with Reena Ahluwalia and Alan Bronstein

those in the room. In a complete change of pace, Bernhard Berger, president of Cartier Tradition, explored the creative evolution of gemstones and the jewellery pieces that have made Cartier such an iconic force in the global market. His talk covered state of the art restorations, the importance of brand authenticity and the archives that have become so intrinsic to Cartier's business.

The penultimate Sunday session was led by senior research scientist at GIA, Dr Ulrika D'Haenens-Johansson, who discussed the evolution of man-made diamonds, including CVD and HPHT synthetics. Ulrika engaged the audience with her analysis of how laboratory-grown gem diamonds have shifted from being a niche material with a marginal presence in the jewellery industry to a gem material that is manufactured on a global scale, readily-available to the trade. Her talk also considered screening methods and identification techniques, ensuring the trade can differentiate synthetics from their mined diamond counterparts.

The Conference concluded with authors and explorers Vladyslav and Samanta Yavorskyy, who created quite a stir with an interactive presentation of their gemstone travels and discoveries with colourful photography, vivid fancy gemstones and mining videos. Determined to finish the Conference weekend with a memorable bang, Vladyslav showcased his devotion to photography by taking photos of the audience and Samanta whilst on stage.

GRADUATES IN THE SPOTLIGHT

This year's Graduation Ceremony took place at Central Hall Westminster, offering a wonderful opportunity to celebrate the outstanding achievements of Gem-A students. The Grade II listed building, located opposite the iconic Westminster Abbey, added an air of

FANTASTIC TRIPS AND TOP TIPS

As in previous years, Gem-A hosted a series of interactive workshops and field trips on

November 6-7, giving Conference attendees a taste of Gem-A HQ and London itself...

On the morning of Monday, November 6, GemWorld International president Richard Drucker FGA (Hons) GG, led a morning session on coloured stone grading and pricing, followed by jewellery designer Sarah Steele FGA DGA, who presented a workshop on quick visual identification of black gemstones.

Founder and principal of the Asian Gemmological Institute and Laboratory (AGIL), Dominic Mok FGA DGA, hosted both morning and afternoon workshops examining contemporary and advanced jadeite testing techniques. Attendees were delighted to have hands-on grading practice with Dominic's very own creation – the Jade View Wheel – as well as an introduction to the new UV-Visible Spectrometer.

Contemporary jadeite testing and grading workshop by Dominic Mok.



grandeur to the event, which was presided over by Gem-A CEO Alan Hart, Gemworld International president Richard Drucker, and Gem-A president Maggie Campbell Pedersen. This year, 619 students from around the world passed the Gemmology Diploma and Diamond Diploma examination — a

Gem-A's popular field trips were once again sold-out on Tuesday, November 7. Attendees joined Natural History Museum earth science curator, Mike Rumsey, for a behind-the-scenes look at the museum's mineral collection and new acquisitions. A second trip gave delegates from across the world the opportunity to view the Crown Jewels in the Jewel House at the Tower of London, including the Koh-i-Noor diamond and the Cullinan I (the Star of Africa).

The occasion was given an extra dose of Britishness with tea, coffee and pastries hosted by Lyon & Turnbull at The Club at Ten Trinity Square in the heart of the City of London.

testament to the hard work of all our students and the dedication of Gem-A tutors.

Special awards and prizes were presented to a range of students from all areas of the globe, including Gaëlle Daru from Institut de Gemmologie de Madagascar who secured the Anderson



A Gem-A 2017 Graduate with must-have Graduation accessories: Diploma scroll and Barnett Bear

Medal, alongside Zoe Lewis from the United Kingdom. This is the first time the accolade has been presented to two individuals in one year, highlighting just how exceptional their Foundation examination papers were. It is safe to say that Basil W. Anderson FGA, former director of the Gem Testing Laboratory in London, after whom the award is named, would be proud.

Jiaqi Yu, a student from China University of Geosciences, was presented with the Christie's Prize for Gemmology (best overall candidate of the year in Gemmology Diploma examination) and the Read Practical Prize for, you've guessed it, the best practical papers in the Gemmology Diploma exam. The latter prize was also awarded to Dr Shuk Kwan Mak, a student from Hong Kong Institute of Gemmology. Finally, Ungkhana Atikarnsakul, an online student from Thailand, was praised with the Anderson Bank Prize for the best theory papers in the Gemmology Diploma exam.

Moving on to the Diamond Diploma and Anne Galmiche, an evening student at Gem-A's London HQ, was granted the Deeks Diamond Prize in recognition of her exceptional theory exam. Minutes later, London-based student, Lucy Bedeman, was named the winner of the Mok Diamond Practical Prize. The final accolade of the evening, the Bruton Medal, was awarded to UK-based online student, Marianne Pughe. This coveted award celebrates the best overall candidate of the year in the Diamond Diploma examinations and was established in 1996 to honour Eric Bruton FGA and his work in the field of diamonds. ■

LIFETIME ACHIEVEMENT

At this year's Gem-A Conference, Andrew Cody, founder of leading Australian opal company, Cody Opal, was named an Honorary FGA for his exceptional services to gemmology and the broader industry.

During his professional career, Cody has played a key role in transforming the reputation of opal as Australia's national gemstone. This included the production of an award-winning opal stamp series with Australia Post, the design of the official National Gemstone emblem and development of the official 'Opal Nomenclature'.

Cody is the joint founder and director of The National Opal Collection (NOC) with showrooms and museums in both Sydney and Melbourne. His opalised fossil collection is particularly impressive, and includes a 2.5 metre opalised pilosaur, and the opalised upper jaw of a rare Mesozoic mammal. This passion for collecting is accompanied by a strong business sense, leading to both of Cody's businesses being awarded Government Export and Tourism Industry accolades. Additionally, he has a Gold Commendation from the Lord Mayor of Melbourne, is an honorary fellow of the Gemmological Association of Australia and is a research associate of The Australian Museum.

His commitment to the industry has seen Cody take on a number of

official positions, including president of the Australian Gem Industry, founding member and chairman of the Australian Jewellery and Gemstone Industry Council, and president of the International Colored Gemstone Association. Most recently, Cody has been working with a number of organisations on a review of opal classification. His goal is to create a universal system throughout the world gemstone community. In order to achieve this goal, he has put together 50 master reference sets for use in education and laboratories.

On receiving the Honorary FGA, Cody said: "When I was told of the nomination, I was overwhelmed and in fact I still am. I never considered myself deserving of this honour, and feel there would be many more that are better qualified! But it is with gratitude that I accept this important award from the world's oldest gemmological institution."



Photo credits for Gem-A Graduation Tempest Photography.



The class of 2017 Gem-A graduates

ACTION ON ETHICS

As issues of ethics, sustainability and environment gain momentum in the eyes of consumers, Vivien Johnston, responsible business strategist and jewellery supply-chain expert, discovers what is shaping the conversation in today's gemstone market.

Mine water pond of a cassiterite and topaz mining area in the dry season, Rondonia/Brazil.

There are a number of initiatives emerging to improve supply chain responsibility and practice within the coloured gemstone industry. Often, these are initiated by standard-setters, or in response to external pressure on the trade from government, campaigners or consumers.

One group that has proactively mobilised to address this important reputation issue for the industry is the Coloured Gemstone Working Group (CGWG). Founded in April 2015, the CGWG was formed out of an interest in leading luxury jewellery brands and gemstone miners to better understand the risks and opportunities for positive impact in their coloured gemstone supply chains.

The working group brings together leading luxury brands and large scale mining companies, and includes Kering, LVMH, Cartier, Swarovski, Bulgari, Tiffany & Co., Gemfields and Muzo. The members of the group have dedicated the time and resources of senior and specialist staff to contribute to building a more responsible and transparent coloured gemstone supply chain.

The Dragonfly Initiative, a sustainability advisory firm of which I am an executive partner and project manager, was asked to manage the working group and develop and execute the technical work plan. Here are some of the areas that have been in the spotlight so far:

INSTRUMENTS FOR BETTER PRACTICES

Collectively, the members of the CGWG immediately recognised the need for practical guidance and management tools on best practices in the industry to facilitate the continuous improvement of businesses of all sizes and at all tiers in the gemstone supply chain.

Claire Piroddi, sustainability manager for watches and jewellery at global luxury group, Kering, comments: "Transparency across the supply chain is critical to transform our business models. At Kering, one of our sustainability targets is about ensuring a transparent and responsible supply chain, and to achieve this, we aim to trace our raw materials

all the way to their origins. This is exactly what we are doing for coloured gemstones; and we do it in collaboration with all the players on the market because we know that collaboration is key if we want transformational change."

With this objective in mind, they developed, and continue to improve, instruments designed for better practices in the coloured gemstone supply chain. Included is a framework of guidance for environmental, health and



Cassiterite mine run recovered from Garimper mining operations, Rondonia/Brazil.



Artisanal miners process sapphire bearing tailings in the nearby river bed, Ilakaka/Madagascar.

safety, business integrity and social best practices for the coloured gemstone supply chain from producer to retail, including artisanal and small enterprises in the mining and cutting and polishing industries. In order to avoid duplication and to collaborate with and contribute to industry efforts, the framework draws on and aligns with the RJC Code of Practices. Other aspects include a practical due diligence assessment tool for the industry that is applicable to different tiers in the supply chain and for different business activities, plus a series of coloured gemstone risk profiles that describe the social, environmental and governance aspects of the supply chain for a number of popular gemstones.

COLLABORATION

Members of CGWG have been clear from the outset that the group is not a standard-setting organisation, nor does it intend to displace existing standards. Instead, it hopes to galvanize action in the supply chain and standard setting organisations by implementing the tools they have built in their own supply chains and actively working with others to harmonize approaches.

"At Tiffany & Co., we have long focused on ensuring that we operate and source in an ethical fashion. We also recognize that collaboration is key to realising true, systemic change," explains Tiffany & Co. chief sustainability officer, Anisa Kamadoli Costa. "Participation in the Colored Gemstone Working Group allows

THE WORKING GROUP BRINGS TOGETHER LEADING LUXURY BRANDS AND LARGE SCALE MINING COMPANIES

us to partner with other luxury brands to identify opportunities to increase due diligence, widen stakeholder engagement and advance the industry towards a more transparent and responsible coloured gemstone supply chain."

