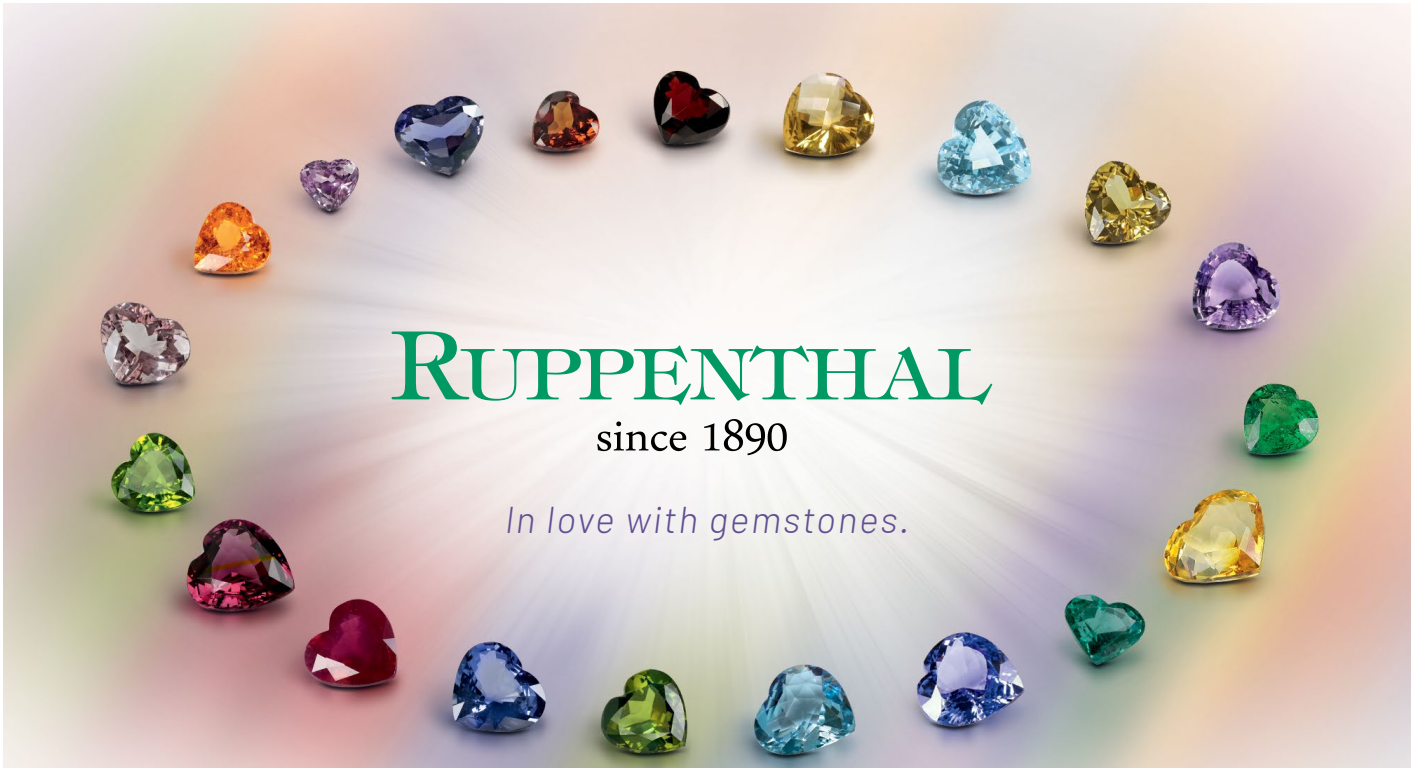
Gems & Jewellery

SPECIAL DIAMOND EDITION

Winter 2020 / Volume 29 / No. 4

Gem-A
THE GEMMOLOGICAL ASSOCIATION
OF GREAT BRITAIN



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THE DIAMOND ISSUE

Gems&Jewellery

WINTER 2020

OCEAN ORIGINS

With a background in offshore drilling and marine construction, Robert Goodden talks about transitioning into the world of fine jewellery with his start-up brand, Ocean Diamonds.

WRESTLING WITH RADIATION

Dr Thomas Hainschwang, Director of GGTL Laboratories explains the origin-of-colour determination of yellow green to green to greenish blue diamonds with radiation-related colour.

CROWNING GLORY

We speak to Tammy Cohen at Crown of Light (Almod Diamonds), to find out more about the business' patented diamond cut.

GEM-A GEMSTONE PHOTOGRAPHER OF THE YEAR 2020 WINNER

COVER PICTURE

Melissa Allen secured the winning position in this year's competition with her phenomenal 'Helvite Merry-go-Round'.

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Gems&Jewellery

The Diamond Issue 2020 Featured Contributors

1. DR THOMAS HAINSCHWANG

Dr Thomas Hainschwang is Director and Co-Founder of GGTL Laboratories (GGTL Laboratories Liechtenstein, formerly Gemlab Liechtenstein, founded in 1996). Dr Hainschwang has been working on the analysis of diamonds, coloured stones and pearls for the past 24 years, and is a respected expert in the field of gemmological research, with extensive experience in the complex topic of coloured diamond. Dr Hainschwang has also developed and built many analytical instruments for gem and pearl testing in the past years. He has published over 155 articles and taken part in more than 100 conferences around the world. He received the prestigious Antonio C. Bonanno Award for Excellence in Gemology in 2015 and the Gemmological Excellence Award of the Swiss Gemmological Society in 2017.

2. KYM HUGHES

Kym Hughes of Symmetry Jewellery Valuation Specialists is one of Australia's leading independent jewellery valuers. Kym is highly respected in the industry, with extensive experience and knowledge of manufacturing techniques of modern and antique jewellery from around the world. With over 30 years' experience, Kym has national and international qualifications in gemmology and valuation. As president of the National Council of Jewellery Valuers, past president of The Gemmological Association of Australia (Queensland) and past Federal chair and president, Kym is unquestionably one of the world's leading valuation experts.

3. ELISA CHUNG

Elisa Chung completed her BA in Translation and MA in Communication in 1995 and 2006 respectively. She has over 20 years' experience in the public relations field. She has had interest in diamonds since she was an undergraduate but didn't have the chance to study the Gem-A Diamond Diploma until 2018.

4. RICHARD EVANS

Richard Evans is the Diamond Consultant for the De Beers Group Institute of Diamonds, based in the United Kingdom. He started his career in the diamond and jewellery trade in 2007 at the heart of the UK's diamond industry, Hatton Garden. Originally dealing in precious metal wholesale, he soon developed a keen interest in diamonds, deciding to devote his time and energy into the expansion of his diamond knowledge. He later completed his Gem-A Diamond Diploma and joined De Beers in 2014 as a diamond grader. Richard joined De Beers in 2014 as a diamond grader. He was soon promoted to Grading Supervisor, heading the UK grading standards in 2016. In 2020, his role evolved to become the De Beers Group Institute of Diamonds' Diamond Consultant.

5. NICHOLAS DELRE

Nicholas DelRe is the Chief Information Officer (CIO) of Gemological Science International (GSI). He has nearly four decades of experience working in research and gem identification departments of gemological organisations as well as serving in an R&D capacity with Industrial Diamonds. DelRe has presented at numerous functions within the jewellery industry, including NYC Mineral Club, where he has held office as secretary for many years.

6. ALETHEA INNS

Alethea Inns is the Chief Learning Officer (CLO) of Gemological Science International (GSI). She has nearly two decades of experience in the jewellery industry, working both in research and gem identification departments of gemological organisations, and developing learning for members of the trade and associations. She leads efforts to expand gemological and educational offerings for the jewellery industry.

7. MARIA MROZEK

Maria Mrozek is the Chief Laboratory and Testing Officer (CLTO) at Gemological Science International. She has three decades of international gemological laboratory experience and is specialised in the detection of laboratory-grown gems. Maria Mrozek is known though her work with natural and laboratory-grown documentation and detection.

8. CHARLES BEXFIELD

Charlie Bexfield FGA DGA EG, has a huge passion for gemstones which he communicates enthusiastically as a gemmology and diamond tutor at Gem-A London. His passions lead him to the microscope, where he loves examining and studying the sometimes microscopic inclusions found with in gems. This love for hidden features within the earth's treasures started a hobby-photographing these inclusions to share both educationally and as art.

Straight from the heart

Opinion and comment from CEO, Alan Hart FGA DGA

The winds of change are blowing and in this unprecedented year we continue to see the effects of coronavirus impacting global economies, businesses, and individual livelihoods, which have challenged our very way of life. Our great Association has been through hard times before, but nothing could've prepared us for a global pandemic and the inevitable impact on our finances and business activities.

Despite the uncertainty and disquiet of our current times, we've been working tirelessly to do everything possible to support our Association and its core function of education and membership. Over the last six months we've taken measures to move the Gem-A London ATC courses online, supported our global ATCs in online delivery of the theoretical course components and actively promoted our Online (ODL) offering, including scheduling additional ODL courses for our global students. Following the postponement of the June exam, we successfully delivered our exam session in September. More recently we've adhered to the government's coronavirus guidelines to make Gem-A London COVID-secure for the delivery of our onsite lab classes. The current pandemic saw the rise of the webinar culture and many Gem-A Members and industry friends took benefit from the fantastic webinar series that we delivered every Wednesday throughout lockdown. This brought our gemmology community together, despite the brakes on international travel for various global tradeshows and events. We have maintained our publications during this time and while *Gems&Jewellery* has moved online, we continue to print *The Journal of Gemmology* for our Members.

Like many other businesses within our industry and beyond, Gem-A put in place financial measures including accessing the government's furlough scheme and the various support mechanisms that were applicable in way of extensions for our financial commitments. However, like many organisations we are having to pivot, change, and adapt to the current environment in order to maintain our core activities. As such, it is with regret that we have had to put in place an interim structure for Gem-A, which unfortunately has also meant staff redundancies. We've made every effort to minimise the job roles at risk and we have ensured that the process was conducted swiftly, diligently and sensitively while considering the impact on the individuals concerned, staff well-being and the well-being of the Association itself. While these are not easy decisions to make, they were essential to ensure that Gem-A has the financial stability and cost efficiency to continue to support its core mission of education and membership. We are grateful for the support and strategic guidance that we've received throughout this process from the Gem-A Council.

> During challenging times, support from our membership and global community is key.

Over the last six months we have received many well wishes and notes of support from our brilliant membership community. We would like to reassure our Members that our Association remains resilient and following these measures we will see the uncertain times through. During challenging times, support from our membership and global community is key. At the end of October we started our annual membership renewal run and your support has never been more important than now.

As a result of the changes that we have made, and for some time, we will be a leaner Institution, focused on delivering our education and membership objectives but one which will maintain its highest standards. Working with the Gem-A Council, we have developed a mid-to-long term business plan which, as we adapt and come through this, will ensure we are in a position to improve, grow and flourish into the future.

In my last update, I had informed you of the temporary closure of our offices due to the national lockdown imposed by the government. Currently, the Gem-A London office is closed once again due to a second national lockdown across England, due to end on December 2. Gem-A instruments is now open for click and collect via our shop website. However, our offices remain closed for the public and to our Members. While we miss welcoming our Members and general public to the Gem-A offices, our staff continue to work diligently to support our students and Members. Should anyone wish to speak to a member of the team, please do so via the email addresses listed below:

- Education: *education@gem-a.com*
- Membership: *membership@gem-a.com*
- Gem-A Instruments: *instruments@gem-a.com*

Once again, I thank you for your continued support of our great Association and wish that you all remain safe and well. We of course look forward to meeting you again soon in brighter times.

Best wishes
Alan Hart FGA DGA

Gem-A News

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

GEM-A BRANCHES RETURN

We are pleased to see the return of the Gem-A North West Branch, together with the Gem-A Midlands Branch.

Both groups have put together an active calendar of online lectures from renowned gemmologists that can be accessed by all. Make sure to sign-up for the mailing lists of both Branches and stay up to date.

Find out more about the North West Branch via **peterwilson.co.uk/departments/gem-a-north-west-branch/** or email **liz@peterwilson.co.uk**

At 7.30pm on November 27, the Midlands Branch will host a talk with Paul Phillips on micro photography via Zoom video conferencing. Paul's presentation will cover the techniques and equipment required to produce photographs of minerals and gemstones. As a keen amateur photographer, he will also include some interesting photographs from his personal collection. Please email **gemamidlands@gmail.com** to find out more.

GEM-A AGM

To stay COVID secure, this year Gem-A will be conducting the Gem-A AGM online. The date has been announced as Wednesday 16 December at 17:00 GMT. Details of how to access the meeting and place votes will be sent out in due course.

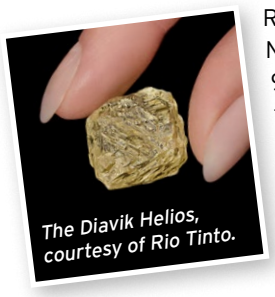
GIFT WITH PURCHASE

Customers shopping via the new, fully transactional Gem-A Instruments online store will receive one free box of diamond cleaning wipes with any purchase (while stocks last). Discover the product here: **shop.gem-a.com/gem-a-diamond-sachet-wipes**

QUICK LOOK

The all-diamond ring. Image credit Jianxin (Jae) Liao/GIA.

This caught the eye of our editorial team back in the summer of 2020 — a ring made entirely of natural diamond, which is the first of its type evaluated by the Gemological Institute of America (GIA) in New York. The 13.15-carat, fancy-dark-grey diamond originated from a rough stone weighing approximately 20 carats. Known as the Beaufort Ring, this unusual ring can be traced back to the Beaufort diamond, a Type IaB rough recovered in the Northwest Territories of Canada.



The Diavik Helios, courtesy of Rio Tinto.

Rio Tinto's 'Specials' Tender in October/November 2020 (bids closed November 9) included this spectacular 74.48 carat fancy yellow diamond, dubbed the Diavik Helios, as Lot One. Fancy yellow diamonds are rare finds from the Diavik diamond mine in the remote Northwest Territories of Canada which primarily produces high quality white diamonds. ■

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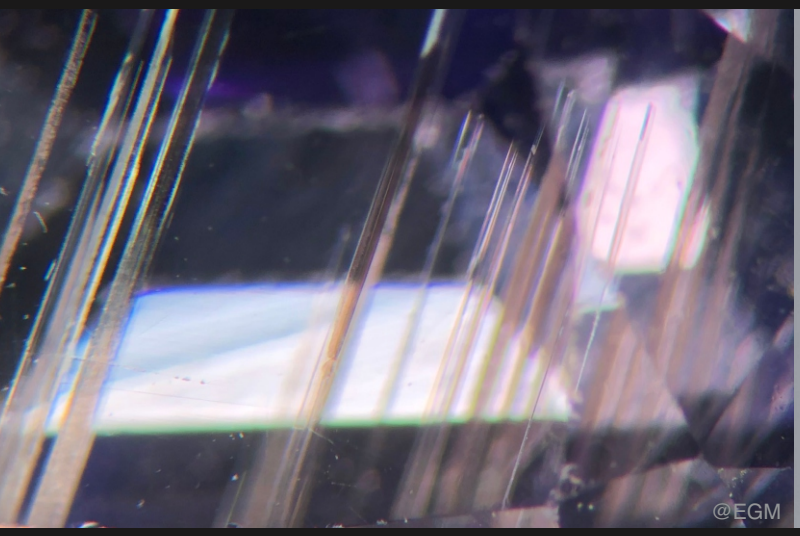

Welcome to the Montreal School of Gemmology

Thanks to the diversity of our programs, we transform beginners into connoisseurs and connoisseurs into experts.

We are a bridge between North America and Europe, between tradition and modernity between knowledge and know-how.