The CGWG monitors changes to and reviews other initiatives that are working on standards in the mining and mineral supply chains, not only to make sure its activities are informed by current thinking, but also to incorporate that thinking into its tools where possible. In particular, the CGWG has sought to align its due diligence approach as much as possible with the Organisation for Economic Co-operation and Development (OECD) guidance, while also considering the insights of Fairtrade and Fairmined,



Artisanal mining activities near Ilakaka/Madagascar.

What is the Minamata Convention on Mercury?

This global treaty was adopted by 150 states in 2013 to protect human health and the environment from the adverse effects of mercury. As the Artisanal Gold Council explains, ore is mixed with mercury to capture the gold in a mixture known as amalgam. The amalgam is then heated to evaporate the mercury, leaving residual gold and other metals. Mercury vapour is proven to cause damage to the nervous system and kidneys, and result in insomnia, tremors, depression and gum disease. Once released into the atmosphere, mercury can travel far and wide, polluting fish species and entering the

food chain. The Convention entered into force on August 16 2017, and was swiftly followed by the first Meeting of the Conference of the Parties to the Minamata Convention on Mercury (COP1) in Switzerland from September 24-29, 2017. Now, the Convention is being implemented at a national level across the world, with support in place to help countries use state-of-the-art technology that reduces the need for mercury. The Convention also includes a ban on new mercury mines.

Did you know? Artisanal and small-scale mining is the source of the largest releases of mercury, estimated at 1,400 tonnes per year in 2011.

In September, the De Beers Group announced a three-year partnership with UN Women, pledging \$3 million to support women and girls in its diamond producing regions; Botswana, Canada, Namibia and South Africa. De Beers also committed to achieving parity in the appointment of men and women into senior leadership roles, while CEO, Bruce Cleaver, was named a UN Women HeForShe 'Thematic Champion' — one of just eight in the world.



Active mining area on a river terrace nearby Ilakaka/Madagascar.



Topaz and quartz bearing gravel.

the Electronic Industry Citizenship Coalition (EICC), the Responsible Raw Materials Initiative (RRMI), the Better Gold Initiative — Swiss Better Gold Association (SBGA) and others.

FIELD TESTING AND IMPLEMENTATION

Through the supply chains of members and a small reference group of businesses at different points in the supply chain, the CGWG has begun the testing and implementation of its Due Diligence Tools. Speaking on behalf of the group, Michael Schlamadinger,

The second Jewelry Industry Summit was held in 2017, drawing a range of experts from all areas of the gemstone and jewellery industries to discuss key ethical, sustainable and environmental issues. As an incubator and facilitator of CSR and sustainability projects, the Jewelry Industry Summit supports a number of initiatives, including efforts to fight silicosis and other industrial illnesses among gemstone cutters led by Eric Braunwart of Columbia Gem House. In recent months, the Jewellery Development Index — proposed by Summit participants in January 2017 — caught the attention of the US State Department. This forward-thinking Index proposes a relative positive or negative score indicating the degree to which the jewellery and gemstone industries impact on the economic and social well-being of societies in a given country or region. Now, the US State Department is spearheading the project and is planning a full concept paper following in-depth industry consultation.

A recent report by the CIBJO Pearl Commission suggests that unscrupulous pearl traders online and on social media are deceiving consumers through incorrect terminology. Kenneth Scaratt, president of CIBJO (The World Jewellery Confederation) Gemmological Commission, explains that 'cultured' is being omitted from descriptions of cultured pearls online, and coloured freshwater cultured pearls are being described as 'natural pearls' in sales pitches. When challenged, sellers argue 'natural' is referring to the naturally-occurring colour of these cultured pearls, rather than their growth origins. These sort of deceptive marketing practices were debated at the CIBJO Congress 2017 hosted in November in Bangkok, Thailand.

We are very happy about the progress that was reached by the CGWG and see this as a solid foundation towards establishing a transparent and responsible supply chain of coloured gemstones.



Pink Sapphire crystal from a mechanised mining operation, containing a large inclusion, Ilakaka/Madagascar.

IN CONVERSATION WITH...

Dr. Laurent Cartier



Laurent examining a pearl harvest on Ahe in French Polynesia. Photo: Andy Bardon.

Laurent Cartier holds a Master's degree in Earth Sciences and a PhD from Basel University and completed his Gem-A Gemmology Diploma in 2008. He has been working for SSEF (Swiss Gemmological Institute) since 2010. Cartier is also a lecturer in Gemmology at the University of Lausanne (UNIL). He has widely travelled to gemstone mines and pearl farms worldwide, having spent prolonged periods of time in Sierra Leone, Madagascar and the Pacific.

You have achieved a great deal in the last 10 years – what are your career highlights?

Leading a *National Geographic*/Waitt Foundation-funded research project to French Polynesia to evaluate the impact of pearl farms on the fish and reef ecosystems. It was incredible to dive with local fishermen and pearl farmers exploring those magnificent waters full of colourful fish. Seeing that beauty and its fragility really motivated me to pursue work on sustainable pearls; bringing together pearl producers, retailers, scientists, NGOs and other stakeholders in Hong Kong in 2014 to organise the Sustainable Pearls Forum, which showed how much is possible in our industry.

Overall, every visit to pearl farms and gemstone mining regions around the world to get a better understanding of how gems are formed, mined and traded has been a highlight in itself.

Why is sustainability important to you?

As clichéd as it sounds, because it's the right thing to do. There is a heritage and an astounding beauty in gemstones that deserves to be around for many generations to come; some of the pearl farms and mining regions I have had the privilege of visiting these past few years should still be around in a few decades.

Do you separate sustainability from ethics and if so why?

Both words are rather overused and there are diverse interpretations to what they mean in the trade. I would rather people focused on the issues and finding solutions. Some people argue that sustainability is totally misplaced in the gemstone mining/trading context. I would disagree. Gemstones have been 'recycled' for centuries if not millennia. There is a need to address how gemstone extraction can fund long-term sustainable development. That road is filled with challenges, but also full of opportunities.

What do you see as the three issues affecting the coloured gemstone or organics industry currently?

For pearls, I would say global environmental change (including rising sea levels, rising sea temperatures and pollution), and the economic difficulties that pearl farmers are facing. With gemstones certainly treatments (that are rarely highlighted in recent sustainability/ethics discussions), and the whole question of how to address sustainability issues in such a complex and fragmented industry that is experiencing rapid changes.

You are working with Delaware University on a gem knowledge hub – how did this idea come about?

The Sustainable Pearls project that Prof. Saleem Ali and I had initiated in 2011 had shown that people both in the trade and consumers were hungry for information about (sustainability) issues in the sector, and possible solutions. Pearls were a great place to start, as there are a lot of business-conservation synergies in marine pearl farming.

Having learned valuable experiences from this, we felt that a 'Gemstones and Sustainable Development Knowledge Hub' that brings together existing knowledge, research and sustainability initiatives around these themes could be a great way to move things forward in the gemstone industry. We also wanted to target some parts of the supply chain (such as the cutting and polishing sector) which we felt were important but often forgotten in bringing some of the discussions to the next level.

The project is based at the University of Delaware and involves a range of different partners including University of Lausanne and University of Queensland, along with gemmological research labs (such as SSEF and GIA), museums, industry associations, gemstone miners, cutters, dealers and retailers.

GEMSTONES HAVE BEEN 'RECYCLED' FOR CENTURIES IF NOT MILLENNIA.

What other action can those interested in sustainability take to improve the gem business?

Accepting that there is no one size fits all solution. There is such a diverse range of gems in our industries, coming out of so many different countries, different geological and ecological environments and different cultural environments. Some gemstones are treated, others are not. Some mines are only active for very short periods of times because they come from small deposits but produce very high quality stones (e.g. Winza in Tanzania). Disclosure, as with treatments, is an important topic. Engaging with stakeholders across the supply chain. Supporting projects that are trying to both understand some of the issues involved and developing solutions to improve the footprint of the industry, such as for example 'Conservation Gemstones'. Finally, education seems vital, for miners, traders, retailers and consumers. ■

www.sustainablegemstones.org

IN CONVERSATION WITH...

Kathy Chapell



Kathy Chapelle.

Kathy Chapell has worked in the gemstone business for over 20 years. She emigrated to Canada as a child in 1965, settling in the gold mining town of Red Lake, northwest Ontario and later in the diamond province of Guyana and then South Africa, returning to the UK in 1974.

Through the family gemstone business she has successfully marketed the Nyala Ruby from the Chimwadzulu mine in Malawi. She buys stones from source and has a working partnership with Columbia Gem House - a leading proponent of ethical sourcing and distribution.

She is a member of Women in Mining, and was named special advisor on ethical issues to the London Diamond Bourses' Council of Management.

Your role at the London Diamond Bourse has been newly created, what prompted this move?

The decision to appoint an ethics advisor arose from the increasing demand for ethically produced gemstones among purchasers. My position is designed to bridge the gap between the ethical community and our members and assist them in any particular areas of concern. Ethics increasingly applies to all goods, particularly those produced in low-income developing countries. Gemstones are emotive because the majority are sourced from developing countries and diamonds, by value, are the largest proportion of the total. I am in a position to teach our members about the route

of diamonds from the mine to the market place. We are also building a database which will be available to members dealing, for instance, in goods from specific countries where there are ethical concerns.

What are the top three threats you see to the reputation of the diamond industry currently?

Synthetics: There has been a practice of mixing synthetics with natural —particularly in small, calibrated sizes, without declaration. Almost any gemstone can be produced by laboratory methods. Diamonds lead because they parallel natural stones in almost all respects. If declared and marketed as such, they will hold a place in the chain, but will always be cheaper.

Artificial enhancement: Diamonds can be fracture-filled, surface-coated or coloured to enhance their appearance for sale. If undisclosed, this is criminal. Dealer trust and certification are two obvious routes to handling the problem.