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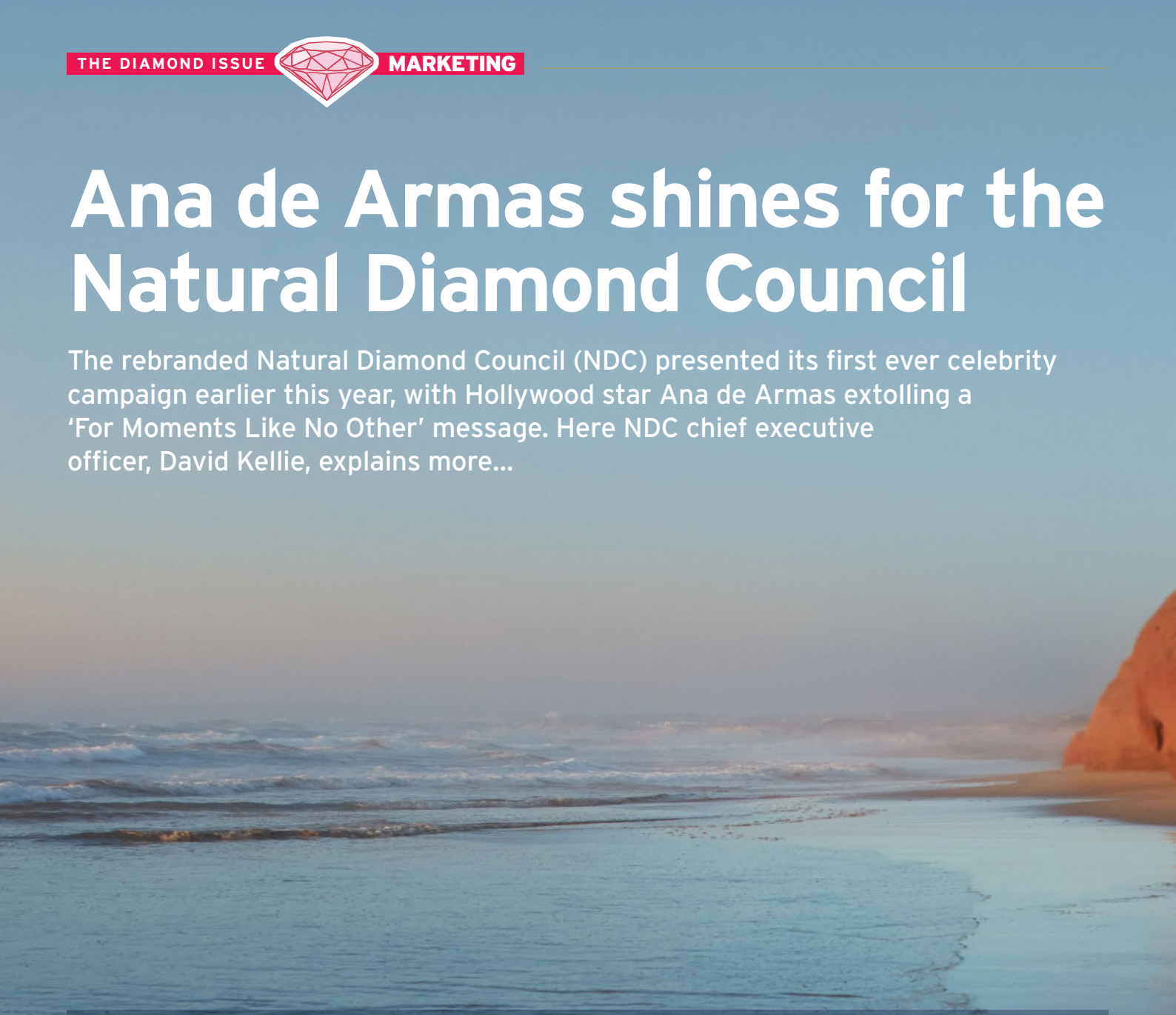
Winter 2021	**Gem and Jewellery Appraisal Diploma** (in English and French) Accredited by the Canadian Jewellers Association	
Winter 2021	**Rough Diamond Grading and Evaluation Diploma** (in English) Complete 6-day program - theory and pratice	

We invite you to visit our website, to come and meet us, and to join our network.

Ana de Armas shines for the Natural Diamond Council

The rebranded Natural Diamond Council (NDC) presented its first ever celebrity campaign earlier this year, with Hollywood star Ana de Armas extolling a 'For Moments Like No Other' message. Here NDC chief executive officer, David Kellie, explains more...



Designed to highlight the versatility and beauty of natural diamonds, the Natural Diamond Council's 'For Moments Like No Other' campaign draws on the star power of Knives Out and *James Bond* actress, Ana de Armas, with a series of images and videos shot in sunny Portugal.

This diamond marketing push is the first time the Natural Diamond Council has attempted such a feat and initial feedback has been positive, according to CEO David Kellie who answers our questions below:

Why did you want a celebrity ambassador?

We're entering a new chapter in the history of natural diamonds and we wanted to partner with an ambassador who epitomises the forward-thinking generation and is attuned to their views and values. Ana de Armas is a true talent who brings a sense of fun and energy to this campaign. The dynamism and integrity she demonstrates is exactly what we seek to do daily in our support of the natural diamond industry.

What is the campaign designed to achieve?

We wanted to highlight the importance of celebrating each and every special moment that happens in our daily lives, whatever that may be. Diamonds are no longer solely the purview of romantic interests or formal occasions. They are meant to be enjoyed and to empower every type of moment.

In filming 'For Moments Like No Other', we also wanted to showcase a diverse roster of jewellery designers and champion how they are working with natural diamonds in exceptionally modern ways.

What do you hope consumers will begin to understand through the campaign?

Natural diamonds are not only miracles of nature, they are also precious for the people and the economies of the countries where they are found. Through the purchase of a natural diamond, you are contributing to an industry that directly supports roughly 10 million people worldwide as well as providing social benefits for tens of millions of others.

You can feel good in knowing that your diamond represents more than an incredible piece of jewellery. ■

Image courtesy of the Natural Diamond Council.

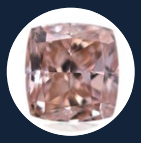
FANCY COLOUR

Very few fancy colour diamonds exhibit a pure hue, which is why most are best described with modifiers. Here, De Beers Group Institute of Diamonds shares its fancy colour modifiers infographic as a useful reminder of its grading approach...

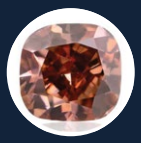
Colour is the most important factor that determines the value of a fancy colour diamond. Colour is determined by hue, saturation, tone and distribution. Hue refers to the dominant colour of a diamond and nine are formally recognised by the Institute of Diamonds for fancy coloured diamonds: yellow, orange, red, purple, pink, brown, green, blue, violet.

De Beers Group Institute of Diamonds also recognises ten modifying hues: brown, orange, green, red, pink, yellow, purple, grey, blue and violet. Modifiers are accompanying colours to the primary hue, appearing as highlights in the crown and table. With the presence of a modifier, the grader will assess the relative strength of the modifier against the primary hue.

The primary hue is always described last.
For example:



Brownish Pink
Pink hue with brown highlights



Pinkish Brown
Brown hue with pink highlights

De Beers Group Institute of Diamonds limits colour grades to a maximum of four terms such as **Fancy Vivid Purplish Red**.

The Institute of Diamonds is the only international grading laboratory to exclusively grade natural and untreated diamonds. Find out more at **debeersgroupservices.com** and **debeersgroupinstitute.com**. ■

MODIFIERS


Brown

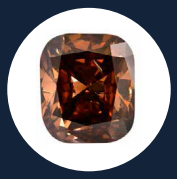

Yellow

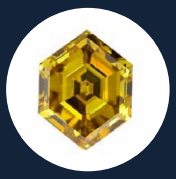

Green


Blue


Violet

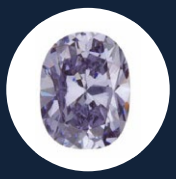

Purple


Orangey Brown


Brownish Yellow


Blueish Green


Violetish Blue

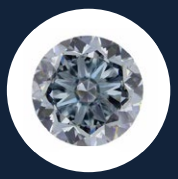

Greyish Violet

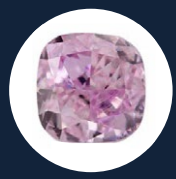

Blueish Purple

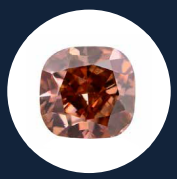

Yellowish Brown


Greenish Yellow

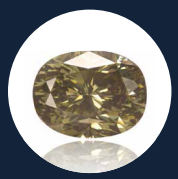

Yellowish Green


Greyish Blue

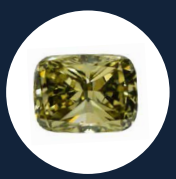

Pinkish Purple

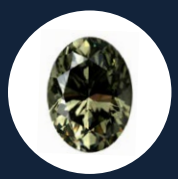

Pinkish Brown


Orangey Yellow


Brownish Green


Reddish Brown


Greyish Yellow


Greyish Green


Purplish Brown


Greenish Brown

Infographic courtesy of De Beers Group Institute of Diamonds.

A parcel of diamonds. Image courtesy of the World Federation of Diamond Bourses.

Yoram Dvash.

Wake Up Call

Can one discuss the diamond industry in 2020 without mentioning COVID-19? *Gems&Jewellery* reached out to Yoram Dvash, President of the World Federation of Diamond Bourses, to get a feel for the market as the year draws to a close.

During this year's (virtual) World Diamond Congress, Yoram Dvash was elected President of the World Federation of Diamond Bourses (WFDB). Although he has served as Acting President since April, this official appointment signals the start of a three-year term and a commitment to the trade as it navigates the tumultuousness of COVID-19.

Dvash takes on this new role during an unprecedented time for the international diamond industry. Just like the representatives of the world's diamond bourses and members of the International Diamond Manufacturing Association (IDMA) who logged on to participate in the World Diamond Congress 2020, Dvash has seen first-hand the blow the diamond trade has taken since Coronavirus made headlines.

The opening session at September's Congress, titled 'Diamonds in the Next Normal', tackled some of the most pertinent, COVID-19 related issues. Attendees also heard from Kim Pelletier, CEO of Get Diamonds — a non-profit online diamond trading platform formally adopted by the WFDB.

This ecommerce platform was created as a viable alternative, produced "by the industry, for the industry", according to Dvash. He says: "By mobilizing the power of individual diamantaires and the leadership of the WFDB, this industry can take its fate into its own hands and accomplish amazing things."

Here, Dvash answers our questions and explains some of the core issues that he will be focusing on in the coming weeks and months...

How has the diamond industry responded to the pandemic in your opinion? What lessons do you think this experience has taught the trade?

The year 2020 was a very challenging year for the diamond industry. We began to feel the effects of the pandemic early on when the Chinese market closed down, and the effects for several more months when the United States, the world's largest market for diamond jewellery, locked down. Thankfully, we are now seeing a rise in demand in both of our major markets and we believe that Europe will come back as well. As of now the major diamond centres have seen a return to 2019 levels and we expect that the Christmas season will be very good.

Do you think this has been a good time for businesses to 'take stock' and make goals for change in the 'next normal'?

The diamond industry has been suffering from low profitability and a lack of adequate financing for several years. The crisis has brought diamond producers to the realisation that they need to be in tune with the market, and they have lowered the amount of rough they released to the market during this period.

Moreover, we all realised that we can do business from our computers and smartphones and that has cut down on

> The crisis has brought diamond producers to the realisation that they need to be in tune with the market...

huge travel expenses. There are also virtual trade shows that are seeing some success, although I am not convinced that they will replace the traditional format. What we are seeing is a great increase in e-commerce, both on the B2B and B2C levels. The WFDB, for example, launched its B2B platform Get Diamonds during the pandemic and it immediately became the largest ecommerce platform for diamond trading.

Transparency and traceability are significant industry talking points, but they are also being demanded by the consumer. How is the WFDB trying to channel efforts in this direction?

In my speech at the opening of the World Diamond Congress I called upon the diamond industry to place transparency, sustainability and consumer confidence at the top of its priorities. There is definitely greater awareness in the industry of the importance of these values. The System of Warranties, which will guarantee the origin of a diamond from mine to retail store, will be adopted in the next several months [a new System of Warranties is predicted to be launched in 2021 with a three-year transition period] and will provide an important boost in this direction.

What is on your agenda for the next 12 months and do you have any goals that you would personally like to achieve or any initiatives you would like to establish?

We launched the ecommerce platform Get Diamonds in April. This is the first time that the WFDB has entered into such a venture. It is non-profit and all of the profits will be invested in projects for the industry, such as generic advertising. Its motto is "By the industry, for the industry."

Get Diamonds was actually an initiative of the grassroots of the industry. It was the desire of a large group of activists among all of the bourses who convinced the WFDB to create its own e-commerce platform. This was in response to various platforms that are privately owned and for profit. So yes, in an important sense, it has put power back in the hands of the trade. But more than that, it has strengthened the industry by proving that by uniting together we can take our fate into our own hands. The energy of the industry members combined with the leadership of the WFDB enabled us to create a platform whose sole purpose is to promote the good of the industry.

Finally, if you could boil the challenges in the diamond industry down to one key issue, what do you think that would be?

I believe the most important issue facing the diamond industry is to ensure that the younger generation of consumers is with us. We need to expose the amazing story of the diamond — its journey from the depths of the earth, to become an object of beauty and a symbol of eternal love. We need to do a great deal of educating about the benefits that diamonds bring to the economies where they are mined.

And we need to invest in marketing the diamond to the younger consumer, as the Natural Diamond Council is doing so well. I am quite optimistic that if we work together as an industry we can be successful in this.

At the opening of the World Diamond Congress 2020, Dvash noted that while COVID-19 has undoubtedly caused problems for the trade, there may also be some long-term benefits. He said: "Our industry has always been based on travel. Rough dealers and manufacturers have travelled to sights and tenders; polished traders to diamond centres to inspect the stones they buy. With no possibility of travel, we began to do business from our computers and our smart phones. We discovered that this was possible, that we could communicate with customers, suppliers, colleagues virtually."

If one chooses to be glass half full, rather than glass half empty, the experience of COVID-19 could spell a more travel-conscious future for the diamond sector and reduce its overall carbon footprint. As Dvash says: "There is cautious optimism in the trade and that is very encouraging." Hopefully, this will continue well into 2021. ■

Find out more via wfdb.com

Cut and polished diamonds ready for sorting. Image courtesy of the World Federation of Diamond Bourses.

OCEAN ORIGINS

With a background in offshore drilling and marine construction, Robert Goodden has transitioned into the world of fine jewellery with his start-up brand, Ocean Diamonds, featuring stones sourced by South African 'diamond divers'. Here, *Gems&Jewellery* speaks to Goodden to find out more...

It is easy to veer into romantic territory when imagining the art of diamond diving; taking a deep breath, swimming just a few metres down to the ocean bed and scooping up a diamond. In reality, mining the ocean for diamonds is a lucrative industry that's fraught with its own challenges, requires significant manpower and exists on a scale from individuals in scuba suits to large-scale, offshore enterprises.

It is certainly not a new tactic in diamond sourcing either. In 2016, Bloomberg wrote about a tourism craze of "scuba diving for diamonds," with riches of "up to 1.5bn carats worth of diamonds across the south coast of Africa, with South Africa offering up the safest and most lucrative adventures".

The practice of diving for diamonds has also been brought to the forefront in recent months by Dr. Laurent Cartier FGA of the Swiss Gemmological Institute (SSEF), who has documented artisanal diamond miners working in the Sewa River, Sierra Leone.

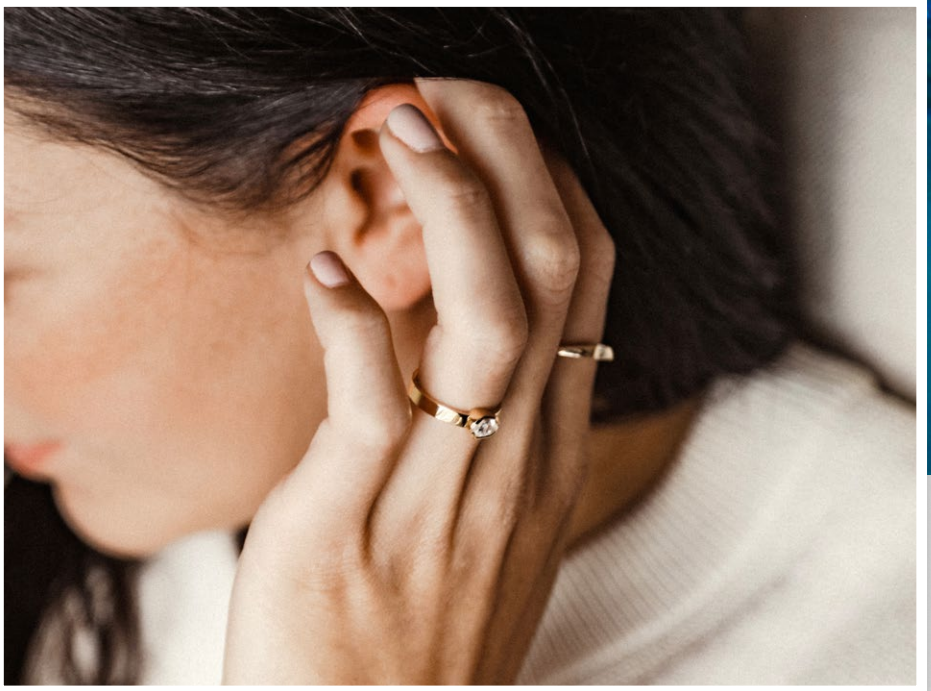
An example of how Ocean Diamonds is establishing its brand identity in 2020.

A scuba diver in the process of shifting seabed gravel to find alluvial diamonds. Image by Lance Cogill (Instagram @lancecogill).

With increasing demand from consumers to know where their diamonds come from, it was only a matter of time until a brand like Ocean Diamonds emerged into the public eye. More than a decade ago, Robert Goodden, an international expert in marine mining projects, watched as local divers sorted through bags of gravel recovered from the seabed at Alexander Bay – a town at the extreme north-west of South Africa on the southern bank of the Orange River and the border of Namibia. What emerged from these bags of ocean gravel was a 15-carat octahedral diamond, sparkling in the sunlight.

At the time, Goodden was in the region as an advisor to local diamond operations owned by the South African State, but he nonetheless decided to register Ocean Diamonds Ltd and oceandiamonds.com as a future investment. Jump forward to 2018, having sold his offshore drilling business specialising in marine geological and geotechnical sampling, Goodden found time to pursue his long-held Ocean Diamonds dream.

"I am an engineer and geologist specialising in ocean mineral deposits, so I know the ways of the sea," Goodden says. "I am totally inspired by the



The Ocean Diamonds fine jewellery aesthetic, captured in a model shot by Goodrest Studios and featuring jewellery made by UK designers Ellie Air Jewellery and Jessie Harris.

geological story of ocean diamonds, which dates back 100 million years from the moment diamonds started their journey to the sea and billions of years from the moment the diamonds actually formed within the earth."

To get the business off the ground Goodden and his associate, Michelle Wood, turned to Elly Buck – an arts graduate with marketing and photographic skills – to rebrand Ocean Diamonds into a contemporary fine jewellery business, complete with social media channels and finished jewellery pieces. The results of all this hard work are clear to see today.

Goodden continues: "Ocean Diamonds works with local geologists and operators who are indigenous South Africans and who are fully engaged with their local communities. This is an on-going relationship, and we believe there is a good feeling towards our company and what we are trying to do. We are seen as a voice for the courage and hard work of the diamond divers and their families and friends."

> I am totally inspired by the geological story of ocean diamonds, which dates back 100 million years from the moment diamonds started their journey to the sea and billions of years from the moment the diamonds actually formed within the earth.

Two scuba diver prepare to diver for diamonds in the far north west of South Africa.

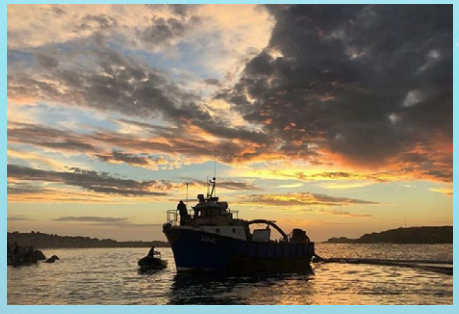
When it comes to consumers, Goodden and his team believe that fine jewellery buyers will buy into the romanticism of ocean diamonds, as well as the more controlled environmental impact associated with this kind of diamond recovery from the seabed. "They understand the connection and romance of a product clean out of the sea," explains Goodden. "Customers like the provenance and knowledge that their stone came from the coast of South Africa or Namibia and even who was involved in its discovery."

At the moment, Ocean Diamonds is operating with minimal competition from other brands specialising in →

A parcel of rough diamonds extracted from the ocean floor.

diamonds from the seabed. This means they have the potential to set the conversation and educate consumers in the right way. Goodden says: "We hope to trade a sufficient amount of diamonds to have a sustainable business within our first year. We want to go into all the details of the geological story and tell it well. We also intend to tell the stories of those who recover the diamonds and their daily lives."

Thanks to his experience on the ground in South Africa and Namibia, Goodden has built strong relationships with local agents who support the brand in purchasing diamonds at public tenders. As its buying power increases, Ocean Diamonds is in discussions with concession holders and contractors to buy direct from source and stipulate its own requirements on sustainable, ethical and environmental essentials that must be met before a purchase takes place.



The artisanal industry of diving for diamonds is conducted on a small-scale by local specialists in South Africa and Namibia. Image by Ryno Kriel (Instagram @rynomakriel).

Goodden says: "We do not see a limit on the availability of diver-recovered diamonds for several years. In the future we may find there's a limit and would then obtain large quantities from dredging vessels. However, if this happened, we would have to educate the market to accept the recovery process, which in our opinion still satisfies the 'low environmental impact' criteria."

In today's saturated diamond marketplace, finding a niche and taking the bold step to follow through is a solid strategy. Although Ocean Diamonds is in its early days, its focus on low environmental impact sourcing and local communities, coupled with a shift away from heavy industrial processes, taps into the contemporary consumer mindset. Could this be a recipe for success? We look forward to finding out. ■

'Raw' Ocean Diamond rings, crafted by Ellie Air Jewellery (top) and Jessie Harris (bottom). Photograph by Goodrest Studios.

Alluvial Diamonds: The Facts

Brush-up on your alluvial diamond knowledge with this guidance from the World Diamond Council.

What are alluvial diamonds?
Alluvial diamonds is the term used to describe diamonds that have been removed from the primary source (Kimberlite) by natural erosive action over millions of years and eventually deposited in a new environment such as a river bed, an ocean floor or a shoreline.

What is alluvial diamond mining?
Alluvial diamond mining is the term used to describe the process through which diamonds are recovered from such deposits of sand, gravel and clay. Large concentrations of alluvial diamond deposits are mined on an industrial basis. However, most alluvial diamond deposits are spread across huge geographic areas which cannot be easily isolated and therefore are not mined industrially. These deposits are mined informally, in a non-regulated way. This is (commonly) known as artisanal or small scale-alluvial diamond digging.

Around 10% of the world's rough diamonds are sourced through industrial alluvial mining and 14% through artisanal or small-scale informal alluvial diamond digging.

Where are alluvial diamond deposits found?
Alluvial diamond deposits are found on the Atlantic coast of South Africa and Namibia, as well as in some riverbeds in Angola, Sierra Leone, Democratic Republic of Congo, Central African Republic, Cote d'Ivoire, Guinea, Ghana, Liberia, Tanzania, Togo, Brazil, Venezuela, Guyana and South Africa.

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GemPen is available from instruments@gem-a.com for

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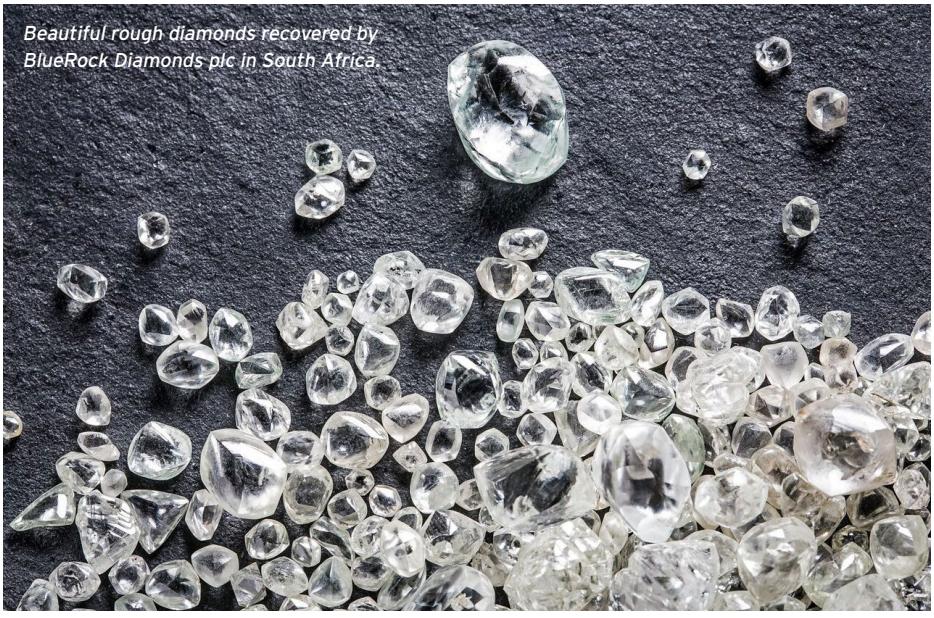
Daily operations at the Kareevlei Mine approximately 100km north west of Kimberley, in the Northern Cape province of South Africa.

THE MINING MIND-SET

With so many big players on the scene, it's easy to miss the medium-sized diamond mining companies doing great things and producing exceptional stones. Here, *Gems&Jewellery* speaks to Gus Simbanegavi, Chief Operating Officer of BlueRock Diamonds plc, to find out more about its operations in South Africa.

First, a little bit of background. BlueRock Diamonds plc is an established diamond producer with operations based approximately 100km north west of Kimberley, in the Northern Cape province of South Africa. Its goal is to become a leading operator of medium-sized kimberlite assets in South Africa, according to its website, as well as other parts of Sub-Saharan Africa. And while this may sound ambitious, BlueRock Diamonds is already turning heads thanks to the exceptional quality of its diamond production, which ranks in the top 10 in the world in terms of average value per carat.



Beautiful rough diamonds recovered by BlueRock Diamonds plc in South Africa.

BlueRock Diamonds operates the Kareevlei Mine, which consists of five known kimberlite pipes across 3,000 hectares (ha). BlueRock Diamonds Chief Operating Officer, Gus Simbanegavi, explains: "There are five known diamondiferous kimberlite pipes ranging from <0.5 hectares to 5.6 hectares. Four of the kimberlites (KVW01, KVW02, KVW03 and KVW04) are situated in close proximity to each other. The three pipes that were the primary focus of historic exploration programmes are KVW01, KVW02 and KVW03, which have sub-crop surface areas against the overburden calcrete of 1.2ha, 1.1ha and 5.6ha, respectively."

HISTORY OF DISCOVERY

BlueRock Diamonds began its mining operations on K2 in 2015, and since then K1 and K5 have been further explored, with a fourth focus due to start in 2021. However, before BlueRock was on the scene a number of exploration companies worked on this 'kimberlite cluster,' resulting in various phases of prospecting and discovery.

Simbanegavi explains: "There was an airborne magnetic survey of the Ghaap Plateau by De Beers Exploration Services (DBES) and a set of anomalies were identified as kimberlite targets. DBES proceeded to drill three holes on the larger anomalies and formally discovered the Kareevlei kimberlite cluster in 1991."

Later, in 1993, further drilling and sampling of KVW02 and KVW03 calculated a grade of 2.6 carats per hundred tonnes (cpht), based on a limited sample mass of 108 tonnes taken from both pipes. "Diamond Resources (DR) undertook a phase of one metre diameter auger drilling for evaluation purposes in 1994 and, based on the limited sample volumes, individual pipe grades of 5.3 cpht, 7.8 cpht and 2.5 cpht were calculated for the KVW01, KVW02 and KVW03 kimberlite pipes respectively," explains Simbanegavi.

The next chapter in the story of the Kareevlei Mine came in early 2004, when Tawana Resources, the new owner of the kimberlite cluster, decided to do more sampling but on a significantly larger scale, thus obtaining more representative individual sample results for each pipe. The results showed that the quality of diamonds in the KVW01, KVW02, KVW03 and KVW05 pipes were exceptional, with the majority being gem quality stones.

In 2015, BlueRock Diamonds purchased Tawana's interest in the Kareevlei Mine and advanced the project into trial mining activities, coupled with the revamp of a small sampling processing plant. This work proved the quality and grades of the deposit and allowed BlueRock to incrementally increase its production volumes, bringing us right up to today.

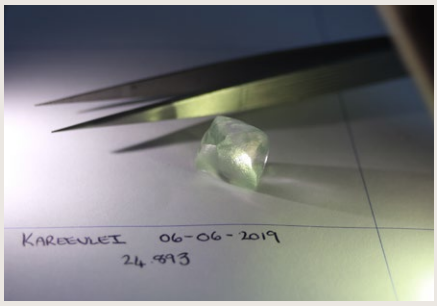
BIG MINING MOMENTS

"The mine has found six, 10+ carat sized, high gem quality stones over the past 12 months, with stones valued at above $6,500 per carat, peaking at $11,300 per carat for a 20.4 carat stone," says Simbanegavi

From geostatistical models done on the Kareevlei kimberlite, the frequency of these high value stones is expected to increase as more tonnes are processed in-line with a planned "ramp up of production" in the coming year.

In September 2019, a second diamond of more than 20 carats was mined at Kareevlei, which made for an exciting moment for the entire team. One year later, on September 10, 2020, the company announced the recovery of a 9.7 carat diamond.

The good news continued in October 2020 when a 2,900 carat diamond parcel sold at an average price of US $300 per carat. Just a few days after this sale, the company also announced the success of a 20.72 carat diamond, which sold for US $236,000 – a record value achieved for a single stone from the Kareevlei Mine. The previous holder of the top spot had been a 24.8 carat stone, which sold in June 2019 for US $190,000.



A 24.8 carat diamond found at the Kareevlei Mine. It later sold for US $190,000.

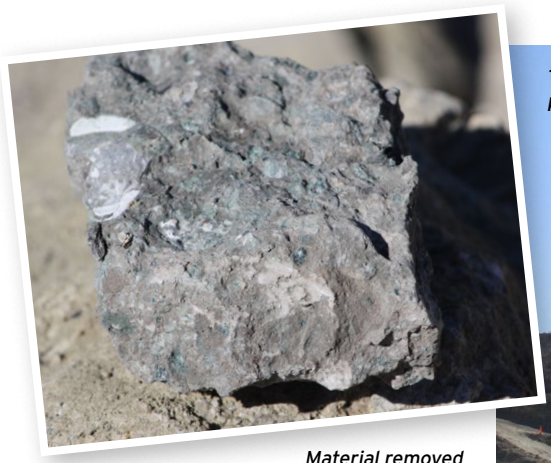
A 20.4 carat diamond found in the last 12 months at the Kareevlei Mine, which peaked prices at US $11,300 per carat.

MINING IN ACTION

Today, BlueRock Diamonds conducts mechanised open pit mining at the Kareevlei Mine. The process uses hydraulic excavators and dump trucks in three mining areas, specifically KV1, KV2 and KV5, which deliver directly to a central plant. Currently, 5,500 tonnes of rock are mined daily, of which +/- 2,000t is kimberlite ore and the rest is waste material. Simbanegavi continues: "The +/-2,000 tonnes of kimberlite ore is then crushed, screened and processed through a combination of a wet pan plant and DMS (Dense Medium Separator) plant. After the process, a diamond rich concentrate equating to less than 0.2% of initial feed is then put through an X-Ray sorting scanner machine, which identifies and takes out the diamonds for final sorting and acid washing to create final rough diamonds for sale."

Mining currently takes place primarily in KV1 (1.1 ha) and KV2 (1.3 ha), both of which have recently been joined into a single 'Main Pit'. KV5 is also occasionally mined but is a much smaller pipe of 0.36 ha. Simbanegavi explains: "Our largest kimberlite pipe is KV3, which has a size of 5.6 ha of which currently 2.3 ha have been signed off to a depth of 60 m. The remainder of the pipe has been confirmed geologically to be a kimberlite pipe, initial historical samples have indicated that it has some areas which a barren. More work will be done to understand this scenario as similar geological phases occurring in KV1 and KV2 have diamonds at reasonable grades." →

The Kareevlei Mine currently employs 131 people who are mainly from the local community and surrounding towns, such as Kimberley.



Material removed from the Main Pit and ready for processing.

The 'Main Pit' combining the KV1 and KV2 kimberlite pipes at the Kareevlei Mine.

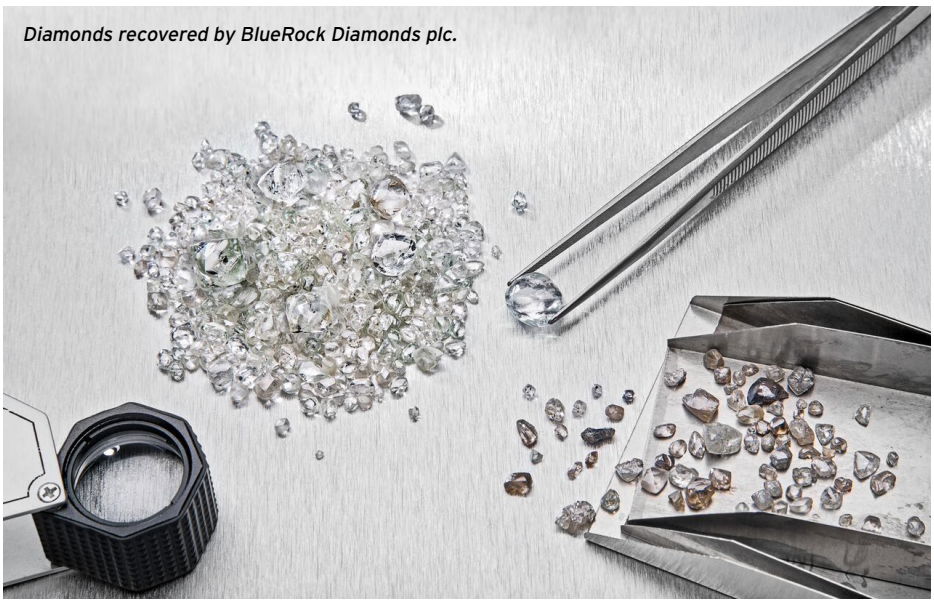
Jock Robey, a Consulting Geologist to BlueRock Diamonds, has some more insights into the Kareevlei kimberlite pipes. He says: "Kareevlei has the complete set of mantle/kimberlite indicator minerals: peridotitic and eclogitic garnets, chromite, ilmenite and lesser chrome diopside. This cluster of kimberlite pipes can best be described as a low grade, high value diamond producer. In this sense, it is similar to the Koffiefontein Diamond Mine. Interestingly, it is the lowest grade primary kimberlite pipe currently being mined in South Africa. Here at Kareevlei, diamond quality is what counts."

Robey continues: "From a geochemical and mineralogical point of view, the Kareevlei kimberlites are classified as Group 2 kimberlites, similar to that of the nearby Finsch and Bellsbank diamond mines. These Group 2 kimberlites are dominated by a phlogopite matrix and are slightly older at 120 million years (my) than the type area Group 1 kimberlites (90 my) of Kimberley. Kareevlei, in addition, has common leucite in the rock matrix and there is speculation amongst kimberlite petrologists of a genetic link here with lamproites similar to the Argyle mine in Australia."