The industry is slow to change: I feel that the majority of diamond retailers are slow to recognise the growing desire from consumers to know the origin of their diamonds. They are slow to adjust to the growing requirement to show that their diamonds are mined, cut and polished in an ethically-friendly environment. Knowledge of and desire for ethically produced stones is growing among end consumers, especially millennials. A child in school is now taught the benefits of fair trade on the environment and the world as whole. This is an issue that will grow with the younger generation; it will only intensify and will not disappear.

What advice can you give to anyone who is concerned about a supplier or who would like to check their supply chain for risks?

I would advise purchasers to ask as many questions as possible, to ask for verbal and written assurances and where possible for a full disclosure of the supply chain from the mine to the cutting factory to the seller. ■

Dutch artist and technologist Daan Roosegaarde installed a seven metre tall Smog Free Tower – a giant air purifier – outside his Rotterdam Studio in 2015. The project caught the attention of the Chinese government, who decided to erect one in Beijing's 798 Arts Zone in September 2016. The by-product of this purifying process is carbon dust, which Roosegaarde is now transforming into diamonds via the HPHT process. Each 'Smog Free Diamond' is cut into a cube and can be worn as a ring or cufflinks.

head of procurement at D. Swarovski & Co, says: "The Due Diligence Tools have been designed to take into account differences between various sites and facilities in terms size, organisational level and availability of resources based on a progressive approach that we think was needed for the coloured gemstone industry. Swarovski, along with other members, has started testing the tools in our supply chain. We are very happy about the progress that was reached by the CGWG and see this as a solid foundation towards establishing a transparent and responsible supply chain of coloured gemstones."

Now, the Working Group is completing field visits in priority gemstone countries, including Colombia, Brazil, Madagascar, India, Tanzania and Sri Lanka. Testing the approach and tools of the CGWG will be achieved by visiting mines – large and small – cutting and polishing facilities, and holding consultations with industry and government representatives. ■



Selected topaz crystals from a mechanised small scale mining operation, Rondonia/Brazil.

All images courtesy of Swarovski Gemstones unless otherwise stated.

GIVING BACK

Gems&Jewellery contributor Christa Van Eerde MA MLitt Cert. GA DGA reports on a group of inspiring gem-lovers who turned a trip to Madagascar into a long-term educational mission.



Clockwise from L-R: Nancy with students at the Arusha School, Tanzania; Scholarship awardee Jessica, from Tanzania, has been employed as a gem-cutter since graduating; Nancy with Peter Salla; Rough stones from Tanzania.



Nancy and Joe on their 2008 trip to Madagascar.

The Devon Foundation began in 2008, when Nancy Schuring, Joe Portal and Debbie Swinney took a life-changing trip to Madagascar – a former French colony set in the Indian Ocean far off Africa's southeast coast – with Jim Fiebig. The aim was to have an educational and gem-hunting experience, and that was achieved, but was so much more. Touched by the people they met, people who form an integral part of each individual business' success and the jewellery industry, Nancy, Debbie and Joe created The Devon Foundation to help those in the gem trade in East Africa by providing them with lapidary skills and educating them about the stones they discover.

The trip included a stop at IGM, the Institute of Gemology of Madagascar, located in Madagascar's capital city of Tana. IGM was founded in 2003 and is

an accredited Gem-A teaching centre. Since then, more than 1,800 students from 31 countries have graduated from the institution. Nancy recognised that many of the students were not from the region, due to the tuition being unaffordable to locals. That realisation is where the idea to provide scholarships to fund gemmology and lapidary education for people in gemstone mining areas stemmed from.

After the success of the first Devon Foundation scholarships, awarded to eight students, four men and four women, the Foundation hit a roadblock. The political situation in Madagascar in 2011 made it increasingly challenging to operate, yet The Devon Foundation was not deterred. Upon advice from Roger Dery, the Foundation turned its attention to the Arusha Gemmological and Jewellery Vocational Training Centre in Tanzania; a small, independent, vocational school that was in dire need of equipment. Thanks to The Devon Foundation, it received much-needed gemmological instruments, including two facetron machines, refractometers, dichroscopes, and polariscopes, as well as the opportunity to award scholarships and expand by constructing another school room.

In 2013, Nancy travelled to Arusha and



met Peter Salla, an inspirational figure in the gem trade who founded the Arusha Training Centre in 2000. Nancy brought with her donated gemstones from her New Jersey-based retail business Devon Fine Jewelry, for students to work with and test as part of their training. Nancy also met Jessica and Sabrina, both scholarship recipients, which proved an emotional meeting for all involved. Sabrina had been cast out of her village for refusing to marry at the age of 15, and when Salla met her begging in the streets for money to attend school, he offered her a Devon Foundation scholarship. She began the very next day, graduated with distinction, and is currently employed in the gem trade. Since opening, the school has seen over 800 students graduate, one third of whom are women.

The next focus for The Devon Foundation is the launch of the first gemmological and gemstone faceting school in southern Kenya. There is no better time to support The Devon Foundation and play a part in providing locals with the power of knowledge to properly identify, cut, export and value stones accurately. ■

Visit devonfoundation.com to find out more.



All images courtesy of the Devon Foundation.

TALKING TREES

The recent rush to discover sapphires in Madagascar has wreaked havoc on the natural environment. Communications consultant, Michael Hoare, shares how the International Tree Foundation (ITF) is working to restore and revive this biologically diverse corner of the globe.

Earlier this year, Madagascar experienced what has been called possibly the country's largest gemstone rush in its history. Sapphires were discovered in a protected rainforest area, and gem traders, as well as tens of thousands of local people, flocked to the forest to try their hand at artisanal mining, hoping to get lucky.

In the process, large areas of rainforest were stripped of trees, becoming huge open-air mines and supporting temporary housing. The rainforest is home to 14 types of endangered lemurs and over 2,000 endemic plant species found nowhere else on Earth. This rich biodiversity is now at risk.

In the jewellery context, precious metals, diamonds, and gemstones are viewed as the main 'offenders' and their extraction and processing has been blamed for conflict, oppression, human rights abuses, exploitation, and displacement of indigenous peoples. Not to mention environmental degradation.



ITF partners with Ny Tanintsika (meaning 'Our Land') - a Malagasy NGO that contributes to poverty reduction and improving natural resource management. Photo credit Ny Tanintsika/ ITF



A community tree planting project underway in Rwanda. Photo credit ITF

Numerous campaigns have sought to raise the collective consciousness about the human and environmental costs involved in extracting raw materials. Since the turn of the century, retailers – as the interface between consumers and the supply chain – have been encouraged to apply pressure on their suppliers to bring about change.

During my 12 year tenure as former CEO of the National Association of Goldsmiths, I witnessed a lot of good work done on cleaning up the supply chain. Members of the Responsible Jewellery Council (RJC), for instance, now commit to – and are independently audited against – international standards on responsible business practices for diamonds, gold and platinum group metals. These standards address human rights, labour rights, environmental impact, mining practices, and product disclosure in the jewellery supply chain.

Since leaving the NAG I have involved myself with the work of International Tree Foundation (ITF), as a way of putting something back into the continent that has given so much to the jewellery industry. ITF's work brings multiple benefits to rural, forest-adjacent communities in Africa, including improved ecosystem functioning, living standards and well-being.

Madagascar has lost over 80% of forest cover. ITF are working with two partner organisations on the island to restore rainforests and to build secure livelihoods. Working with vulnerable households, they are planting trees to increase biodiversity, conserve habitats for wildlife, and improve soil quality and watershed functions.

But added to pure conservation, trees have the potential to greatly improve livelihoods across the African continent. Trees are a source of economic benefits, including fruits and nuts, timber, fibres, cosmetics, and medicines. Tree products open up sustainable income generating opportunities, especially for women.

ITF works with businesses to engage their staff and customers in tree planting initiatives across Africa and in the UK. I urge you to get in touch about how you can support the restoration of ecosystems and the improvement of livelihoods across Africa. Jewellers — let's get planting! ■

For more information, please email: info@internationaltreefoundation.org.



Ethiopia: A New African Treasure Trove

Craig Thomas FGA, head of the African Gemmological Laboratory and Gem-A ATC in Gauteng, South Africa, explains why Ethiopia is an exciting destination for mineral and gemstone discoveries.

Ethiopia is a rising star on the African continent as a source of coloured gems. The list of gemstones discovered to date in Ethiopia is certainly impressive: Opal, garnet (almandine and grossular), peridot, tourmaline, moonstone, sunstone, sapphire, ruby, amethyst, smoky quartz, citrine, tektite, topaz, epidote, sinhalite, emerald, aquamarine, golden beryl and zircon.

The mining of opal, emerald, sapphire and amethyst has become an important source of income for people in remote areas of the country and the government has made the utilisation of their mineral wealth one of the countries principal objectives.

OPAL

In 1964, the discovery of gem opal in the northern region of Shewa Province was significant enough for Ethiopia to achieve recognition as an important opal producing nation. With subsequent discoveries, Ethiopia has begun to rival Australia as a major source of fine opals.

The typical spheres recovered from the Shewa deposit occurred in an igneous matrix. They ranged in size from that of a golf ball to a cricket ball and most of them carried the familiar three-legged Mercedes emblem (1). When broken open they generally revealed a magnificent play of fire against a chocolate or, more rarely, red

ground (2&3). Regrettably much of this opal is prone to crazing. The honeycomb pattern evident in fig. 2 is encountered in both Shewa and Welo opals. (4).

The Welo opal deposit was discovered in 2008 near the village of Wegel Tena in the Wollo Province some 550 kilometres to the north-east of Addis-Ababa. The Welo opal is mostly white to somewhat translucent and milky, however some of the material is transparent and colourless, fire opal-type or brownish. The opaque to translucent material becomes transparent when it is immersed in water (hydrophane).

In 2013 another opal deposit was discovered further north in Wollo Province. With a translucent grey to black body colour, this material exhibits a good play of colour. Personal experience revealed that the play of colour can be localised within large areas of common opal. It was also disappointing that most of the cabochons I cut from this material crazed and cracked.

EMERALD

A recent discovery that is yielding some fine emeralds is located near the village of Dermi in the Seba Boru District. The nearest town is Shakiso, about 160 kilometres north of the established emerald mine at Dubuluk, close to the border with Kenya. The mining is still done traditionally but, despite this, there



1. A nodule of chocolate opal showing the Mercedes emblem. Photo by Arthur Thomas.

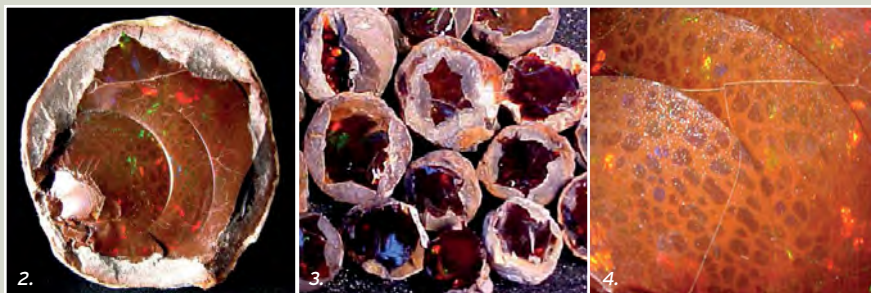
is still a good production of rough. The material is similar to Zambian emerald in character. Most of the production is commercial grade, although fine stones have been cut that did not require oiling. The crystals are generally associated with dark brown to black biotite mica, quartz and kaolinite. This emerald has the same physical properties as Zambian stones. Typical inclusions are platelets of biotite, growth tubes and multi-phase cavities.

SAPPHIRE

A new source of sapphire has been discovered in the Tigray region of Ethiopia where the artisanal miners are recovering rounded crystals from secondary alluvial deposits. Much of the material is distinctly pleochroic, carrying an intense dark blue hue with quite marked green dichroism. The typical inclusions are twinning planes, fingerprints, crystallites, tubules and rutile needles. The majority of the production is dark and would benefit from heat treatment to lighten the colour but a small percentage of the rough is suitable for faceting without any treatment.

THE FUTURE

Ethiopia is a vast country with a complex geology; this can be seen by the variety of minerals that have already been discovered there. In today's world it sometimes feels like there is nothing new to be found. Ethiopia is reminding us that there is always something new coming out of Africa. I wonder what other hidden treasures are waiting to be discovered... ■



2. Honeycomb pattern in chocolate opal. 3. Halved nodules of chocolate opal. 4. Close up of the honeycomb pattern. All photos by Arthur Thomas.

Rediscovering the Cornish Coast

Geologist and gemmologist, Cally Oldershaw FGA DGA, describes the thrill of discovering agate on the shores of Cornwall and how these subtly-toned gemstones are shaping her jewellery collections in collaboration with geologist and lapidary, Ben Church.

With many more people choosing to stay in the UK for their 'staycations' rather than going abroad for the holidays, the numbers visiting popular tourist regions such as Cornwall is increasing.

Of the Cornish rocks and the many millions of pebbles on the beaches, only a few are true agates showing the characteristic banding that defines them. The process of looking for agates is simply to visit a beach and walk slowly, looking at as many pebbles as possible. Determining whether a pebble is an agate is more of a challenge, it takes time and experience to identify the agates and from those, the ones that will be best suited to be made into jewellery.

Time and location are also important. The best time to look for the agates is when the tide is going out, as the banding in the agates shows better when

they are wet; searching the intertidal areas from the high tide 'strand line' is likely to be most successful. Some beaches yield more agates than others and this changes with the tides and the seasons as the amount of sand and pebbles on each beach fluctuates, sometimes daily, throughout the year. It took us almost two years of researching and visiting potential collecting sites to develop an effective method of finding Cornish agates.

CORNISH AGATES

Agates are a type of quartz, the same family as colourless rock crystal, purple amethyst, grey to brownish-grey smoky quartz, black morion and yellow citrine crystals. Cornish agate consists of banded varieties of chalcedony and may occasionally include areas of crystalline amethyst, rock crystal or morion.



Cally collecting Cornish agates.

Chalcedony is defined as microcrystalline or cryptocrystalline (hidden crystals) quartz, where the crystals are too small to be seen without using a microscope.

No two agates are alike, each is formed over millions of years and has its own unique colours and patterns. Their distinctive colours include grey, cream, caramel, white, colourless chalcedony. Some pieces have translucent or transparent bands, where it is possible to see through the agate.

The Cornish agate pebbles and polished pebbles have been used in crystal therapies. Named for their colours; the more vibrant poldark agate and Cornish caramel agate, are believed to help energise, while the cooler colour of Cornish grey agate and Cornish cream agate have a calming effect. A reddish coloured blush agate is particularly rare.

CORNISH AGATE FORMATION

Most agates have a volcanic origin, with the agate filling cavities or vesicles (small bubbles) within volcanic igneous rocks. Cornish agates formed about 240 million years ago and have a different origin. The characteristic granite landscape of the Southwest of England including Dartmoor, Exmoor and Bodmin Moor, as well as the Scilly Isles, are all part of a large intrusion of igneous rock, which slowly cooled between approximately 1.5 and 3 miles underground, causing fissures and cracks in the surrounding



Cornish grey agate slice.

rocks (country rocks). Cornish agates formed from hot silica-rich fluids that filled these cracks and fissures called veins (like the veins within a leaf) within the country rocks, and then cooled and solidified to form vein agate.

The country rocks surrounding the granite were folded and faulted as the sea floor between Cornwall and Europe was compressed, and the rocks buckled up to form the landscapes and coastal cliffs of Cornwall. Over millions of years, these folded and faulted rocks were weathered and eroded. In rare cases, the veins can be seen in the rock faces and cliffs at the back of beaches. As the rock was broken down, agates were released to the beaches, where the energy of the seas moved the agate back and forth with the tides, gradually grinding sharp angular rock fragments into smooth rounded pebbles.

MAKING CORNISH AGATE JEWELLERY

Having collected and sorted the agates, the first step in making the jewellery is to make a slice to check the pattern within. Ben [Church] uses a saw with a 25 cm diameter diamond blade, which cuts about 10 cm an hour. The blade is lubricated and cooled with honing oil that gives a smooth satin surface and is wonderfully tactile. It can take several hours to prepare and make the first cut through one of the larger pebbles.



A model wearing jewellery featuring Cornish agate.

We assess each slice individually, inspired by the unique pattern of each agate, to decide whether to trim and polish a slice as an irregular shape (freedom form), or draw around set templates to produce oval and teardrop shapes for example. We then sort the slices to choose which will be made into cabochons, with a rounded upper surface, and which will be worked as polished, flat slices.

Initially the flat slices were made into freedom forms with a drilled hole so that the agate slice could be worn on a leather cord. A later development was a surf board design which further accentuated the Cornish essence of the agate, fitting with the Cornish beach and surfing lifestyle.

Adding a sterling silver pinch bail and chain was the next development phase. This jewellery has Made in Cornwall accreditation, as we collect the Cornish agates from the north coast of Cornwall, as well as cutting, slicing, polishing, drilling and packaging the jewellery all within about 10 miles of where they have been found. Pieces have been exhibited at Made in Cornwall events and displayed in the Lander Gallery in Truro, Cornwall.

This year we also had some of the agates mounted in sterling silver bezels and displayed on sterling silver necklaces to enhance the natural beauty of the agates, whilst placing the agate in the context of fine jewellery.

THE INFINITE WAVE JEWELLERY COLLECTION

The latest range of jewellery is our Infinite Wave Cornish Agate Collection. We have used the waves of the Cornish coastline as our inspiration to design unique luxury pieces.

Having worked with gemstones and with the jewellery industry for more than 30 years, it has been a wonderful challenge and an exciting experience to bring together my love of gemstones and jewellery to design something so uniquely Cornish. My vision for jewellery, as a consultant in sustainable mining and ethically sourced gemstones, is to design a collection that, in collaboration with jewellers worldwide, would be produced using only Fair-mined and Fairtrade gold and platinum, and ethically sourced silver. ■

Find out more at cornishagates.co.uk



Cornish blush agate cabochon with sterling silver.



Cornish Poldark agate polished slice with pinch bail.



Poldark agate cabochon with sterling silver from the Infinite Wave Collection.

What makes New Zealand jade such a unique and desirable stone and what historical relevance does it have today? Those are the questions being asked by Gem-A student Daniel Francey FGA in his Gemmology Diploma project, exploring the properties as well as the traditional and modern uses of New Zealand jade...



A New Zealand jade boulder at Auckland War Memorial Museum, New Zealand.

POUNAMU: TREASURE OF NEW ZEALAND

In my gemmological studies, I have learnt about a wide variety of gemstones, and the locations around the world where they can be found, but I did not hear much about gemstones that can be found in my home, New Zealand. I was surprised to discover that there is one that is unique to this location, New Zealand jade. I wanted to learn more about this gemstone and to find out what makes it so unique and desirable.

ETYMOLOGY AND ORIGINS OF THE USAGE OF NAMES FOR NEW ZEALAND JADE

There is a lot of confusion about the differences between jade, jadeite, pounamu, greenstone, bowenite, serpentine, and nephrite, and which of these categories the stone known in New Zealand as greenstone falls into.

Although there are many green stones similar in appearance, most of these do not occur in New Zealand, apart from bowenite. If it is found in New Zealand, then chances are it is likely New Zealand jade, but care should be taken to look out

for imitations imported from overseas.

Jade is a general term that can refer to nephrite or jadeite, but New Zealand greenstone refers to nephrite whereas jadeite is not found in New Zealand. When someone refers to greenstone or pounamu, they are referring to nephrite; however New Zealand jade is technically correct, so I will refer to it by this name.

When Captain Cook arrived in New Zealand in 1769, he correctly identified

the ornaments and weapons of the Maori as nephrite, and referred to it as a 'green stone'. Since he made this observation, all Maori artefacts that resemble jade have been called a green stone, and this usage has become popular.

Namu is a Tahitian word that means 'green' and the affix pou is applied to this, creating the word that applies to both the colour and the precious stone.