NEW PERSPECTIVES

To put the business' size and scale into perspective, the Kareevlei Mine currently employs 131 people who are mainly from the local community and surrounding towns, such as Kimberley, which has a long history and association with diamond mining.

> Kareevlei Mine... is ranked in the top six diamond mines producing the world's high value diamonds by price per carat...



Diamonds recovered by BlueRock Diamonds plc.

The Mine is also recognised for the quality of diamonds that emerge from its depths. "Kareevlei Mine is one of the most unique mines globally and is ranked in the top six diamond mines producing the world's high value diamonds by price per carat," notes Simbanegavi. "Kareevlei has not produced any Type IIa stones to date, however, the pipes produce a high proportion of white gem dodecahedrons and only a small proportion of browns and 'near gems'. The mine averaged $415 per carat in 2019."

He continues: "The Kareevlei Mine is also a 'coarse' mine, with an average stone size of +/- 0.35 carats, with the size frequency distribution favouring larger sizes and the smalls not being the majority."

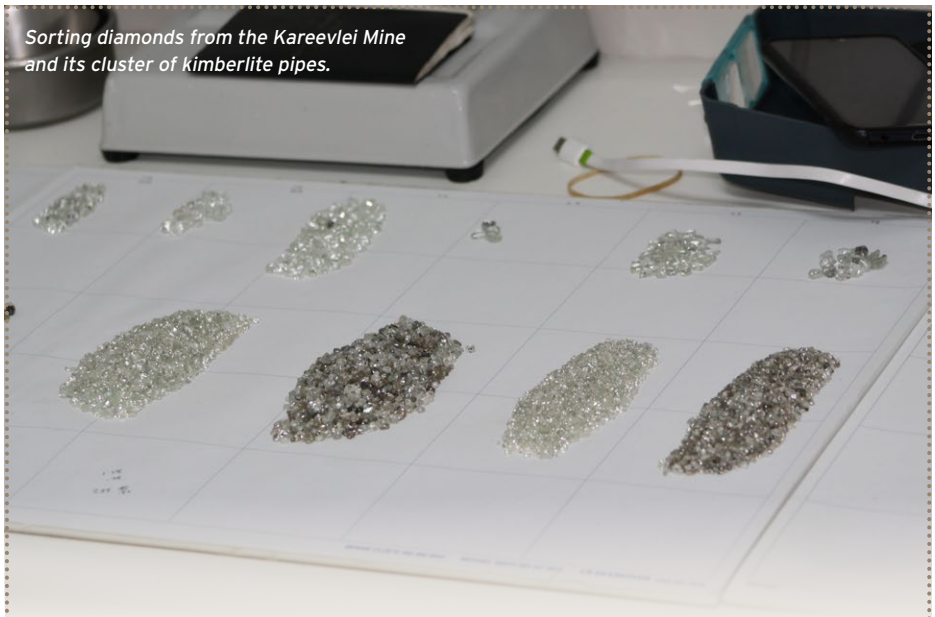
In August 2020, BlueRock Diamonds processed 41,000 tonnes of ore from its main pit at Kareevlei Mine and the diamonds mined had an average grade of 5.1 cpht. According to a press release from the company, this is a "significantly improved" figure that provides a lot of optimism in what has been a challenging year for mining companies, and indeed the entire diamond supply chain.

LOOKING TO THE FUTURE

"Like all business in the world, COVID-19 initially shocked the operations at Kareevlei, resulting in the total stoppage of all operations for a period of 50 days," explains Simbanegavi. "Procedures and systems for the operations teams were put in place at the mine, allowing for protection, screening, monitoring and isolation of staff, if necessary."

He continues: "The Kareevlei Mine is generally a highly mechanised operation which made the social distancing protocol easier to implement. The plant areas have workstations that allow a single person to operate each station. However, where closer distancing was required, PPE was and is still provided, and is worn at all times."

While the on-going saga of COVID-19 continues, mining operations like BlueRock Diamonds are resilient and continue to do what they do best, even despite challenging trading conditions. With a succession of sizeable diamond finds and encouraging price-per-carat sales, BlueRock Diamonds is smaller than the 'big boys' of the mining world, but no less mighty. ■



Sorting diamonds from the Kareevlei Mine and its cluster of kimberlite pipes.

WEIGHING IT UP

Gus Simbanegavi, Chief Operating Officer of BlueRock Diamonds plc, explains some of the positives and challenges of being a small-to-medium sized diamond producer in a market dominated by big players.

Positives

"We have the ability to keep both the processes and our systems simple, which in turn assists with overall cost structures. These reduced overheads allow for the exploitation and mining of a much lower grade, as well as marginal deposits/orebodies."

"We have much closer and more involved participation from senior management, which reduces the 'red tape' and allows for quick decision making, creates flexibility and allows for high productivity and efficiencies on the ground."

Challenges

"There are stringent regulatory requirements, especially in South Africa, which are costly due to the smaller volume of our operations. For example, the safety, reporting and legal requirements from regulatory bodies are the same for small mines and larger mines. This adds additional overheads due to a lower volume base."

Today, BlueRock Diamonds conducts mechanised open pit mining at the Kareevlei Mine.

All images courtesy of BlueRock Diamonds plc.


Ryan Shearman.

A BREATH OF FRESH AIR

Instead of mining carbon from the earth, why can't we pull it from the sky? US-based start-up business, Aether Diamonds, is using carbon dioxide from the atmosphere to make diamonds for a new fine jewellery line. *Gems&Jewellery* spoke to 'Chief Alchemist', Ryan Shearman, to find out more...

The rising rate of carbon dioxide in the atmosphere is a well-documented culprit in climate change and developing methods of extracting excess gasses from the world around us is a growing field. Companies like Climeworks, in Switzerland, build and operate direct air capture machines, which collect carbon dioxide in a form that can either be recycled, used as a raw material or safely stored.

Some of this carbon dioxide finds its way to Aether — a start-up business using air-captured carbon as part of the laboratory-grown diamond process. Described as the "world's first carbon-negative diamonds" by Chief Executive Officer (and Chief Alchemist), Ryan Shearman, the first Aether diamond jewellery collection will offer consumers a way to off-set their carbon footprint through jewellery.

Having first read about the business in American business magazine, *Fast Company*, we reached out to Shearman with our own questions. Here's what he had to say...

What is the story behind Aether and how did the business start?

I co-founded the business with Dan Wojno, a former colleague I met about a decade ago while working at [American designer jewellery company] David Yurman. Dan worked on the women's line and I was one of the early employees on David Yurman's men's team. I oversaw the development of new product collections that featured exotic materials not endemic to the jewellery industry.

Prior to that, I ran a metal casting facility that produced high-end consumer products using a wide range of different metal alloys. It was this unique blend of experience in material science and jewellery, coupled with a personal passion for combating climate change, that led to us coming up with the idea for Aether.

You receive air captured carbon dioxide at your Aether facility in Chicago. What can you tell us about the process of converting this to carbon for creating diamonds?

We have developed a patent-pending process for converting atmospheric CO2 into a special hydrocarbon precursor that is suitable for use in CVD diamond synthesis. Traditionally, the carbon source comes from fossil fuels. Initially, this idea seemed pretty straight forward, but it turned out to be a remarkably difficult challenge that took years to solve. There are lots of little issues that were impossible to anticipate, even with highly skilled scientists and engineers with decades of relevant experience attached to the project.

What makes your diamonds a more appealing alternative for consumers compared to laboratory-grown diamonds created in the 'traditional' way?

What we've seen in consumer purchasing behaviour lately is that people are increasingly focused on aligning their purchasing decisions and the brands they choose with their personal values and beliefs.

We believe Aether will be perfectly positioned to deliver on those consumer expectations, because we will be the most responsibly sourced and ethically minded diamonds available, in addition to being the most transparent. What ordinary laboratory-grown diamonds don't tell their customers is that they source their carbon from fossil fuels (via drilling and fracking), despite their claims of being sustainable and eco-friendly. They engage in greenwashing to distract from the fact that they still rely upon damage to the planet to create their product.

Aether diamonds are a totally different concept. We source our carbon from harmful carbon dioxide pollution in the atmosphere, effectively helping to reverse climate change while producing the highest quality diamonds that will be found in the market. We'll not only be the only diamond in the world that's good for the planet, but we'll also be the world's first carbon-negative diamonds.

When you say 'carbon-negative' can you contextualise this for us?

The average American is responsible for 16 metric tonnes of CO2 emissions per year. The net carbon offset provided by each carat we produce is -20 metric tonnes. If a customer purchases a 2-carat engagement ring from us, for example, they will have offset their own personal carbon footprint for the next 2.5 years. Ours are the first and only diamonds in the world that directly combat climate change instead of contributing to it in some way.

How scalable do you think the business of carbon-neutral diamonds is? Do you see it as a growing market?

Our manufacturing process is extremely scalable. The bottleneck, as it is for all lab-grown diamond producers, is the number of reactors we have running. That's why we're already experimenting with ways to adapt our manufacturing process to work with HPHT as well as CVD. The market for carbon-negative diamonds is most certainly primed for significant growth and we're well-positioned to not only ride that wave but help drive it.

You will be incorporating your diamonds into a fine jewellery collection. When do you plan to launch this range?

We'll be launching at the end of this year with our first jewellery collection. Our designs will have a modern touch with elements of intrigue throughout. Several design features we're playing with are air, light, asymmetry, negative space, and elemental components. We're also diving into the use of the human element of jewellery that allows us to use skin as a canvas for the pieces.

How will you go about marketing your diamonds and your jewellery?

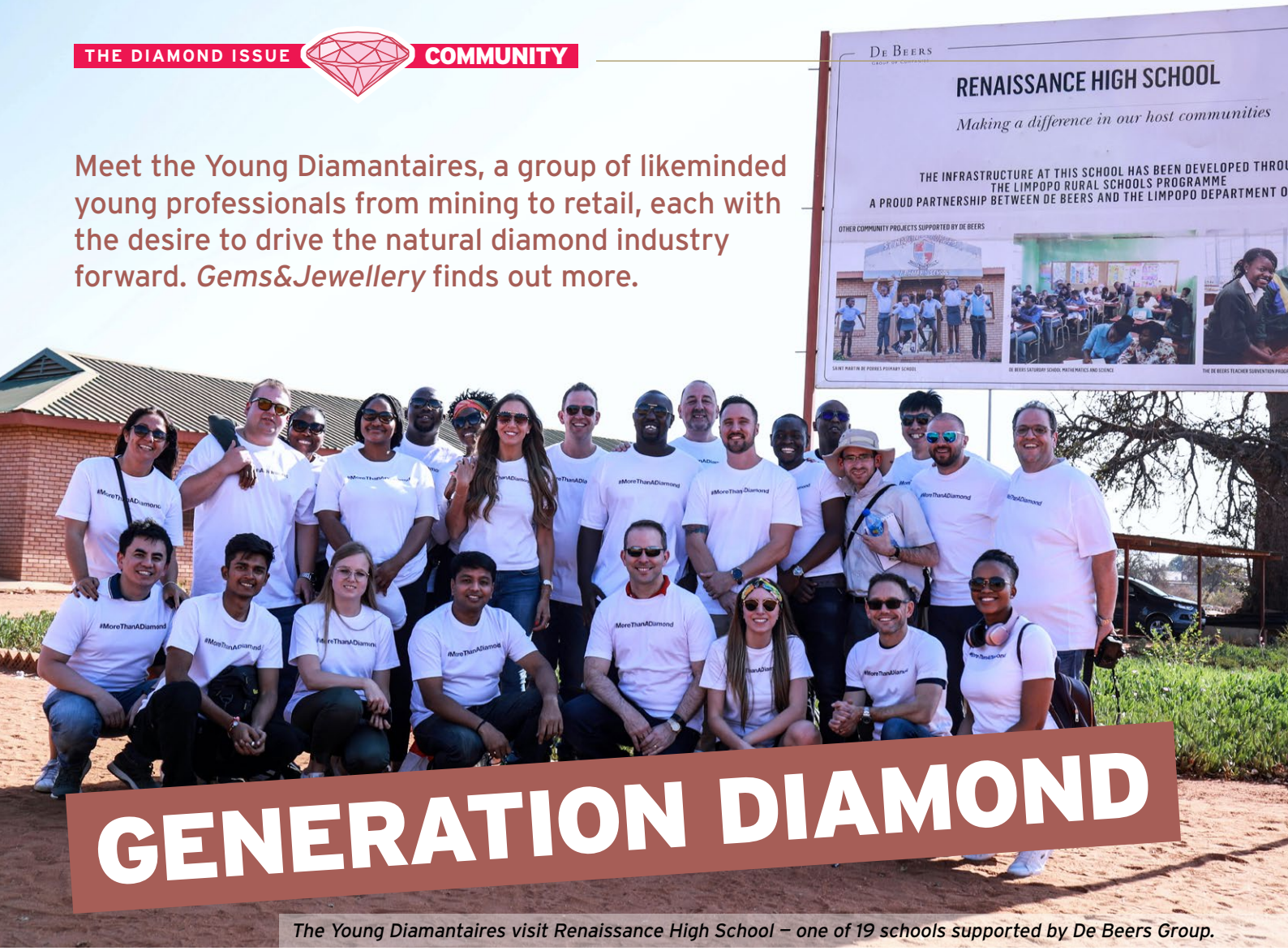
We'll have a multi-pronged approach to marketing for Aether, but for right now we're not disclosing too much of our plans. We'll be launching as a digitally native brand, and so the online world will be hugely important for us. We absolutely believe that consumers are ready for this, and we're seeing data from both inside the industry and across multiple other markets that indicate to us that consumers want and deserve better products with more integrity behind them. The mined diamond industry is so heavily promoting itself because they know their time is coming to an end. We think that it's as clear to consumers as it is to us that there are better options than destroying the planet for personal gain. We're on the right side of history; mined diamond companies aren't. ■

Find out more about Aether by visiting aetherdiamonds.com.

An example of an Aether Diamond created via CVD methods using carbon from 'air-captured' carbon dioxide.

All images courtesy of Aether.

Meet the Young Diamantaires, a group of likeminded young professionals from mining to retail, each with the desire to drive the natural diamond industry forward. *Gems&Jewellery* finds out more.



GENERATION DIAMOND

The Young Diamantaires visit Renaissance High School – one of 19 schools supported by De Beers Group.

Back in 2016, Rami Baron, Chairman of the World Federation of Diamond Bourses' Promotions Committee and President of the Diamond Dealers Club of Australia, came upon an idea. Why not bring together a dedicated group of young diamond professionals to provide a millennial 'think tank' for the industry? That year, the 37th World Diamond Congress took place in Dubai and included a small meeting of minds, with all those invited to participate under the age of 45. That small meeting swiftly developed into a 300-member networking group from 18 countries called the Young Diamantaires.

The group almost exclusively communicates via WhatsApp and has, more recently, begun to spread its wings with a website, industry collaborations and a charitable agenda. Describing itself as a 'platform', Young Diamantaires members engage in discussions on industry topics and participate in global networking events. For Rami Baron, however, the group has an even more important purpose... to help young professionals cultivate a path towards senior leadership roles within the WFDB and other leading industry bodies.

"My goal was to create and guide the next generation," says Baron. "The aim of the Young Diamantaires was to create a social environment and keep posing questions about what is important and what the challenges are. One of our goals is to develop the next generation of leaders through an organisation grounded in mutual respect."

He adds: "Our goal is to give this next generation of up-and-coming diamantaires the exposure of how organisations can be run effectively, so they have the initial learnings to help them one day take over big organisations. You have to learn somewhere and this is a great new-age training ground for what is coming next."

Paris-based Elodie Daguzan, Executive Director of the World Diamond Council, was one of the first members. She says: "Rami had this idea to create a safe space where the new generation would feel comfortable to engage on various topics. Today the group has evolved, the members have matured, and the group has given me hope for the future of our industry. Members of the Young Diamantaires are passionate about the business, they have ideals and they want to change things for the better – that is the quintessence of youth."

The platform also shines a spotlight on individuals in the supply chain who are doing great things and breaking 'traditional' moulds with innovative ways of doing business. "We are first generation diamantaires, so for us, access to people that have been in the industry for longer is vital," explains Mosibudi Jo Mathole, Founder and Director of Kwame Diamonds, which has earned international praise for nurturing female talent in diamond dealing and manufacturing.

She says: "You need to keep current and innovative in this industry, otherwise you will not grow. Young Diamantaires is made up of a group of young people who are very current, very relevant and technologically advanced. Collectively, we

are doing business differently. There is a spirit of building business for the better, for generations to come. Everybody has a part to play, there is no time to sit dormant and just be a passenger on the bus… it is very engaging."

With slow and steady growth since its inception, Young Diamantaires enjoyed a jolt of recognition in September 2019, when a group of its members were invited to explore the Venetia diamond mine in Limpopo, South Africa. Organised by De Beers Group and the World Federation of Diamonds Bourses, 25 Young Diamantaires from 10 countries saw first-hand how the mine operates, how its communities are supported through local initiatives and how the ecosystem of a diamond mine functions on a daily basis. David Troostwyk, Director of Salotro Ltd and Board Member of the London Diamond Bourse was one of the Young Diamnataires on the trip. He says: "We met up in Johannesburg and travelled by bus to the Venetia Mine; it is about an eight-hour bus journey, on the border of South Africa, Zimbabwe and Botswana. One of the things that really stood out to us was the good work that De Beers does in terms of the environment, clean water and looking after the land they are mining. We weren't aware of how much goes into regeneration and looking after the people there."