The word *pounamu* encompassed everything that was precious to the Maori, and came to represent the notion of peace as well, as *pounamu* was often used as a peace offering between warring tribes.

LOCATIONS AND MINING METHODS

New Zealand jade is found in about seven different areas in the South Island of New Zealand, in difficult to access rivers and streams in terrain, in mountains and dense bush; locations that generally lie upon the fault line across the mountains. The main sources of New Zealand jade are the rivers between the towns of Hokitika and Greymouth and it is deposited in rivers and creeks over periods of thousands of years. New Zealand jade has not been found to occur in the North Island. The South Westland jade field is an important location for New Zealand jade, and records of this discovery were first mentioned in 1845, and later lost. It wasn't until the 1970s when there became a jade rush that this location was rediscovered.



Maori tikis at Auckland War Memorial Museum, New Zealand.

The boulders can be quite difficult to spot, and many of them are indistinguishable from the surrounding rocks, so they take a trained eye to spot. During the New Zealand gold rush in the 1860s, large areas of New Zealand jade boulders were found by prospectors attempting to locate gold. At the time, little value was placed on it, and some boulders were reburied once they were discovered, as the miners were unable to recognise or distinguish it from bowenite or serpentine.

Sometimes the boulders were revealed by erosion, building developments, and the movement of land. Because few stones were sold uncut, many beautiful examples were ruined and finds of good quality became rarer.

PROPERTIES AND USES OF NEW ZEALAND JADE

New Zealand jade is a composition of calcium magnesium silicate with some amounts of iron content, which is responsible for its different colours. It is a monoclinic and polycrystalline material with microscopic interwoven needle-like tremolite crystals which are responsible for its hardness, toughness, and durability. It has often been held in high regard as a precious material due to these properties as well as the aesthetic appeal of its colour, and its large amount of translucency, which is the quality that makes carved pieces beautiful and unique. Although it does have a colour range like that found in other countries, its shades of green are particularly intense and unique.

The ancient Maori had an appreciation for its aesthetic qualities, in particular the rare silvery pale green colour, which was prized above all others, and artefacts made of this material were held in high esteem. The value, allure, and appeal have continued to modern times.

Because New Zealand jade was so difficult to acquire, this added to the prestige associated with it. It took a great amount of skill not only to locate it, but to work it as well.

The Maori had war clubs made of New Zealand jade called the patu, which were symbols of chieftainship and the most valuable of all objects made from it. They were made only from the finest specimens of New Zealand jade by the most skilled of craftsmen. These war

clubs were buried with chiefs but were so precious that they were not allowed to remain permanently in the grave and were recovered when the body was removed for its second burial as per Maori tradition.

The Maori had many ornaments made of New Zealand jade, the most common of which were ear pendants. Another was the tiki, a pendant made of a grotesque human shape, thought to be worn in memory of ancestors. This ornament became popular and today is commonly sold in tourist shops around New Zealand, although good specimens are rare and many are mere reproductions.

New Zealand jade became a representation of power, rank, and mana (spiritual power), and was regarded as a treasure having not only material value, but spiritual value too. It was believed that

it could absorb the mana of its past owners, and for this reason, valuable heirlooms were passed between family members.

THE HISTORY OF NEW ZEALAND JADE

The exact date that New Zealand jade was discovered by the Maori is unknown, but it is generally accepted based on archaeological evidence that it was found and used by them in the twelfth century, and by the fourteenth century its use had become widespread.

When New Zealand jade was discovered its impact became revolutionary. Before its use, the Maori had a Stone Age culture, and it provided them with a material that had properties like metal and could be used for tools, adzes and building canoes. Works of art could be made in greater detail and weapons



Picture of a Maori chief wearing pounamu, taken in Auckland Art Gallery Toi o Tāmaki, Auckland, New Zealand. Image by Daniel Francey.



Close up of Maori tikis at Auckland War Memorial Museum, New Zealand.

made for use in war were deadlier.

The Maori's desire for New Zealand jade was akin to the desire for gold that many cultures have had. Every tribe valued it above all other possessions and constant wars were fuelled by the desire to possess it.

In the early twentieth century, New Zealand jade became more desirable and its value began to rise. Supply was decreasing but demand was rising as word of its beauty spread. An increase in tourists to New Zealand caused this demand to increase further. Because the ornaments were small and easily carried, this made them the ideal souvenir.

On the West Coast of the South Island, the buying and selling of New Zealand

jade became a specialised business and was extremely lucrative and many fine boulders were concealed as investments or hidden in bank vaults, where collectors and carvers would visit the West Coast to purchase it.

In 1947, the government passed a law meaning that unworked stone could no longer be exported and could only be worked by New Zealand craftsmen, and in 1997, the ownership of all New Zealand jade was handed back to the Ngai Tahu tribe, making it illegal for people to come and mine it without permission of the tribe. No mining rights are granted to external parties, this privilege remains in the hands of the Maori, who monitor the deposits and administer the extraction

and mining of New Zealand jade. Ngai Tahu has also created a *Pounamu* Resource Management plan to manage the mining of New Zealand jade to ensure that the future of the resource is preserved for later generations.

There are certain areas open to the public, such as some beaches on the West coast of the South Island, where people can look for and keep small rocks of New Zealand jade, however, any raw material found outside these areas and larger than what can be carried, such as boulders, are the property of the Ngai Tahu tribe and should be reported to them immediately. Any artefacts found such as adzes or pendants are the property of the Crown and of cultural significance to the Ngai Tahu tribe, and interference with the site or the artefact is illegal. This act of passing ownership of New Zealand jade back to the Maori was an unprecedented act worldwide and served to alleviate some of the disagreements related to the European colonisation of New Zealand.

NEW ZEALAND JADE TODAY

In recent times, there has been a return to the old ways, where the carving of New Zealand jade is held in high regard. Those who carve it have true passion and skill, and this knowledge is retained through training offered by the Maori. Those who purchase ornaments can do so in the knowledge that they are genuine rather than copies or simulants. Ngai Tahu also has created a "*pounamu*" trademark to guarantee that any New Zealand jade purchased is authentic and to protect it from jades imported by foreign parties and sold as New Zealand jade.



New Zealand jade at Auckland War Memorial Museum, New Zealand.

The Maori's desire for New Zealand jade was akin to the desire for gold that many cultures have had. Every tribe valued it above all other possessions and constant wars were fuelled by the desire to possess it.

Knowing the source of New Zealand jade is important, not only for archaeological and anthropological purposes, but for peace of mind and for authenticity, as in recent times nephrite has been imported from such places as Australia, Canada and Russia to supply the needs of the New Zealand jade industry. Although experienced workers and scientific methods can detect the differences, the general public cannot, and this is a danger, as reproductions can easily be made and mass produced.

Because any raw New Zealand jade or artefacts found must be reported to the Crown as well as the Ngai Tahu tribe, this preserves the culture and heritage of the Maori and makes sure that artefacts are protected and preserved.

New Zealand jade has become a New Zealand icon, and if you were to look in all the museums and towns around New Zealand, especially areas popular with tourists, chances are that you would find some.

THE MASTER CARVER

During my research, I read Neil Hanna's book *Pounamu New Zealand Jade*, and I heard that he was a master carver, so I thought he would be the best person in New Zealand to speak to about the current situation regarding New Zealand jade.

Neil told me that there is a lack of raw material of these due to the laws in place regarding its removal. It is not as commercially viable as it used to be as the marketplace has changed.

In terms of the tourist market, most of the sales of ornamental material go to tourists rather than New Zealanders. A lot of the material in souvenir shops comes from overseas. It is sourced in British Columbia then sent to factories in China to be made into ornaments and finally sent to New Zealand to be sold. The quality of the souvenirs is not too great, but the whole industry is driven by overseas visitors.

New Zealand greenstone is recognised around the world and the ornaments have become quite fashionable. Where older pieces are sold at auctions they can fetch huge, overinflated prices. The raw material used to be worth about \$40-50 New Zealand dollars a pound in the 1960s but now could be between \$200-300 a pound.

There are still a few good quality carvers of New Zealand jade and they sculpt some very beautiful pieces of which there is huge demand for. The Maori are training up people and there are courses available to learn it as well.

I asked Neil what his favourite material to carve from is and he told me that he likes clean stones with good texture, clear of fractures.

I wanted to see New Zealand jade with my own eyes, so I made a visit to the Auckland War Memorial museum. It was proudly on display in large areas of the museum and there were numerous artefacts on exhibit. I saw Maori patu, tikis, carving tools, and raw stones, and it became clear to me just how cherished and important New Zealand jade is to the people of New Zealand and how much of an influence it has had on New Zealanders, not just in the past, but today.

To summarise the value of New Zealand jade to the ancient Maori, a speech by the Chief Ropoama Te One comes to mind, where in 1856, upon selling land at Waikawa to European settlers, he said, "Money vanishes and is lost, but this greenstone shall endure as a lasting witness of our act that the land itself which is ours has been on this day transferred to you forever." (24-25 *Pounamu: Notes on New Zealand Greenstone*). ■

Additional sources and bibliography available upon request. All images copyright of the author unless otherwise stated.



A Maori patu at Auckland War Memorial Museum, New Zealand.

Erwin working in his workshop in Veitsrodt.
Photo credit D. Mazza.

A Never-Ending Story

Deborah Mazza FGA explores how contemporary gem carvers are continuing an age-old artistic tradition of storytelling through gemstones.

Once upon a time, in a land far, far away, there was... How often have we all heard these words? This is the most common beginning to a story that fires the imagination, transporting one into a magical world full of marvels and wonders, starting in our childhood and possibly continuing into adulthood. But, what has this to do with gemmology and gemstones?

Well, let me tell you my story starting in Idar-Oberstein, a little town in Germany, where gem carvers continue to tell stories through stones, carrying on an old tradition that started in ancient times. Any good story has interesting characters, here are mine...

ERWIN PAULY

In his little workshop in Veitsrodt (Idar-Oberstein), surrounded by nature, Erwin Pauly creates objects of beauty and is in very high demand by VIP's worldwide. He learned the art of gemstone carving from masters of the time and has now become a master carver in his own right. Erwin Pauly is generous in giving his insight and helping aspiring artists who want to learn from him, he trained his three sons who have now acquired their own worldwide fame, one of them is Hans-Ulrich Pauly whose works can be admired in Tucson.

Mr Pauly started out with traditional agate carvings, consisting of an oval cameo on layered agate with classical motifs, or head portraits either shown in profile or front view. These portraits



are also of living people, and can now be admired in his studio or in the museums in Idar-Oberstein.

Erwin Pauly thinks of himself as an artist who speaks through gems. He wanted to break away from the classical oval carvings to tell his own stories, so he started introducing other cameo shapes. In some of these carvings the face or the hair breaks out of the confinement of the frame bringing a new contemporary quality to the piece and adding another essential part to the story. He also started using other gemstones for his creations, opal, ametrine, citrine, beryl, rock crystal, and collaborates with Bernd Munsteiner for some of his pieces.



Three different female head cameos in agate, where the frame is worked differently and the colours of the agate are used for different purposes. Photo credit Erwin Pauly.

A citrine preform by Bernd Munsteiner, worked as a cameo by Erwin. Note the use of Munsteiner's lines and circles in Erwin's creation. He uses the line as a divider between face and hair, working it to then develop in a wheat sheaf. The circles are then part of the hairstyle. Photo credit Erwin Pauly.



Stefan Klein in his workshop.
Photo credit D. Mazza.



The smallest tourmaline frog, placed on a one Euro coin for scale. Photo credit D. Mazza.



Small hot dogs in agate complete with mustard, sold for cufflinks to the UK. Photo credit D. Mazza.



Carved roses in citrine and amethyst with tourmaline, peridot and aquamarine leaves. Photo credit D. Mazza.

MUNSTEINER

Munsteiner has become a very well-known name in the trade. At shows everyone rushes to visit the Munsteiner booth and admire the latest creations this workshop produces. Munsteiner's introduced something new to the trade; inspired by nature, they challenged conformity and tradition, embracing the inherent inclusions and irregularities in gemstones, which unleashed a wave of creativity in many new artists. Their understanding and feeling for gemstones seems to continue exactly where nature left off.

Munsteiner is made up of Bernd Munsteiner, his son Tom, and Tom's wife Jutta who is a very talented jeweller and channels the mood set by the lapidary artist into individual jewellery pieces. The final designs that emerge from Munsteiner's gemstone sculptures remind one a little of the Bauhaus movement and minimalism due to the simply, unfussy lines in pieces. But there is much more behind these pieces than what meets the eye.

Munsteiner uses the optic laws of refraction and reflection to produce interesting three-dimensional effects in pieces; highlighting that the essence of a crystal can be soft and organic, not just angular and hard. Munsteiner believes that nothing is more powerful than an

idea, and sometimes this idea has to wait until the right gemstone, with the right set of inclusion in the right arrangement, comes along. Only then will it be able to tell us a story.

HERBERT KLEIN

Nothing really prepares you for the surprise you feel when presented with this company's miniature creations, including leaves, flowers, blossoms, fish and mammals all carved out of various gemstones. The attention to detail is stunning, the cuteness of some almost unbearable. All these little creations, some no larger than a one Euro coin, appear to have a life of their own and tell their story, all with a certain sense of humour.

The current artist-carver at Herbert Klein is Stefan Klein, who started as an engraver in his father's company and developed his skills. Stefan's creative process is long, leading to a perfect creation; he carefully studies pictures and films of the nature he intends to represent in his pieces, he establishes a connection with the piece until he declares it finished and only then reveals its fairy tale.

None of his pieces are exactly the same.

They all have small differences, whether that is the materials used, the inclusions within or the representation chosen. Each aspect contributes to telling a fantastic tale.

CONCLUSION

There are many more stories and tales I can tell you about these artists and their creations: Patrick Dreher, for example, creates stunning gemstone animal sculptures that seem to come to life as they give the effect of muscles rippling beneath the skin. Michael Peuster creates stories out of different materials, gemstones and elements put together, while Manfred Wild sees a single, lonely stone in a gem parcel, picks it up and creates a story around what he sees.

But these are stories for another day. ■

Find out more:
erwin-pauly.com
munsteiner-cut.de
herbert-klein.de

'Magic Eye', Brooch with a 43.95 ct citrine, agate and diamond in 18 ct yellow gold. Photo credit Munsteiner.

Earrings in platinum by Jutta with Munsteiner stones, tourmaline 21.62 ct, tourmalinated quartz, rubellite tourmaline 0.93 ct. Photo credit Munsteiner.

18 ct yellow gold ring with a 9.11 ct tourmaline. Photo credit Munsteiner.



Bernd, Jutta and Tom Munsteiner. Photo credit Munsteiner.

Challenging Perceptions

Sarah Steele FGA DGA visits a growing community of gem cutters in Newcastle who are quietly, but effectively, pushing boundaries.

When we think about the great gem cutting centres of the world, Newcastle in the North East of England wouldn't necessarily spring to mind. There is however a growing community of gem cutters who are challenging our perception of the faceting industry, entering and doing extremely well in international competitions, and quietly cutting world class gems for both pleasure and profit.

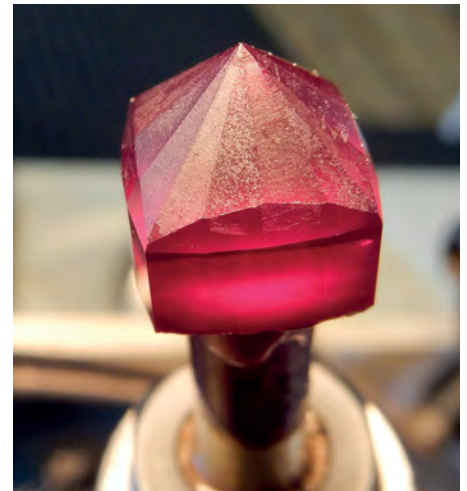
The NE1 Faceters (a play on words standing for 'Anyone Faceters') was established in 2012 by Steve Smith and Paul Sampson. As members of the UK Faceters Guild, both were keen to pass on their knowledge to a younger generation so Steve, along with Paul a master goldsmith and keen faceter himself, decided to form a group open to promote the art of faceting within the UK.

The group is run on a not-for-profit basis but has within its membership a number of professional cutters. The membership has an age range from 11

to 87 from diverse backgrounds, many of them scientists or engineers as well as archaeologists and artists within the ranks. The group meets monthly to broaden their knowledge of gemmology, but they also run annual summer schools where members and visitors spend a weekend cutting together under supervision of Paul and Steve. For the past four summers, I have packed up my faceting machine and joined them for the weekend. As a gemmologist I believe that the best way to truly understand a gem species is to cut it yourself.

In June, I visited the Saint Marie Aux Mines Mineral Show and had purchased a half boule of synthetic Verneuil corundum for a mere €20. I was keen to see if I could cut a large stone at this year's faceting school. I had pre-formed the ruby back in my workshop so it was ready to dop on arrival in Newcastle.

As I cut the girdle of my stone I'm feeling rather smug, the clarity is good and there is no obvious colour zoning. As I move on to the pavilion facets, however,



The pavilion girdles of my synthetic Verneuil ruby unfortunately showing a textbook example of chatter marks.

I notice a distinct difference in the feel of the stone on the diamond lap in two cutting plains. The design is an antique cushion square and two sides of the pavilion are beginning to look a different texture to those on the opposing sides. I change to a finer grit lap to begin the



Gemma McFarlane, Sarah Steele and Nigel Wilson cutting on our respective machines.

pre-polishing but the problem seems to be getting worse. Rather than polishing the problematic facets, chatter marks are appearing in increasing quantity. Steve advises me to touch the stone on the lap in only three spots rather than the fluid arc movement we would normally use. This can often cure this problem as the diamond is now only cutting in three distinctive planes. In the case of this stone however, the problem persisted.

Steve then asked me how I'd aligned the rough on the dopstick. I had assumed that the C-axis on a Verneuil boule was parallel to the longest axis. Rather embarrassingly I was then informed that the C-axis in the Verneuil product always lies within the plane along which the boule is split, though not necessarily parallel to the boule's length, so I'm probably polishing along at least one cleavage direction.

**As a gemmologist
I believe that the best
way to truly understand
a gem species is to
cut it yourself.**

The only hope for this stone is to realign the table at a slight angle, re-dop and recut the pavilion. I decide to leave this for a later date and cut an amethyst aligned at the correct angle previously prepared by Steve. Mine isn't the only setback over the weekend, we have chipped culets, stones knocked of the dop (everyone's worst nightmare), extra facets, missing facets, facets cut on the wrong cog, poor polish, no polish – the list is endless.

Paul and Steve offer one-to-one tuition over the weekend. Simone Muehlbayer has been allocated to Steve and is an amateur jeweller keen to cut her first stone. By Saturday evening she was very proud of her polished pavilion and girdle. Conversation at Saturday evening's annual barbeque revolves around the problems associated with faceting from a British perspective. Surprisingly, the major problem lies in the acquisition of the faceting machines themselves.



Simone Muehlbayer receiving expert tuition from Steve Smith.

There are over a dozen of us participating over the weekend and no two machines are identical. Five of the machines are the GemMaster11 fac-ETTE, a machine considered by many to be the Rolls Royce of faceting rigs. However, this machine has not been in production for many years. I imported my second hand machine from California four years ago which including duty was in excess of £4,000. The rights to the GemMaster11 machine were purchased by Wyatt Yeager, a diamond prospector and fan of the machine. I spoke to him regarding his plans for future production and he told me that the costs are so prohibitive that he intends to manufacture to order only. A new machine is likely to retail at \$6,000 and that is working on a tiny profit margin.



Simone Muehlbayer's brilliant cut citrine, featuring a feather in the girdle duplicated many times when viewed through the table.