During this visit, the Young Diamantaires were invited to Musina, the northernmost town in Limpopo with residents numbering around 40,000, many of whom are employed in neighbouring diamond mines. Here, they visited the Renaissance Secondary School, one of 19 schools De Beers has helped to build as part of a School Infrastructure Development Program, in partnership with the South African government.

Troostwyk explains: "Whilst we were there, the headmaster told us they started in 2008 with 120 pupils, four teachers and four classrooms. Today, it has 36 teachers, 24 classrooms and 1,329 students. What they don't have is a kitchen, dining area or a library, and we all felt committed to making a positive impact on this diamond community."

With a waiting list of around 1,500 pupils hoping to attend the Renaissance Secondary School, the Young Diamantaires decided to establish a charitable initiative to raise

> … they have ideals and they want to change things for the better – that is the quintessence of youth.

AU $500,000 to support the school and continue its important work. It established a fundraising committee and set-up and online Go Fund Me campaign, raising AU $20,000 in just five hours.

Troostwyk adds: "We are looking to raise funds from within the industry so that everyone can take some type of ownership and genuinely say they have offered their support. We want to bring in stakeholders, whether they be jewellers, jewellery manufacturers and brands, whoever wants to come along on this journey with us. Together we can achieve so much more, which is why a charitable project like this is so important. It doesn't just reflect on the Young Diamantaires, but on the industry as a whole."

Of course, what started in 2019 has been challenged by the COVID-19 pandemic of 2020. The Young Diamantaires have shown resilience and are continuing to work towards a range of goals, both in terms of industry recognition and charitable giving. Members took part in the 39th World Diamond Congress – the first one ever to be hosted virtually – in September 2020, and announced a collaboration with Diamonds Do Good (formerly The Diamond Empowerment Fund) to host a Virtual Global Gathering on October 29 titled, 'Understanding Current Consumer Values to Capture Market Share for Natural Diamonds'. Proceeds from the event were channelled into the Go Fund Me campaign for the Renaissance School.

Even though all members of the Young Diamantaires group have their own full-time jobs, they have shown admirable commitment to driving the group's positive mission forward. And, with access to a 300-strong network of professionals throughout the diamond pipeline, Young Diamantaires is in a strong position to share positive stories about the diamond industry with the wider world.

For Rami Baron, the platform has developed into something far beyond his expectations. He says: "When someone reaches our to you on private message and says, 'thank you for supporting me' or 'thanks for believing in me and giving me this opportunity,' it is a wonderful thing. When you see someone rise up, it's the best!" ■

To find out more about the Young Diamantaires and apply to become a member, visit ydts.org. To donate to the Go Fund Me campaign, please visit uk.gofundme.com/f/yd-fundraising-one.

The Young Diamantaires at a networking event in Johannesburg, South Africa.

All images courtesy of Young Diamantaires and David Troostwyk.

Looking ahead to 2021

After a year that none of us expected, we're choosing optimism and looking ahead to a happy, healthy and successful 2021 with our Members at the heart of everything we do. Here's what you need to know...

What a year it has been! As our CEO Alan Hart noted in his Editor's Letter, "despite the uncertainty and disquiet of our current times, we've been working tirelessly to do everything possible to support our Association and its core function of education and membership". With this in mind, we have spent our time behind-the-scenes focusing on efficiency and introducing new measures that will make processes like renewing your membership and updating your details easier.

EASIER WAYS TO PAY

We have listened to the feedback provided by our Members and streamlined our 'ways to pay' by introducing GoCardless and PayPal subscription services. These annual payment methods mean you never need to miss a renewal, as your payment is already in place and ready to go each year. We are pleased to say that many of our Members now opt to pay via a recurring payment method and we hope more of our Members will access this payment method in 2021.

We've made it very simple for Members to renew their membership via the Gem-A Website, which is an especially helpful way of continuing your Gem-A Membership in these unprecedented times. Due to ongoing regulations in the city of London, and elsewhere in the world, the Gem-A team is being encouraged to work from home as much as possible. With that in mind, we would kindly discourage you from sending cheques and we will also be unable to take payments over the phone.

The most secure way to pay is via the Gem-A website. Simply login and choose to pay via annual subscription or a one-off PayPal payment. We are also still able to accept bank transfers. Don't forget, if you get stuck or need us to walk you through these processes, our Membership Secretary is still available via email on membership@gem-a.com.

NEW FEATURES

Unlike previous years if you choose to pay for your membership via the Gem-A website, you will receive an automated receipt. This is a new feature that we have introduced this year to combat wait times and ensure that you have all the necessary paperwork you require, whether for your business or personal records.

Another new feature is being able to update your details online. Our goal is

> Recognition. FGA & DGA membership gives credit to my knowledge and experience; plus it's a matter of trust.

to ensure you can quickly and easily change your email and postal addresses via our website. This will help to make sure you don't miss an issue of *The Journal of Gemmology* and don't miss-out on alerts, email correspondence and updates about the online publication of *Gems&Jewellery*. You can now log-in to the Gem-A website and ensure your details are correct.

IMPORTANCE OF FGA DGA

We currently offer a range of membership options that accommodate alumni of our Gemmology Diploma and Diamond Diploma courses, corporate businesses and individuals without gemmology qualifications (or current students) who can apply for Associate Membership.

Those who have successfully completed the Gem-A Gemmology Diploma or Diamond Diploma and apply to become Members can use the letters FGA (Fellow of the Gemmological Association) or DGA (Diamond Member of the Gemmological Association) after their name. These post-nominals are an exclusive Membership benefit that demonstrate knowledge and professionalism on an international level. Plus, the FGA DGA Register is publicly displayed on the Gem-A website so customers, clients and colleagues can see they are working with someone who can be trusted.

We have been successfully inviting Gem-A Graduates to become Fellows since 1931. Unfortunately, one of the most common mistakes in the wider Gem-A community is the misuse of post-nominals, more specifically by those who have completed Gem-A courses but are not Members. We remain committed to making sure everyone associated with Gem-A understands this distinction.

We want to thank all our Members for their ongoing support to our great Association. Now more than ever, we are proud of and inspired by all Gem-A Members who have kept their part of our diverse industry going during this international pandemic. By being part of a highly regarded and well-respected global network of gemmology professionals, you will help our Association to continue its core focus of developing the next generation of gemmologists. We are the world's longest serving provider of gem and jewellery education and we look forward to continuing this tradition of excellence for many more years to come. ■

Visit gem-a.com/membership for guidance and support.

A BIG THANK YOU!

We would like to thank our Corporate Members, who continue to support the goals and initiatives of Gem-A. If you would like to find out more about Corporate Membership, please contact membership@gem-a.com

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- Berganza Ltd
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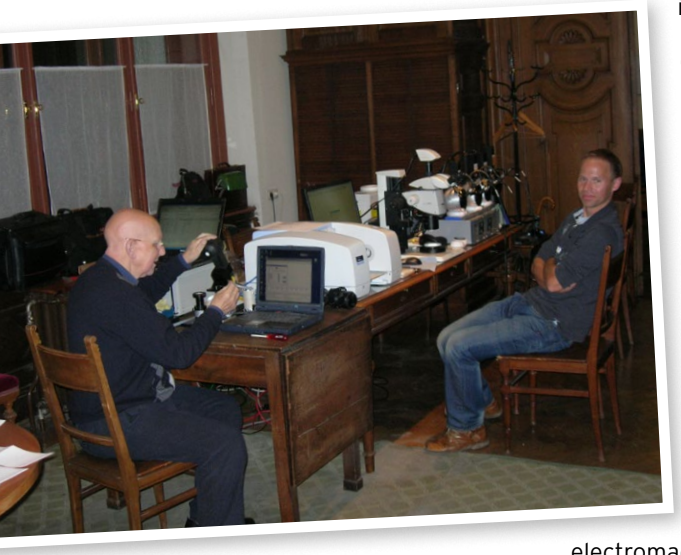
WRESTLING WITH RADIATION

Franck Notari, a colleague of Dr Thomas Hainschwang, in Vienna in 2012 conducting another test of green diamonds.

The origin-of-colour determination of yellow-green to green to greenish-blue diamonds with radiation-related colour is one of the biggest challenges in diamond testing. Here, Dr Thomas Hainschwang, Director of GGTL Laboratories in Liechtenstein, shares insights into an ongoing research project that addresses this challenge head-on.

The origin of colour determination of fancy colour diamonds is amongst the most difficult and specialised task in gem testing. Within this task, there are some coloured diamonds that are comparatively easy, while for others the determination of colour origin is difficult – sometimes even impossible.



George Bosshart and Dr Thomas Hainschwang at the Natural History Museum in Vienna testing green diamonds.

The most difficult coloured diamonds include stones that owe their colour to irradiation-related defects such as yellow-green to green to greenish-blue diamonds. The problem of such diamonds is that their colour is caused by irradiation with or without annealing, and that while this occurs in nature, it can also be imitated through artificial laboratory irradiation – and annealing.

THE PROBLEM

The problem created by the situation mentioned above is that natural and artificial irradiation with or without annealing create pretty much identical defects in diamond.

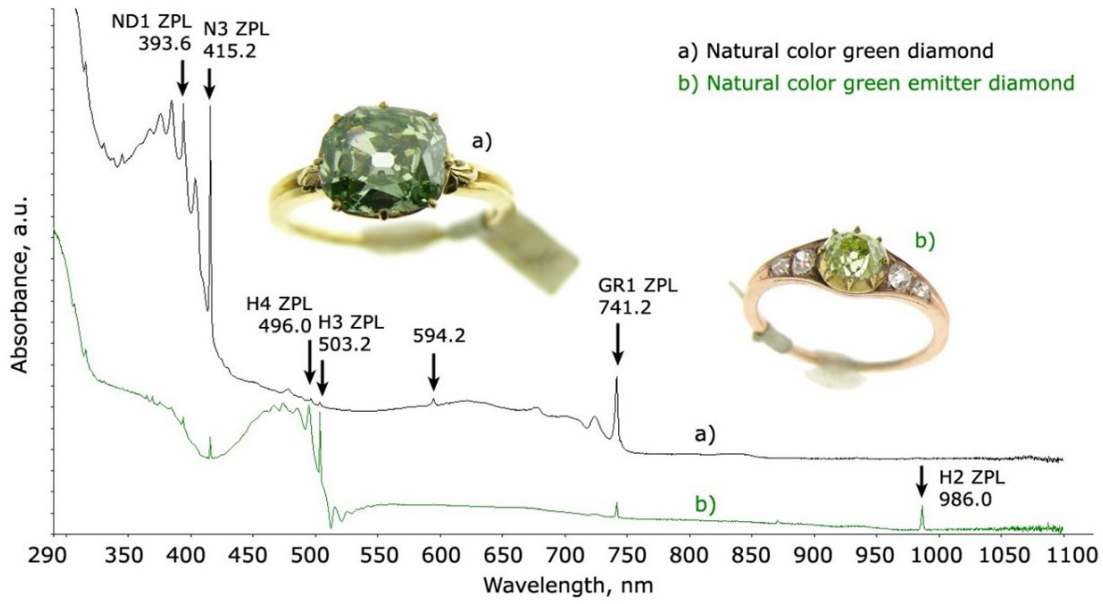
Irradiating diamond with highly accelerated particles such as electrons or neutrons or theoretically by prolonged exposure to gamma irradiation – the shortest and thus highest energy wavelengths of the electromagnetic spectrum – knocks carbon atoms out of their lattice site.

The empty lattice site is called a vacancy, and this vacancy exists in a neutral charge state as well as a negative charge state. The knocked-out carbon atom does not just disappear, but it is put into a site between the carbon atoms and are then known as (carbon) interstitials.

While gamma rays are the most likely candidates for having induced the colour of most natural green to greenish blue diamonds, in artificially coloured diamonds it is by far the least likely candidate, since it takes months or more commonly years of irradiation by gamma rays to produce any colour in a diamond.

Today by far most irradiation treated green to greenish blue diamonds in the market are irradiated by electrons and much more rarely by neutrons. If a black colour is desired by irradiation, then most typically neutrons are used as a source, since they are most efficient in causing vacancies in diamond; the problem with neutrons is that they can cause lasting radioactivity in diamonds with inclusions, while this problem does not occur with electrons.

Now when testing yellow green to green to greenish blue diamonds coloured by irradiation, the results



The UV-Vis-NIR absorption spectra of two mounted historical diamonds with irradiation-related colour, acquired with the pieces kept at 77K in liquid nitrogen. Sample a) is a diamond with green body colour, while sample b) is a yellow diamond with very strong green fluorescence, a so-called 'green emitter'.

obtained from the typical testing performed by even very well-equipped gem testing laboratories are practically identical between naturally coloured and artificially coloured diamonds, and it is often a seemingly impossible task to tell whether such irradiation-coloured diamonds are of natural colour or if they have been treated.

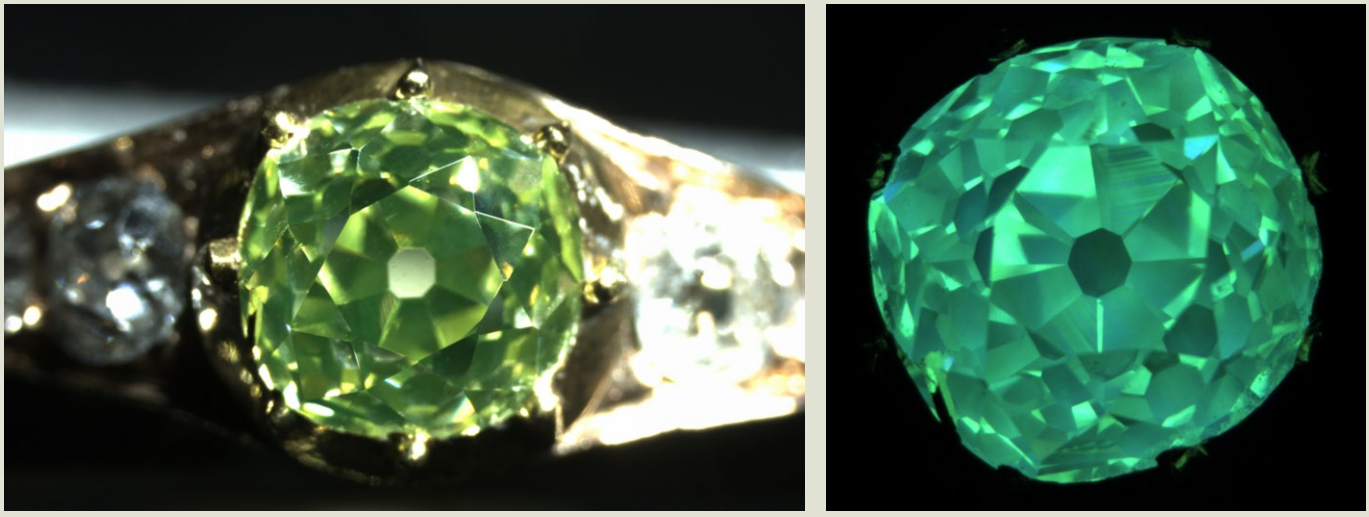
NATURAL VS ARTIFICIALLY IRRADIATED DIAMONDS – THE RESEARCH

A new approach to solve this problem was started in 2009, when a giant research project involving the testing of coloured irradiation-related yellow-green to green to greenish-blue diamonds of known natural origin was started.

This project was extended into an even bigger diamond treatment project, in which we have treated several hundred diamonds by different types of irradiations and by subsequent annealing up to HPHT conditions.

The project included the testing of known naturally coloured diamonds, particularly stones kept in museums since prior the time when irradiation became commercially available (approx. 1950 for neutrons and electrons).

For this, we transported all the equipment from the lab all the way to the museums to be able to test onsite, which by itself was a major operation. The data obtained from such stones became some of the most valuable data that our laboratory has ever acquired, such as the UV-Vis-NIR absorption spectra seen above. The data includes absorption and luminescence spectroscopy from the deep UV all the way to the infrared as well as imaging with microscopic techniques and ultraviolet with the DFI luminescence system. Some of the spectroscopic techniques used were specifically developed and/or modified for the testing of diamonds with irradiation-related colour, since the standard techniques often did not reveal sufficient information to conclude on the origin of colour. →



Two views of a historical 'green emitter' diamond under strong daylight and under LWUV, respectively.

THE DRESDEN GREEN DIAMOND

Not much is known of the early years of the Dresden Green, a rare Type IIa pear-shaped natural green diamond housed in the Green Vaults of Dresden in Germany. At approximately 41 carats, it is the largest natural green diamond known and is set in a mounting dating from 1746, converted to a hat ornament in 1768.

We know that the stone was offered for sale to the King of Poland by a London dealer in 1726, and had therefore probably been mined from an alluvial source in India (the only known locality for diamonds at this point in history). In 1988, a team of GIA gemmologists assessed the stone as being VS1 clarity, but potentially flawless with uniform 'Fancy Green' colour throughout the stone.

In 1904, the British scientist Sir William Crookes presented his findings on the colour treatment of diamonds to the Royal Society of London. Crookes had buried some Cape colour diamonds with radium salts, initiating a process of irradiation which turned the stones green.