Steve tells me that in his opinion, many of the cheaper faceting machines on the market are simply not good enough quality to cut a stone to the exacting requirements required for competitions and high end clients. As a result, many members with engineering expertise heavily modify their own machines, some members choosing to build from scratch. Steve and Paul are seriously considering producing and retailing a British machine but it is difficult to find the precision engineering companies at a cost that would be feasible. In the meantime, Steve and Paul manufacture their own metallic resin and soft type-metal laps which are machined perfectly flat. They also mix their own custom recipe diamond compounds specific to the gem species they are polishing.

By Sunday evening Simone has produced a fantastic brilliant-cut citrine that Steve confirms is considerably better than a commercial cut stone. Unfortunately, a feather in the pavilion is giving an interesting fingerprint look when viewed through the table but she is rightfully proud of her achievement. I don't leave with the 20 ct ruby I'd hoped for but I am happy with my modified emerald-cut amethyst and as usual have learnt a vast amount about cutting.

The NE1 Faceters can be contacted at ne1info@btinternet.com to discuss cutting projects and any unused faceting machines would be gratefully received. ■



“Corals of the family Coralliidae – the so-called precious corals – have been under the research spotlight...”

Maggie Campbell Pedersen FGA ABIPP explains why taxonomy is vital for the conservation and preservation of coral species.

The taxonomy of corals is sometimes bewildering, as their Latin names are occasionally changed. This happens when the phylogeny or evolutionary development and diversification of a coral type is researched in greater depth, and the research proves that it had previously been placed in the wrong genus, or even the wrong family in the Taxonomy Table.

To be able to identify a coral species with absolute accuracy is important for marine biologists, and will aid in the conservation and preservation of endangered or vulnerable species by improving our understanding of them, where they come from, and which species are increasing or decreasing in number.

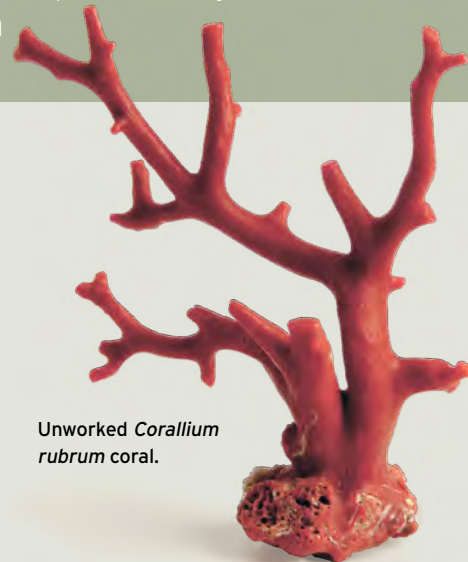
This might seem of less immediate importance to a gemmologist or a jeweller. Using the correct name will, however, help with export and import of certain species, allowing us to make clear their origins by means of accompanying paperwork, so that those with no restrictions can pass without a hitch.

In recent years corals of the family Coralliidae – the so-called precious corals – have been under the research

spotlight, and the various *Corallium* corals have been divided into three genera: *Corallium*, *Pleurocorallium* and *Hemicorallium*, with several of the species being renamed, for example *Corallium elatius* (*C. elatius*) now becomes *Pleurocorallium elatius* (*Pelatius*), and so forth. Further, white and pink *C. secundum* from Hawaii and Medway Island now becomes *P. secundum*, while the pomegranate-coloured material from Hawaii becomes *H. regale*. The *C. secundums* from other areas have completely new names.

This is all slightly muddling, but becomes more baffling when it is realised that CIBJO and CITES have no connection; CITES continues to use the term *Corallium* for the entire genus, and so CIBJO recommends that the jewellery trade do likewise — at least for the time being. So for now we can continue to call all corals in the family Coralliidae: *Corallium*, but it is worth taking note of the new names so that we are not alarmed when we encounter them. All details of species, origins and names (old and new), plus photographs of each, can be found in CIBJO's 'Book of Coral' which has recently been updated.

At present no Mediterranean precious



Unworked *Corallium rubrum* coral.

coral (*C. rubrum*), has import or export restrictions as the very stringent fishing laws are successful in conserving stocks, but a number of the precious corals in the Far East are listed on CITES Appendix III. This allows for trade, but with permits, and indicates that one or more countries have raised the alarm about their vulnerability, so conservation groups are now watching them to assess whether they should be raised to a higher level of CITES cover in order to give greater protection. ■

(CIBJO: *The World Jewellery Confederation*; CITES: *The Convention on International Trade in Endangered Species of Flora and Fauna*.)



Fighting back with fingerprints

At New Scientist Live, Gem-A tutor Barbara Kolator B.Sc. M.Sc. FGA DGA EG, met with Dr Leon Barron, senior lecturer in Forensic Science at King's

College London, to discuss an innovative fingerprinting technology with implications for those associated with the fight against the illegal ivory trade. Normal fingerprints cannot be lifted from ivory because its odontogenic pores soak them up within a

day or two. With this chemically-tailored and finer magnetic powder, less fingerprint sweat material is needed and the powder can adhere to residues from 28 days previously. The powder can also be coloured for use on dark materials, such as rhino horn, and it has been successfully tested on tiger claws, hippopotamus teeth, sperm whale teeth and even bird's eggs.

The kit costs £100 and comes in a robust, lightweight field case for use in remote areas — at least 60 kits have been sent to 15 countries across Europe

and Africa. Everything needed to carry out the forensic test is inside and the powder itself is relatively inexpensive. The trade in illicit ivory is increasing and the UK is a major trafficking centre, with ivory from Africa going to Asia, passing through British ports and airports. In 2007 there were 11 seizures of ivory, in 2015 there were 345 including one of 100kgs at Heathrow Airport. ■

To read the full article, please visit gem-a.com.

Awarding Talent

This year's Gem Empathy Award saw Turkish designer Özlem Tuna scoop the top prize for her nature-inspired design...

Gem-A has always encouraged the most creative, innovative and inspiring use of gemstones in jewellery design, which is why we continue to host the annual Gem-A Gem Empathy Award, in association with trade event International Jewellery London (IJL).

This year, IJL exhibitors in the Design Gallery were tasked with creating a hand-drawn or CAD rendered design based around a 4.14 carat zig-zag-cut green tourmaline supplied by award-winning gem-cutter, John Dyer.

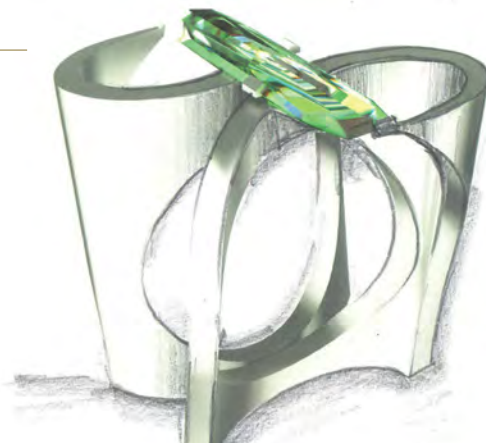


L-R: IJL marketing executive Leigh Martinez, Gem-A CEO Alan Hart and Gem Empathy Award winner Özlem Tuna.

Despite stiff competition from global jewellery makers, it was Turkish designer Özlem Tuna, of Özlem Tuna Design, who scooped the top prize with her Dance of Branches ring. Judges praised the design for its architectural yet fluid shape, and the prominence afforded to the size, texture

and vibrant colour of the gemstone itself.

The final piece features two curved bands in 18k gold, designed to look like the branches of trees moving in the wind. These bands of gold meet at the green tourmaline, which floats above the surface of the precious metal like leaves on a tree. ■



'Dance of Branches' design concepts by Özlem Tuna.



International Outlook

Gem-A North American manager Eric Fritz FGA DGA, shares insights from the recent Canadian Gemmological Association (CGA) Conference in Toronto.

Gem-A is proud to be a Ruby Sponsor of the Canadian Gemmological Association annual conference, which took place this year from October 20-22. The speaker line-up was fantastic as always, starting with Alan Hodgkinson FGA DGA, who shared his studies of zircons and how gemmologically they can differ from uniaxial to biaxial, to practically amorphous due to natural radiation damage and heat treatment.

Later, Tammy Cohen and Tatiana Conte shared the Crown of Light Diamond branding story. Branding is not always widely accepted in the industry, but has been successful for Almod Diamonds. With the 'story' being important to the new generation of customers, its cutting facility in Namibia, training local cutters along with a patented cut, fills this niche.

Odile Civitello FGA, founder of the Montreal School of Gemmology, a Gem-A ATC, traced the history and importance of jade, both jadeite and nephrite. The combined market of jade is \$30 billion,

second only to diamond in the world markets. Canada is the leading producer of nephrite in the world, with 90% going to China. Canadian nephrite from British Columbia can be traced back to the 1400s as an ornamental stone.

Warren Boyd FGA is director of marketing for Potentate Mining, specialising in Montana (USA) sapphires. Rock Creek, the current mining site, dates back to the 1800s when sapphire was mined as an industrial source for Swiss watch movements. Current production is around 200kg per year of gem material, with 18% not requiring heating. The prize stone to date is the Montana Queen, whose rough was discovered on June 22, 2016. This heated stone yielded a 12.62 carat finished cut.

John Phillips of Corona Jewellery Company went over current diamond mining in Canada at the conference. It was not until the 1990s that these 3.5 billion year-old diamonds were first commercially mined in Canada. The Divik mine in the Northwest Territory is

the third largest producer by value of world diamonds; 18 million carats worth \$2 billion. This mine employs 1,000 workers, a quarter indigenous people.

Brad Wilson, a mineral explorer and partner and gem-cutter for Coast to Coast Rare Stones, shared his quest for Canadian tourmaline. Yes, Canada has tourmaline, as well as many mineral and gemstone species. The localities are far remote and Brad's adventures with helicopters, vertical assents, seaplanes, weather and bears show why everyone is not out there collecting. I am glad Brad goes out there for us!

Other speakers at the event included estate dealer Art Samuels, Lucent Diamonds CEO Alex Grizenko, Richard Drucker FGA (Hons) GG, of GemWorld International, and American Gem Laboratory director, Chris Smith. I also hosted a talk on the journey of the pearl, from ancient beginnings to modern-day culturing.

Next year marks the 60th anniversary of the CGA. I hope to see you all in Vancouver. ■

What's next for the Indian diamond industry?

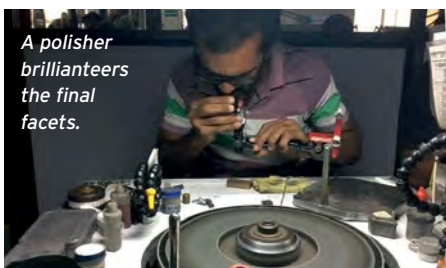
Gem-A gemmology tutor, Angharad Guy FGA DGA, explores the factors that have shaped the growth of the diamond industry in Surat, India, also known as the 'Diamond City'.

In February this year, I spent a month exploring the diamond industry in Surat, India. Hosted by Lakhi Group and Keshav Diamonds, I experienced life as a labourer where I gained insight from both a practical and logistical standpoint. Invited by several companies from small individual start-ups to larger manufacturers, I gathered a good understanding of the business culture and current operations.

Situated close to the commercial capital of Mumbai, Gujarat is home to the world's largest diamond cutting and polishing industry. Despite having no diamond mines of its own, India dominates the polishing business. Exploration of the Panna Mines was initiated; however, most of the rough diamonds polished in Surat are imported from mines in Botswana, Angola, Namibia and Russia.

90% of the world's diamonds pass through Surat, Gujarat before being sold on through trading houses. Known as 'Diamond City', Surat is the economic capital of Gujarat and hosts a complete monopoly on the smaller demands. Yet with no local need for diamonds, just how did Gujarat become an essential processing hub?

Gujaratis have a long history trading with Africa, many working as labourers before becoming traders. Emigrants later went over in droves which included professionals such as lawyers, doctors, and engineers. However, due to the political policies of Southeast Africa and Uganda, all were forced to leave in the 1970s. With a proximity to Mumbai, Surat soon became the centre of the diamond cluster.



A polisher brillianters the final facets.



Surat diamond trading hub – sorting meelé diamonds in colour and size order.

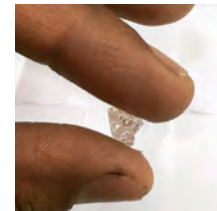
Diamond manufacturing in Gujarat developed due to its competitive conditions that included good infrastructure, international links, and low wages. Since the beginning of the economic reforms in the 1980s, India's states have an enviable autonomy. Led by Narendra Modi, Chief Minister at that time and now Prime Minister of India, Gujarat was one of the first states to declare plans for Special Economic Zones (SEZs).

Insights from my recent trip testified a struggling market and a drastic time for the industry. Many businesses were still in recovery from earlier false projections made in the market. Consequently, this mistaken estimate made by manufacturers led to a gap between rough and polished diamond prices in India. Average prices of cut and polished diamonds have been falling, whereas the prices of roughs have remained high making the market unsustainable.

As the structure of the diamond industry changes, the cluster in Gujarat is vulnerable to China's higher-productivity, supply constraints and a decline in demand. With China's increased market for rough diamonds, it is believed that Beijing will become the new centre for

diamond cutting and polishing. India's Prime Minister has not helped matters. The demonetisation to invalidate Rs1,000 and Rs500 currency notes has forced businesses to slow operations.

The diamond industry in Gujarat has developed faster than the Indian average, due to policies that have favoured investment in infrastructure and its location, such as diamond transactions being exempt from sales tax. Many small-scale manufacturers with low productivity compete on price rather than product quality. In contrast, manufacturing in India reflects poorly with China; that uses its large supply of cheap labour to produce a competitive edge in labour-intensive manufacturing. To remain viable, the government of Gujarat must act to improve labour productivity.



An Alrosa diamond being manually checked against the Sarine final plan.

According to a 2008 study conducted at Harvard University, the Gujarat diamond cluster captured only 4% of the total retail value of diamond jewellery. Once polished, the manufacturers sell back to the traders to export, and there is no further capturing of the value chain. While India processes 85% of the world's diamonds by capacity, this indicates only 57% of the world's diamonds by value. In addition, India by concentrating on the processing of low-value diamonds captures even less of the total value.

With uncertain demand, unreliable and increasingly expensive supply, it is inevitable that China will capture this market, leaving only the larger organisations able to compete. The Indian diamond manufacturing industry is under threat, and now is the time for Gujaratis to evaluate and innovate. ■

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Contact the Education Department
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Gem Central Online!

Gem-A are excited to announce that the October Gem Central talk, 'The Bemaity Sapphire Rush, Madagascar 2016' by Rosey Perkins GG, is now available online for all of our members to enjoy.

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From Industry News

Turkish Designer Özlem Tuna named Gem-A's Gem Empathy Award Winner at IJL 2017
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Birthstone Guide for October
Monthly birthstone guide round-up

Friday 4th May to Sunday, 6th May, 2018

The Scottish Gemmological Association Annual Conference

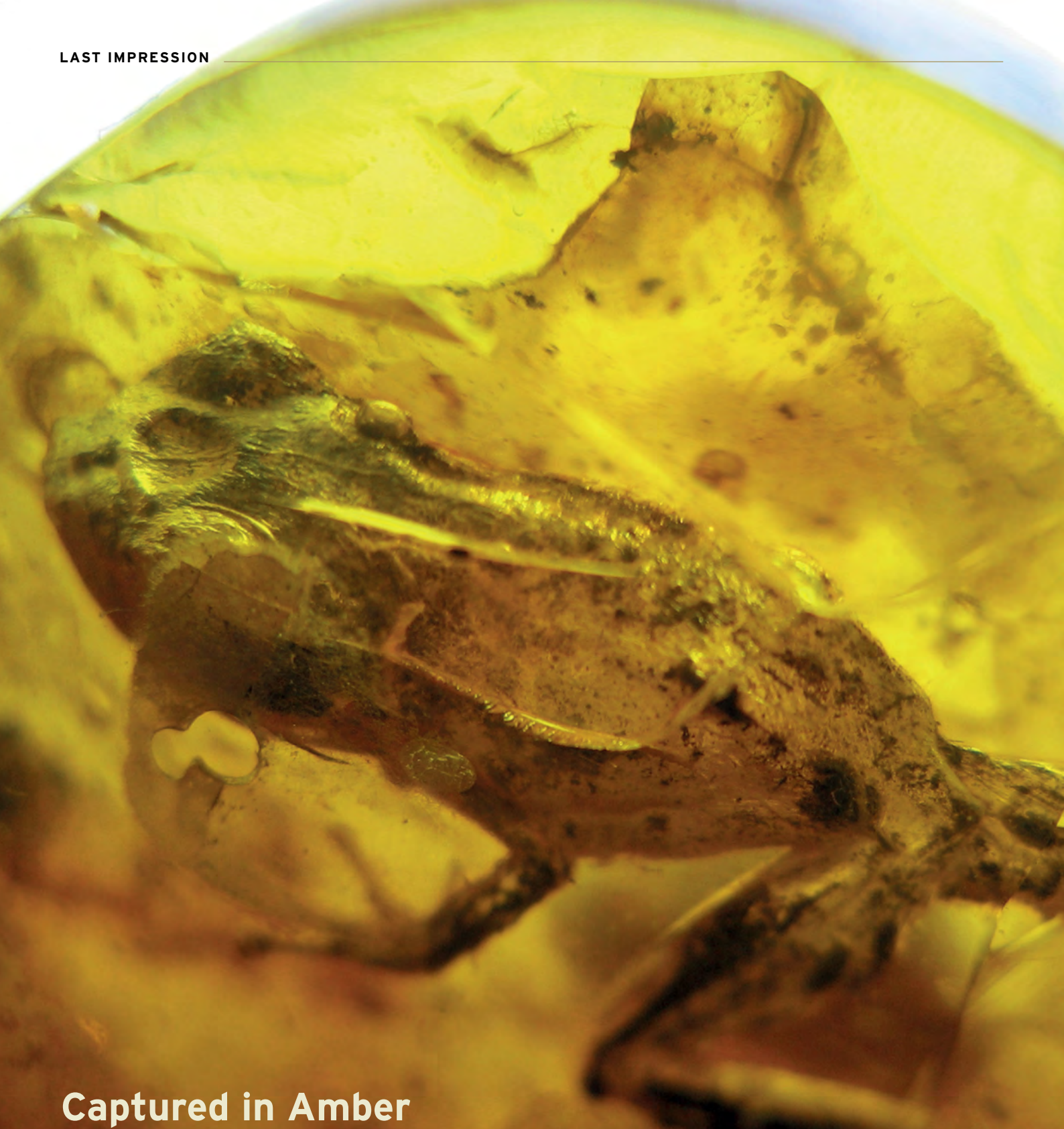
at The Westerwood Hotel
near Cumbernauld
(Between Glasgow and Edinburgh)

Full details are available on our website:

<http://www.scottishgemmology.org/conference/>



Image: Kim Rix Photography



Captured in Amber

Antony Shih FGA DGA entered this incredible photo of a fossilised frog in amber into this year's Gem-A Photographer of the Year competition. To find out more, *Gems&Jewellery* asked Shih to share the story behind this particular specimen and reveal why it is so unusual...

“ I am originally from Taiwan, but I have lived in the Dominican Republic for 21 years. When I was 13 years old I discovered Dominican amber, and was especially fascinated with blue amber. Since 2000, my company Tripower Jewelry has been mining blue amber, and we are considered pioneers

of blue amber classification in China. In fact, my father was the first man who took blue amber to China. After earning my Gem-A Gemmology Diploma, I began to study blue amber further from the point of view of geology, while also uncovering evidence as to what gives blue amber its colour. This frog's

fossil is extremely rare in the world of amber fossils, largely because frogs are dynamic animals that are difficult to capture in resin. Also, this frog is 100% complete, which is unusual compared to other examples of fossilised frogs in Dominican amber that are typically less than 50% complete. ”

- Identification of colored gemstones • Country of origin determination • Full quality and color grading analysis

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580 5th Ave . Suite 706 . New York, NY 10036
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