The Dresden Green Diamond – a 41 carat (8.2 g) natural green diamond, which probably originated in the Kollur mine in the state of Andhra Pradesh in India. Here it is pictured as part of a hat clasp ornament. (By ubahnverleih – own work, Creative Commons).

The biggest part of this study was, and still is, the irradiation treatment project. For this project, several hundred diamonds of all different types and colours were selected by their properties and then irradiated by different methods including electrons and neutrons. Prior to and after irradiation all the samples were documented and characterised by all available analytical methods, and then stepwise annealed from 150 to 1500°C (all samples) to 2500°C (selected samples).

After each of the 14 annealing steps all data for the diamonds were recorded; this resulted in a very significant database for irradiation treated and annealed diamonds which allowed us to get a very profound insight into the defects created and destroyed/modified at the various treatment conditions.

Thanks to these 11 years of research invested into this project, today our laboratory is in the position to accurately and unambiguously identify the colour origin of the vast majority of diamonds with irradiation-related colour. While this conclusion holds true for all Type Ia diamonds, unfortunately we are still not at this level of confidence and experience for yellow green to green to greenish blue Type IIa diamonds, for the simple reason that there are no reference diamonds of known untreated type IIa diamonds in such colours, with the exception of the 'Dresden Green' diamond.

Unfortunately until today we were not permitted to analyse this only specimen theoretically available, because the responsible people in Dresden were afraid that the liquid nitrogen could damage the invaluable diamond, even though George Bosshart cooled the diamond already in the 1980s. Thus far, it was unfortunately impossible to convince them that cooling a diamond to –196°C was totally harmless for a diamond (and, by the way, also for by far most other gemstones), hence we could not get our hands on this magnificent and unique green Type IIa diamond.

CONCLUSIONS

The colour origin determination of diamonds with irradiation-related colours is a highly specialised task that requires a significant amount of expertise and reference data. While being the earliest diamond treatment, the distinction of untreated and treated diamonds with irradiation-related colour remains the biggest challenge in diamond testing even today.

The green diamond research project by GGTL Laboratories Liechtenstein was started 11 years ago with the final goal to solve this difficult task, and to be able to determine the origin of colour of the many diamonds out there that thus far are accompanied by reports that indicate their colour origin as 'undeterminable'.

With the data of hundreds of diamonds treated and all the data of naturally coloured diamonds, our laboratory is currently in the position to positively and unambiguously identify the colour origin of such diamonds with irradiation-related colour for the vast majority of Type Ia diamonds. Future research may enable us to do the same for Type IIa diamonds, but this depends mainly on the accessibility of reference diamonds with known natural colour origin. ■

Images courtesy of Dr Thomas Hainschwang, unless otherwise stated.

A historical naturally coloured green diamond in ring dated pre-1850, exhibited at the NHM in Vienna, that was studied for the GGTL green diamond project.

FANCY IDEAS

Richard Evans, Diamond Consultant for De Beers Group Institute of Diamonds, explains why grading fancy shaped diamonds is an art form.

Pear shaped diamonds with exceptional symmetry and proportions.

Grading fancy shaped diamonds requires highly trained gemmologists who are supported by cutting edge technology to aid the human process. The art of diamond grading is a subjective rulebook; we don't come across fancy shapes as often as round brilliant cut diamonds so we must use all our skills and experiences to come to the most accurate conclusions.

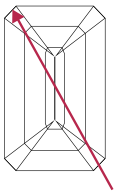
Colour Grading

Colour grading a fancy shaped diamond is more complex than colour grading a round brilliant cut diamond, largely because a fancy shaped design alters the appearance of colour from different viewing directions. For example, an emerald cut will appear lighter across its width, but darker down the length. To counter this effect, we grade all fancy shaped diamonds from the direction with the most amount of material: along the diagonal. By assessing through the diagonal, we achieve a balance of the two appearances, while maintaining the correct viewing geometry – perpendicular to the pavilion facets, with a gentle tilt to almost perpendicular to the girdle. This viewing direction will minimise external reflections and refraction from within.

Clarity Grading

Fancy shapes have a variety of different faceting designs, including those which may have pointed ends or be cut with more intricate facet designs than round brilliant cut diamonds. Therefore, the resulting appearance will have many facet reflections, which could obscure the presence of small inclusions. It is key to pay extra attention to these areas when locating and grading clarity in fancy shaped stones. However, on the contrary, busy facet patterns may accentuate the appearance of an inclusion. In princess-cut diamonds, for example, an inclusion in a corner may be reflected multiple times in the surrounding facets. Certain shapes, because of their proportions, can accentuate or hide inclusions.

Personally, I find baguette cuts the most difficult to grade. This shape is not on the list of the nine recognised fancy shapes and, even with 'preferred' proportions, there is a lot of variety in facet design. They are very good at being tricky to colour grade too; due to their long shape, transparent facet design and pointed corners. Colour often concentrates in the corners, while appearing much lighter through the body.



Fancy colour grading is performed at a diagonal viewing direction, perpendicular to the pavilion facets, through to almost perpendicular to the girdle.

Cut Grading

Fancy shapes do not receive cut grades because of the wide variety of different facet designs available. No single faceting design or proportion range is considered 'standard' for any of the most recognised fancy shapes. This creates a whole new area of 'personality' when grading a fancy shape and customers may have their own personal preferences when choosing a fancy shaped diamond.

Despite this, there are preferred ratios and market preferences that help to provide an 'unwritten rulebook' for fancy shapes. A great example of this is the pear shape, which is far more appealing to the eye within a range of proportions that find a balance between being too wide or too long.

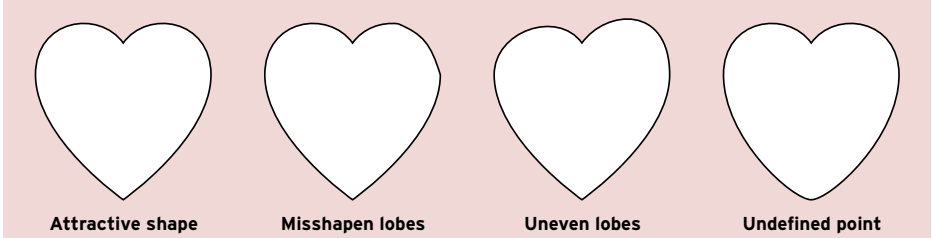
Symmetry Grading

There are no proportion standards, but this is not the case with symmetry. This is one of the most complex areas of fancy shape grading and we have two key areas of focus to help with the symmetry grading decision: the outline and the keel line. A fancy shape's outline should be true to its description; if the outline is misshapen or unsymmetrical, the allure of the shape is lost and the grade is lowered (see graphic below).

The keel line is an imaginary line that runs along the vertical axis of the fancy shape's design. Essentially it is a mirror line – a shape should be perfectly symmetrical on either side of the keel line. If a marquise diamond, for example, has a dull point at one end, the outline is not true to the design, and therefore affects its symmetry grade. If the point of a heart cut diamond is rounded and undefined, this is a step away from the 'unwritten rules' of how a heart cut diamond should look, hence this will affect its grade.

As you can see, when it comes to fancy shaped diamond grading, we need a combination of skill, experience, gut instinct and teamwork, something that we benefit from at De Beers Group Institute of Diamonds. ■

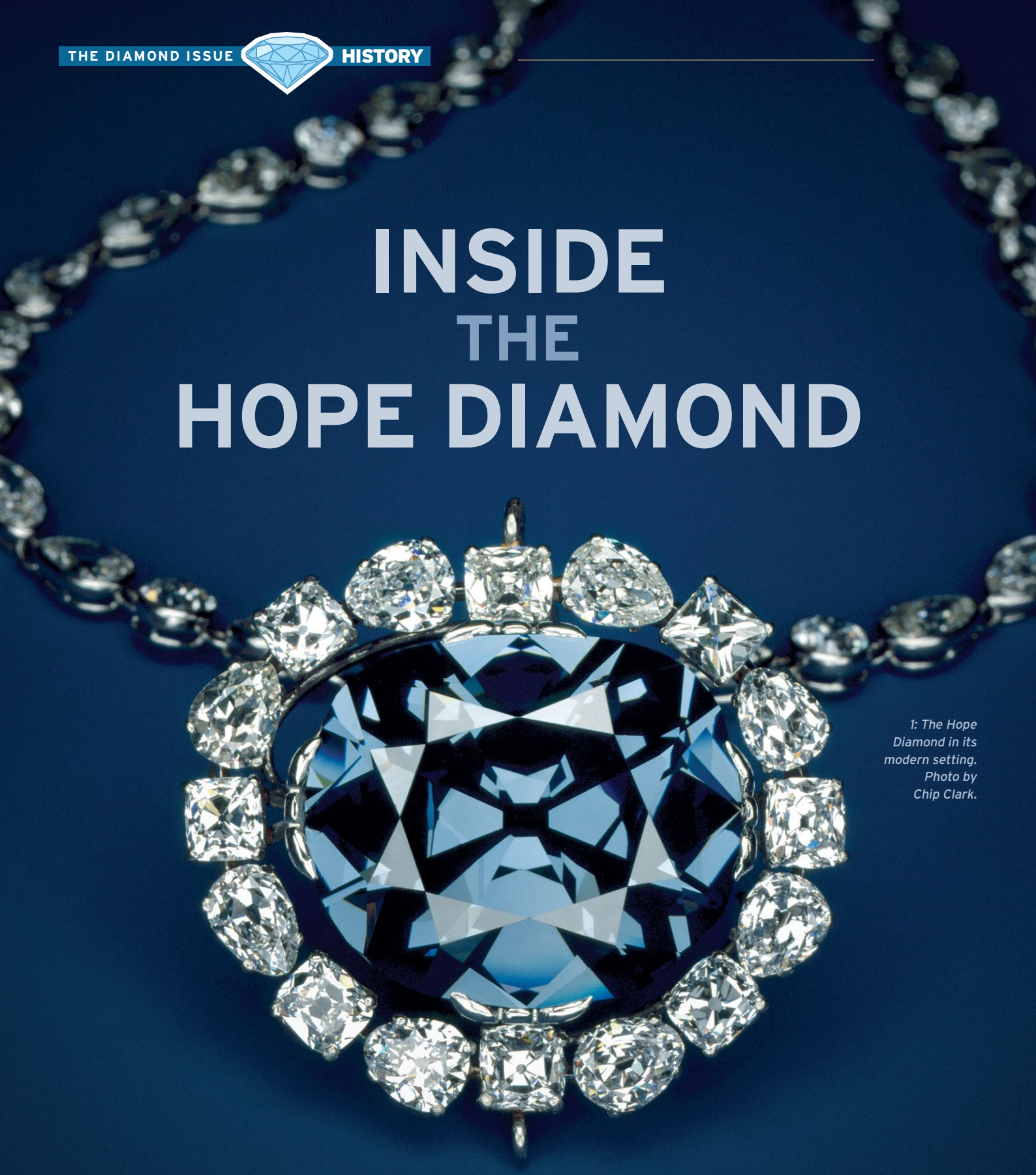
Find out more at debeersgroupinstitute.com and debeersgroupservices.com.



A fancy shaped diamond's outline should be true to its description to secure the best possible grade.

Images courtesy of De Beers Group Institute of Diamonds.

INSIDE THE HOPE DIAMOND



1: The Hope Diamond in its modern setting. Photo by Chip Clark.

As part of Gem-A's Diamond Diploma assessment, students can undertake a research project on a famous diamond or collection of diamonds. Gem-A Graduate, Elisa Chung, chose to study the infamous Hope Diamond; her report explores the stone's distinctive gemmological properties alongside its fascinating history, in addition to the composition and grading of fine blue diamonds.

The Hope Diamond is one of the most famous historical diamonds in the world (**1**). Having an ownership which can be traced back four centuries, it is well known for its blue colour, its exceptional size and its myths of a curse.

DISTINCTIVE FEATURES OF THE HOPE DIAMOND

According to the Smithsonian Institution, the Hope Diamond – the largest of all blue diamonds on record – has a weight of 45.52 carats, with dimensions of 25.6 mm in length, 21.78 mm in width and 12mm in depth (**2**). Its cut is cushion antique brilliant with a faceted girdle and extra facets on the pavilion. In December 1988, the diamond was graded by the Gemological Institute of America (GIA) as having a colour of fancy dark grayish-blue and a clarity grade of VS1 (very slightly included 1) with the presence of whitish graining.

The diamond was removed from its setting in 2010 to measure its composition and boron, hydrogen and possibly nitrogen were detected in tests using infrared light to measure the gemstone's spectrum. According to Smithsonian curator Dr Jeffrey Post, the boron may be responsible for causing the blue colour of the diamond. The trace amounts of boron atoms intermix with the carbon structure of the diamond, resulting in the rare blue colour.

This blue diamond exhibits red phosphorescence when it is exposed to short-wave ultraviolet (UV) light (**3**). It is believed that this red glow may have helped fuel its reputation for bad luck.

The Hope Diamond has changed hands many times from India to France, the United Kingdom and finally to the United States. It is now housed in the National Gem and Mineral Collection at the Smithsonian National Museum of Natural History in Washington DC.

FROM INDIA TO WASHINGTON

The first historical records suggest that French gemstone merchant Jean-Baptiste Tavernier obtained this blue diamond in 1666 and accounts of his remarks suggest that this blue gemstone originated in the Kollur mine in India in the 17th century.

This blue gemstone, a crudely cut triangular-shaped one of 115 ct, became known as the Tavernier Blue diamond. It was suggested that he took 25 diamonds to Paris, France, including this large blue rock which later became the Hope Diamond, and sold all of them to King Louis XIV.

In 1678, Louis XIV commissioned his jeweller to recut the Tavernier Blue diamond into a 67.125 ct stone which was thereafter named the Blue Diamond of the Crown of France or the French Blue.

3: The Hope Diamond phosphoresces red under ultraviolet light. Photo by Chip Clark.

The French Blue was stolen from the treasury in 1792 during the French Revolution, in which King Louis XVI and his queen Marie Antoinette were guillotined in 1793. It was likely that the blue diamond was smuggled to London after the theft.

It was recorded that a blue diamond with the same shape, size and colour as the French Blue was in the possession of London diamond merchant Daniel Eliason in 1812.

The stone was later reported to have been acquired by a London banker called Thomas Hope. After falling into the ownership of the Hope family, the blue diamond came to be known as the Hope Diamond. It had stayed in the Hope family until Lord Francis Hope sold it to pay off his debts in 1901 and he eventually died in poverty. The diamond was subsequently sold to a diamond dealer who took it to New York, USA.

Despite the alleged curse of the Hope Diamond – put down to its association with the beheading of Louis XVI and his queen, and the death of Francis Hope in poverty – American socialite Evalyn Walsh McLean was attracted by the unfortunate tales related to the diamond and purchased it in 1911. The stone was later placed in a new setting of a platinum framework surrounded by a row of 16 diamonds, alternating between cushion and pear-shaped cuts.

The Hope Diamond was acquired by New York diamond merchant Harry Winston when McLean's collection of jewellery was put up for sale after her death in 1947. Between 1949 and 1953, →

2: The Hope Diamond. Photo by Chip Clark.

4: The Hope Diamond in the Embracing Hope necklace. Photo by Don Hulbert.

the Hope Diamond toured around the US in exhibitions and charitable events as part of Winston's Court of Jewels, which helped raise funds for local good causes.

Smithsonian mineralogist George Switzer later persuaded Winston to donate the Hope Diamond for a proposed national gem collection to be housed at the Smithsonian National Museum of Natural History. On 10 November 1958, Winston sent the diamond in a box wrapped in brown paper to the Smithsonian Institute by ordinary registered post. According to Dr Post, Winston had never believed in any tales about the curse and he donated the diamond with the hope that it would help the US establish a gem collection.

On 18 November 2010, the Hope Diamond was unveiled and displayed at the Smithsonian in a temporary newly designed necklace called Embracing Hope, created by the Harry Winston firm (**4**). The diamond was returned to its historic setting on 13 January 2012.

VALUE OF THE HOPE DIAMOND

While the Hope Diamond is considered priceless by the Smithsonian National Museum of National History, it was last reported to be insured for US$250 million and it was estimated in 2016 that the price of this world-renowned precious diamond is about US$350 million.

THE HOPE DIAMOND AND WITTELSBACH-GRAFF DIAMOND

Both the Hope Diamond and the 35.56 ct Wittelsbach-Graff Diamond have been examined together at the Smithsonian (**5**). Since they were both mined in India in the 17th century and have comparable grayish-blue colours and orange-red phosphorescence, there have been speculations that the two diamonds may have come from the same piece of rough. But the testing results indicate that these two diamonds did not originate from the same crystal.

BLUE DIAMOND MINES

Apart from the Kollur mine in India where the Hope Diamond was found, blue diamonds have also been discovered in the Golconda region in India and the Cullinan mine in South Africa. A few blue diamonds have also been discovered in the Argyle mine in Australia.

THE BORON EFFECT

The Hope Diamond is a natural Type IIb diamond, with its blue colour caused by trace amounts of boron. While previous studies of blue diamonds showed levels of boron of less than one in a million atoms, boron levels in parts of the Hope Diamond have been found to be as high as eight per million atoms.

As boron absorbs red light, diamonds containing boron but in the absence of nitrogen as trace elements are blue in colour. Diamonds containing boron also exhibit electrical properties and are semi-conductive. Hydrogen is another impurity that can cause grey or blue colours in diamonds, but these diamonds are not semi-conductive.

GRADING BLUE DIAMONDS

Blue diamonds belong to the subcategory of diamonds named fancy-coloured diamonds. The four Cs – colour, clarity, cut and carat weight – are used to grade blue diamonds but colour becomes the most important criterion in determining the value of a blue diamond.

Fancy colours are described by hue, tone and saturation. Hue refers to the general appearance of the colour, e.g. blue, green, yellow; tone describes the lightness and darkness of a colour; while saturation refers to how strong the colour is, ranging from pale to vivid. When assessing the value of a fancy-coloured blue diamond, tone has somewhat less importance than hue and saturation. Most blue diamonds exhibit low saturation and appear greyish blue.

Based on the tone and saturation, the

> Winston had never believed in any tales about the curse and he donated the diamond with the hope that it would help the US establish a gem collection.

GIA grades fancy coloured diamonds as Faint, Very Light, Light, Fancy Light, Fancy, Fancy Dark, Fancy Deep, Fancy Intense or Fancy Vivid. The Hope Diamond has been graded as having a fancy dark greyish-blue, meaning that the stone has a dark tone, but the greyish blue colour is not very strongly saturated.

As with all diamonds, the 10x magnification is used to judge the inclusions in the fancy coloured diamonds. High quality blue diamonds often contain inclusions, but small ones will not greatly affect the clarity grading of fancy coloured diamonds.

Good proportion, symmetry and polishing are important to the cut grading for colourless or near colourless diamonds. As for fancy-coloured diamonds, including rare blue diamonds, a poor cut may still hold a significant value. It is more important for blue diamonds to receive cuts that will bring out their colour, while brilliant cuts help enhance the brilliance and fire of colourless or near colourless diamonds.

As natural fancy-coloured diamonds are rare, especially blue, pink or red specimens, the prices of stones of larger sizes rise rapidly.

TREATED BLUE DIAMONDS

Since blue diamonds are so rare, some natural yellow to brownish-yellow diamonds can undergo irradiation, for example, by using Gamma rays from a cobalt 60 source or electrons from a Van de Graaff generator, to create the blue colour. Light blue diamonds can be treated to get darker hues as prices will increase with better colour intensity. Blue diamonds with grey or brown tones can receive the High Pressure High Temperature (HPHT) treatment to remove the unwanted overtones to leave a purer blue colour.

These treated diamonds, which usually exhibit high saturation, are much less expensive than their natural counterparts. Laboratory reports or certificates of these treated diamonds will indicate that they are 'treated' or mention 'HPHT'.

Some tests can be conducted to reveal whether blue diamonds have been irradiated. While natural blue diamonds usually produce a red fluorescence when they are exposed to shortwave UV light and are inert to long-wave UV light, irradiated blue diamonds will sometimes produce a greenish florescence when they are exposed to long-wave UV light.

SYNTHETIC BLUE DIAMONDS

Laboratories can create blue diamonds which is a good alternative for buyers on a budget because they can be 20 to 50 per cent cheaper than natural blue diamonds.

Synthetic diamonds can be produced through the HPHT methods. Diamonds produced by the HPHT methods are Type Ib diamonds which have nitrogen as impurities in the form of isolated nitrogen atoms replacing single carbon atoms randomly throughout the crystal structure. As Type Ib diamonds are yellow to brownish-yellow, zirconium and aluminium (as a nitrogen getter) are added to the metallic solvent during the synthetic process to produce colourless diamonds. When boron is introduced to the reaction cell with the nitrogen getter, Type IIb blue diamonds will be created.

There are various ways to differentiate natural and synthetic blue diamonds. While natural blue diamonds contain inclusions such as feathers and crystals, synthetic ones may contain metal solvent or dust or 'breadcrumb' inclusions which are results of the HPHT methods. Under examination by advanced technological equipment such as the DTC DiamondView, synthetic blue diamonds may show 'hour-glass' or 'Maltese cross' colour zoning. As synthetic blue diamonds may contain metal solvent, they may also exhibit an attraction to a strong magnet.

Natural blue diamonds may produce a red fluorescence when being exposed to short-wave UV light and are inert when being exposed to long-wave UV light. Synthetic blue diamonds, however, are inert or show moderate yellow, green or orange fluorescence when being exposed to short-wave UV light. They are inert or produce weak orange fluorescence when being exposed to long-wave UV light and have a typical long lasting mainly white phosphorescence. ■

A bibliography and references are available upon request.

All images courtesy of the Smithsonian Institution.

5: The Hope (right) and Wittelsbach-Graff diamonds. Photo by Chip Clark.

Putting a PRICE on Colour

In a condensed version of a presentation delivered at The Jewellery Valuers Association's (JVA) Virtual Conference in October, Kym Hughes FGA shares her valuer's perspective on coloured diamonds and their popularity in the market.

Coloured diamonds are increasing in popularity and some are fetching extraordinary prices at auction. It is becoming apparent that the market has deemed these to be collectable and are willing to pay for the privilege of ownership of these wonderful gems.

Pricing of coloured diamonds at times can be difficult and a valuer will need access to relevant pricing information, resources and networks that they can refer to if needed, such as *GemGuide, Fancy Color Diamonds – The Pricing Architecture* by Eden Rachminov, and websites like ben-yona.com, leibish.com and israel-diamonds.com.

These resources will give indications of prices; however, prices can vary depending on market influences in your locality such as in Australia or Canada where premiums can be achieved for diamonds originating from that country.

When undertaking a valuation a few steps need to be considered:

Take in — in my view the most important. Ask the client for supporting documentation such as grading reports, sales receipts, or previous valuations.

Verification — verify the validity of the documentation, is it from a reliable source e.g. GIA, HRD, IGI, Argyle etc.? Is the diamond laser inscribed? Check and verify.

Documentation unavailable — check for coatings or treatments then consider is the diamond natural or synthetic and/or is the colour natural or treated. Often at this stage you may need to consider sending it to a laboratory for advanced testing to confirm. These tests will include — UV Vis, FTIR and Raman spectroscopy.

Once the identification process has been completed the challenge is then to accurately grade the colour (if not certified) and discern a price, with some colours more difficult than others. An example table at the bottom of this page shows how the difference in colour grade can affect the value.

Using the below table it shows that if you had 0.50ct total weight of 0.01 – 0.03ct pink diamonds you could have around an estimated $6000 – $15,000 AUD in retail value difference without taking into account any jewellery branded margin.

However, if we are to use the same scenario for yellow diamonds the colour intensity has a lesser effect on the prices as seen in this table.

Round brilliant cut 0.01 – 0.03ct	Percentage difference between each grade
Fancy light yellow	
Fancy yellow	Increase of 150%
Fancy intense – fancy vivid yellow	Increase of 150%
Fancy intense purplish pink – fancy intense pink (5P)	Increase of 50%

1: A diamond set bracelet presented with certification stating 22.04 carats of fancy intense yellow diamonds.

Round brilliant cut 0.01 – 0.03cts	Percentage difference between each grade
Fancy light pink FLP (8P)	
Fancy purplish pink – fancy pink (7P)	Increase of 100%
Fancy purplish pink – fancy pink (6P)	Increase of 250%
Fancy intense purplish pink – fancy intense pink (5P)	Increase of 50%

UNRELIABLE CERTIFICATION

The diamond set bracelet in figure one came in for valuation and was presented with certification stating 22.04ct fancy yellow – fancy intense yellow as the colour grade. Upon examination of the bracelet the diamonds had yellow gold cup galleries in all the settings except for the clasp (**2**). It can be clearly seen that this diamond was much lighter in colour than stated on the certificate (**3**). After discussion with the client this diamond was removed so colour grading could be completed. The loose diamond on the right is far lighter than the GIA graded FIY on the left. (**4**).

Being that this bracelet had just over 22ct of just yellow diamonds this made a considerable difference in the value. In fact, this bracelet valued much less than the price paid. Whilst this may be an extreme example because of the amount and size of

2: Yellow gold cup galleries appeared in all settings except for the clasp.

3: A loose fancy intense yellow diamond compared to the diamonds set in the bracelet.

4: A loose fancy intense yellow diamond (left) compared to a loose diamond (right) that was removed from the bracelet to compare actual colour.

the diamonds care should always be taken when relying upon certificates.

Care should be taken when colour grading set coloured diamonds. As you can see by this example, the setting can influence the face up colour of the diamond – in this case enhancing the yellow – giving the appearance of a far stronger colour

PRICING

Prices have especially increased in the pink diamond market, this is also due to the closure of the Argyle Diamond Mine in Western Australia.

An example of the increase in price would be a 2010 Argyle #51 tender diamond 1.17cts 1PP (purplish pink) P1 round brilliant cut — this diamond was released onto the market at wholesale in Australia in February 2011 and, over a six year period, it increased in wholesale value by 58%.

This requires a valuer to carefully examine and research what is happening within the market at the time of valuation and correctly prepare documents for the purpose and function required. This can prove difficult at times because of the limited supply now available. Therefore, when quoting for this type of work, the valuer will need to take into consideration the extra time it will take to perform the valuation or report.

THE ARGYLE GRADING SYSTEM

The pink colour grade referred to above is linked to the Australian Argyle grading system, however, worldwide most people are more familiar with the GIA grading system (**5**). Argyle developed its own grading system when it became apparent that they had a relatively consistent supply of pink diamonds.

The GIA colour grading system is vastly different as it uses a word description. Above right is a guide only to be able to compare the two systems using straight pink only as the colour.

The valuer should always take care when pricing and trying to make comparisons, especially when using the GIA system. For instance, some colour categories will have varying intensities of colour, which can make a significant difference in price and, in some instances, GIA will give the same colour grade to two very different Argyle colours as seen in the examples (**6** & **7**). If these two diamonds were the same size, shape and clarity the 6P would be around 70 - 80%

GIA	Argyle
Fancy Red	Red
Fancy Vivid	1P - 2P
Fancy Deep	1P - 2P
Fancy Intense	3P - 5P
Fancy	5P -6P
Fancy Light	7P
Light	7P -8P
Faint	9P

more than the 4PR even though they both have the same GIA colour grade.

In conclusion, the valuer needs to take care that they have the experience and knowledge required to value coloured diamonds. The public bring items to you as the expert and it is your job to know when to ask for help or decline the assignment if it is beyond your area of expertise.

The Jewellery Valuers Association (JVA) is a leading independent organisation in the UK and Ireland for professional valuers of jewellery, gemstones, watches and silver. To find a valuer visit thejva.org/find-valuer. ■

5: (left) An image of the current grading system sourced from argylepinkdiamonds.com.au/diamonds.

6: (top) An Argyle 0.39ct radiant cut with an Argyle grade of 4PR and GIA fancy intense pink. Image credit: Leibish.com.

7: (bottom) An Argyle 0.62ct round brilliant cut with an Argyle grade of 6P and GIA fancy intense pink. Image credit: Leibish.com.

On to a Winner

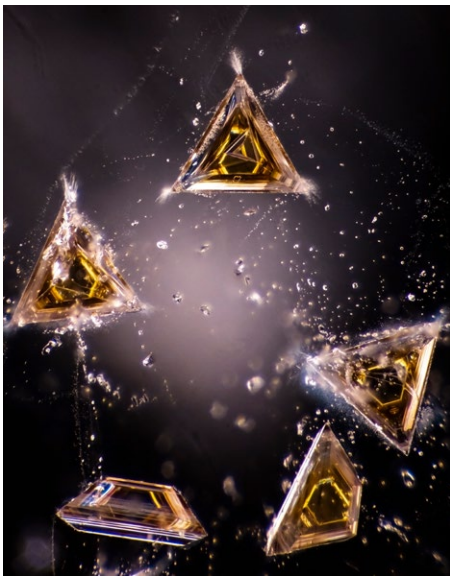
Hundreds of entries, furious voting on Facebook and a superb guest judge... this year's Gem-A Photographer of the Year competition has captured our imagination and demonstrated the sheer talent of our industry. Here are the winning shots...

The Gem-A Photographer of the Year competition is one of our favourite times of year, but in 2020 especially, feeling transported to far away lands, delving deep into gemstones, and witnessing human skill in action has been an enjoyable escape from the norm.

Launched at the end of July, the Gem-A Photographer of the Year competition welcomed entries in three key categories: Cover Shot, The World of Gems and Photomicrographs and Special Details. We hoped to see a variety of entries from across the trade, including Gem-A Members and non-members. What we didn't expect was the sheer number of entries we received! Your photographs captured mine sites, diamond surface features, gem sorting, inclusions, cut and polished gems and everything in between.

Once the deadline for entries closed, our team kickstarted the enjoyable task of sorting through the submissions and devising a shortlist – three images from each category. Of course, trying to make a decision was impossible, so we swiftly increased the shortlist from nine to 13 images that we felt were worthy to put into a 'public vote' via Facebook.

Our Facebook gallery of the shortlisted images reached nearly 30,000 people and was shared more than 90 times by our audience. In order to progress onto the next stage of the competition, photographs had to earn the 'Likes' of our Facebook audience and capture the imagination of not just our team, but



Melissa Allen secured the winning position in this year's competition with her phenomenal 'Helvite Merry-go-Round', our cover image.

Melissa Allen also secured a runner-up position with 'Frozen in Time'.

our entire social media audience. We chose a set time and date to close the competition on Facebook and made a note of the number of 'Likes' on each image – the five images with the highest number, regardless of the category they were entered into, were progressed onto the next stage.

To narrow down the top five to the top three (first place and two runners-up) we knew we needed the support and guidance of an expert. We were thrilled when respected jewellery photographer, Orasa Weldon, agreed to be our 2020 Guest Judge, sharing her time and talents with us to choose the images that demonstrated the most skill, attention to detail, finesse and imagination. Weldon received an Accredited Gemology Diploma from AIGS in Bangkok, Thailand, and studied diamonds, jewellery design, jewellery manufacturing arts and faceting at the Gemological Institute of America (GIA). Thanks to a degree in graphic design and years of experience as a jewellery photographer, Weldon knows a thing or two about creating the perfect shot… and she certainly chose three great images for the top spots in this year's competition.

THE WINNER

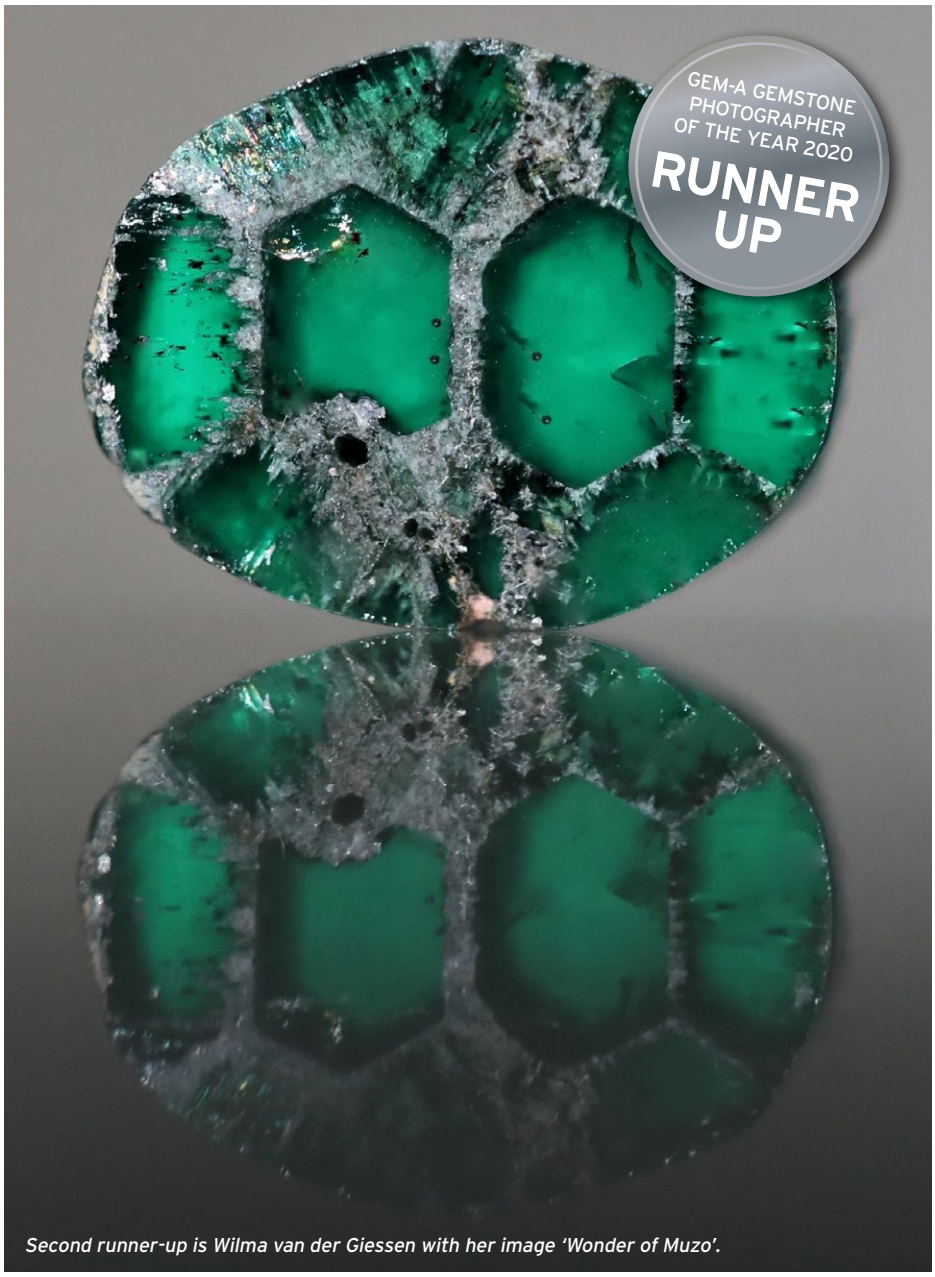
Huge congratulations to Melissa Allen FGA GG who secured the winning position in this year's competition with her phenomenal 'Helvite Merry-go-Round' photograph. Her image showcases triangular inclusions of helvite inside a rough morganite tabular crystal, which was purchased by Sid Tucker in 1989, in Peshawar. Each helvite crystal measures approximately 1mm and what's depicted in the photograph is approximately a 4.5mm field of view.

Guest judge Orasa Weldon

Allen used diffused fibre optic lighting in addition to darkfield illumination to capture this shot, which currently has a starring role on our front cover!

Speaking on the winning image, Orasa Weldon, says: "Even though stationary, the inclusions exhibit apparent 'movement'. The soft light at the centre of the image helps focus the viewer's attention, spotlighting this cluster of sharp, angular inclusions. The contrasts of light and dark, as well as monochromatic and colour, are superb."

As the winner of this year's competition, Allen will be gifted a £300 voucher to spend at Gem-A Instruments and will receive one year's free Membership of Gem-A.



Second runner-up is Wilma van der Giessen with her image 'Wonder of Muzo'.

THE RUNNERS-UP

In an unprecedented winning streak, Melissa Allen also secured a runner-up position for the second of three images she entered into this year's competition. Titled 'Frozen in Time', the image presents a winged insect perfectly preserved inside a piece of copal from Colombia. With a field of view of 3.5mm, Allen used darkfield illumination and diffused fibre optic light to capture incredible detail and, as a happy 'added extra' make the insect's eyes appear red.

Weldon comments: "This is a masterfully detailed study of a fly; a gilded insect that appears to be captured in motion. Straight shafts of light and shadow help to frame and highlight this time traveller." →

Angel van der Hoogen – 'A Colourful Start to the Day'.

The second runner-up is Wilma van der Giessen FGA GG AJP, who impressed our team, Facebook and Weldon with her image 'Wonder of Muzo'. Pictured is an exceptional trapiche emerald, with two hexagonal cores surrounded by eight trapezoidal sectors. Weldon describes it as "meticulously illuminated to exhibit vibrant colour" and "reminiscent of a stained-glass window".

As runners-up, both Allen and van der Giessen receive a £50 Gem-A instruments voucher to grow their arsenals of gemmological equipment, books and tools.

Evgenios Petrides – 'Trigons on Trigons'.

FACEBOOK'S TOP FIVE

While these three images secured the top spots, we would be remiss not to mention the other two images included in our top five, which secured a wave of Facebook 'Likes'. Congratulations must go to Angel van der Hoogen for her fantastic image 'A Colourful Start to the Day', featuring a goldsmith choosing gemstones for a multi-stone ring. Last year's competition winner, Evgenios Petrides FGA GG, also made it into this year's top five with his image, featuring trigons on the surface of an octahedral diamond crystal seen through a microscope with transmitted light. The image is aptly called 'Trigons on Trigons'.

THE WIDER SHORTLIST

And if you haven't had chance to view our shortlist on Facebook, here's a quick look at the remaining eight images that made it onto our shortlist this year. All these images were selected by our team as the best of the best in each category.

1. 'Anatase Quartz' by Tyler Smith FGA GG: A steely grey anatase in Brazilian quartz. The trailing fluid inclusions gives this beautifully euhedral crystal a sense of kinetic energy. Horizontal FOV 6.0 mm.

2. 'Artisanal Mining in West Mogok' by Nicolas Hébert: Yadanar Kaday Kadar mine is located under the Kyauk Pyat That pagoda. This active ruby-sapphire-spinel-moonstone secondary deposit has recently seen the local community taking the opportunity to mine the uncontrolled area for its direct benefit.

3. 'Agate Plumes' by Tyler Smith FGA GG: Two plumes of iron oxides arch to meet each other in this flame agate, their extremities rimmed in milky chalcedony. Horizontal FOV 11.5 mm.

4. 'Danburite Sunset 2.10 mm' by Nathan Renfro FGA GG: The surface of a danburite crystal from Mexico with an interesting subsurface ring-like structure of what is likely the clay mineral nontronite.

5. 'New Generation' by Katerina Spinos: A photograph of Spinos' brother polishing tourmaline in Bangkok, Thailand. She says: "He has always been fascinated by light, and his interest in lapidary craft is being honed at an institute that uses Thai-style jamb pegs and polishing machines. When this was taken in June, he was 20 years old, the youngest person to have joined the on-site programme in which highly experienced cutters train both locals and foreign visitors."

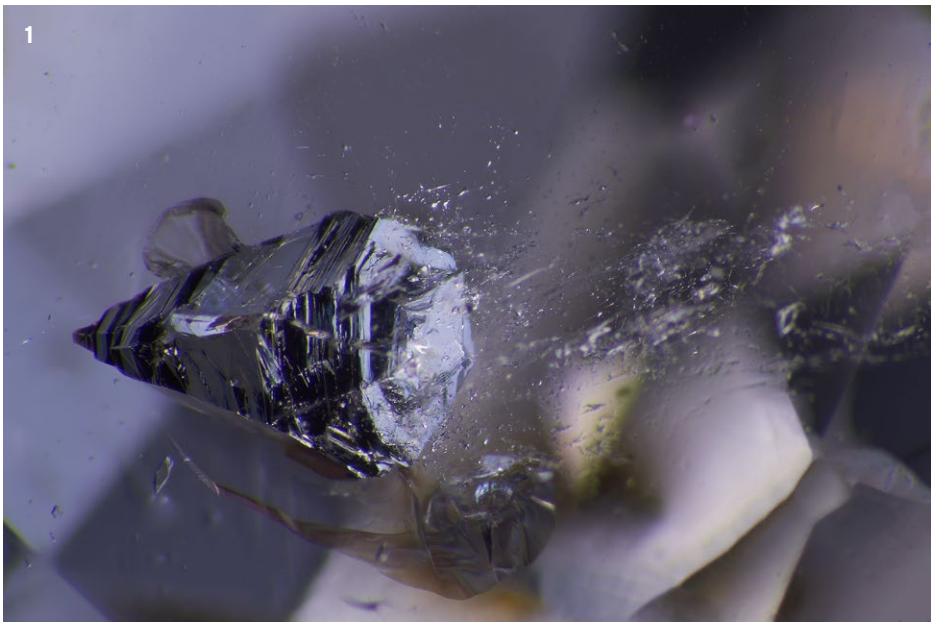
6. 'Tough Soccer Ball' by Dalin Wu FGA: A 1.35 carat rough diamond with a spheric appearance nicknamed 'the soccer ball'.

7. 'The Man from a Land Down Under' by Tasnara Sripoonjan MSc: A miner uses a water cannon to route gem-bearing gravel from a ground pile.

8. 'Fluorite Sunset' by Melissa Allen FGA GG: Rough rock crystal quartz with fluorite inclusions from Madagascar, captured with Rheinberg illumination filters (red and blue). The lighting technique used can give a greater contrast on many inclusions, in this case it highlights the surface of the fluorite crystal. FOV 4.5 mm. ■

The Gem-A Photographer of the Year competition is a wonderful demonstration of the talent, skill and creativity of the gemmological community. Thank you to everyone who participated and to Orasa Weldon for contributing her time as a guest judge.

Find us on Facebook @GemAofGB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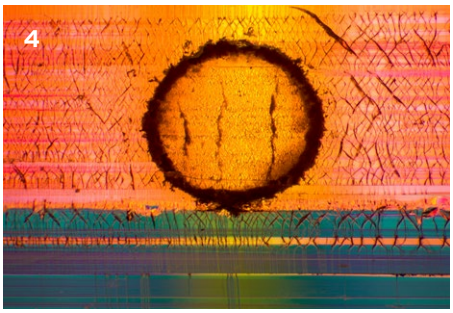
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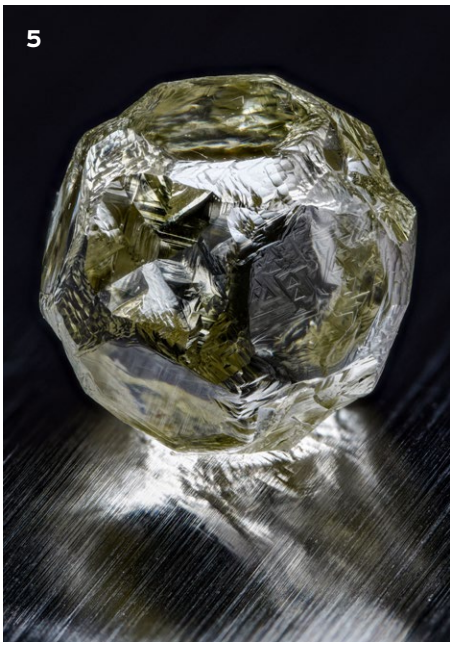
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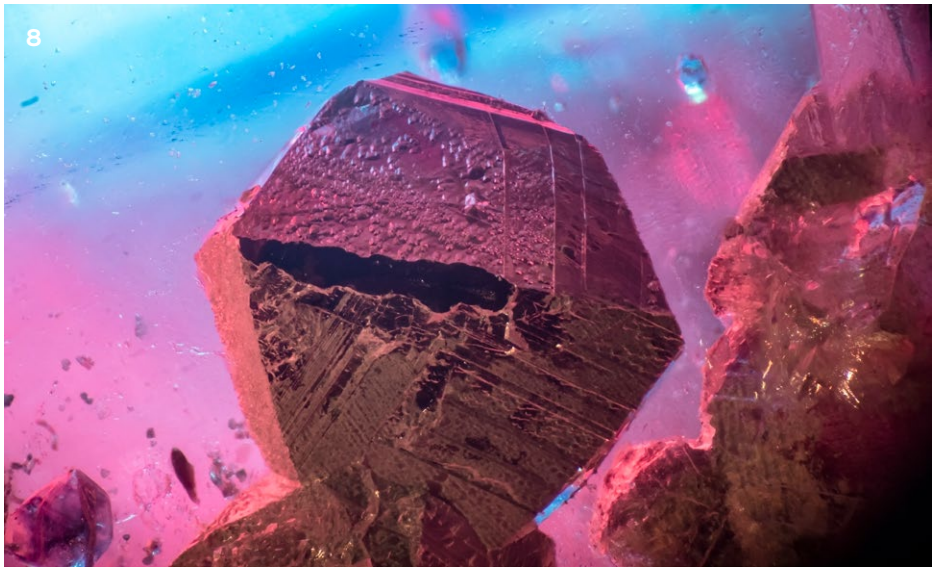
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CROWNING GLORY

We speak to Tammy Cohen at Crown of Light (Almod Diamonds), to find out more about the business' patented diamond cut.

A side view of a Crown of Light diamond.

What makes the Crown of Light diamond different?

The Crown of Light premium diamond is a 90-facet patented diamond with a distinctive higher crown and a smaller table, producing more fire and scintillation. The facet shapes, size and angles, and their relationship to each other, play a vital role in the increased light performance of our proprietary branded diamond cut.

typically 40-50%. Octahedral and cubic crystals are far less common than all other configurations of rough.

What faceting patterns are used in a Crown of Light diamond?

In the Crown of Light diamond facet pattern, the deeper pavilion angle is a strategically planned adjustment that captures and reflects the light from the additional facets back to the viewer's eye.

Comparing the distinctive profiles of a round brilliant cut diamond and a Crown of Light diamond. Notice the unique shape of the Crown of Light, which has become synonymous with the cut brand itself.

A Crown of Light diamond begins with specific crystal rough requirements. Crystals considered for cutting a Crown of Light cannot be too long or too shallow. Flat rough is also unsuitable. The factory looks for square or roundish rough to be able to shape the high crown. Since the shape of the crystal factors into its yield, ideal crystals fit for the Crown of Light are octahedral or even cubic. The yield from ideal, crystal-shaped rough is

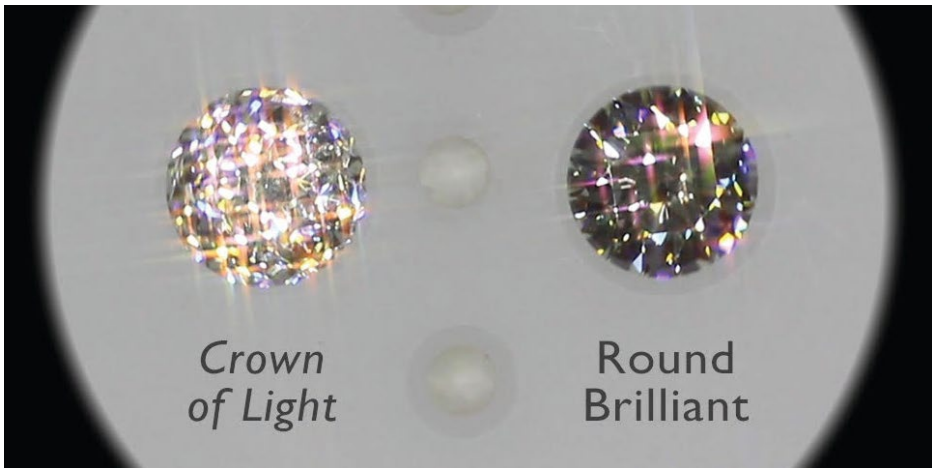
For instance, a Crown of Light diamond has an 80-84% depth percentage. By contrast, a conventional round brilliant's depth percentage is 62%.

A Crown of Light diamond has 24 bezel facets on its crown in contrast to a conventional round brilliant diamond with eight bezel facets. The increased number of crown facets near the girdle allows for lower angles of light to enter the stone and be reflected to the viewer's eye. Due to the Crown of Light's complex facet blueprint and the expertise required to polish them by hand, cutting the 90-facet stone is very time-consuming. It takes twice as long to cut a Crown of Light diamond compared to its conventional counterpart.

Of course, more facets do not mean higher value necessarily. We believe it is about how those facets are aligned, placed and what they do together that creates the value.

A Crown of Light cut diamond set in a dress ring from the Crown Brilliant Brown Collection.

> We believe it is about how those facets are aligned, placed and what they do together that creates the value.



A light performance comparison between a round brilliant cut diamond and a Crown of Light diamond.

What has been the response of consumers to your diamonds?

Customers are hungry for something new. They've heard it all before about the standard round brilliant 'ideal' cut, set in either white gold or yellow gold. The same generic cut in a solitaire setting became staid and boring outside of the bridal realm. A diamond with a story drives sales and more unique cuts have this edge. Today's customer is more confident and willing to try new things.

One of Crown of Light's most popular categories is larger carat weight browns set in pink gold. The cut brings out the modifiers so that an array of warm accent colors pop out of the stones.

Crown of Light has grown to the tune of $200 million dollars in sales; it's a top-selling diamond brand that is still new to the market. Due to demand, Crown of Light has entered the coloured stone arena, cutting Crown of Light in tourmaline, tanzanite, alexandrite, ruby and sapphire, among others. One of the most exciting new adventures for the brand is Crown of Light fancy cuts. The fancy shapes are patent pending and are bow-tie free – a real first! There are lots of new developments are on the horizon. ■

Discover more at crownoflight.com.
All images courtesy of Crown of Light.

A Crown of Light cut tourmaline set in a diamond mount.

Impressive Inclusions

Gem-A Gemmology and Diamond Tutor, Charlie Bexfield FGA DGA EG, investigates two garnet inclusions found in his collection of diamond specimens.

A Pyrope-Almandine Garnet Crystal within a Diamond Macle ▲

Garnets are one of the few minerals that can be found inside diamond. Garnets form alongside diamond in the earth's mantle simultaneously and on occasion the diamond crystal will engulf the crystals of garnet.

Garnet inclusions are relatively common in diamond, however they tend to be viewed as negative imperfections rather than interesting features. Personally, I think that these inclusions add a level of interest and beauty and viewing under a microscope enables us to view the vibrant colours and formations of the minerals present.

This image was taken at 60× magnification with low level dark-field illumination and oblique pinpoint side lighting on a Leica stereo-zoom 6 microscope. The macle is 4.4 × 4.3 × 1.5 mm and weighs 0.306 carats.

Two Pyrope-Almandine Garnet Crystals within a Diamond Octahedron

The garnets enclosed in this diamond almost appear like one inclusion, reflecting from one side to the other of the octahedron, however they are in fact two crystals similar in size and shape which seem to mirror one another. If you look closely, you can also see echoes of the reddish-purple colour of the garnet at the edges of the colourless diamond.

The image was taken at 18× magnification with dark-field illumination with a Leica stereo-zoom 6 microscope. The octahedron measures 4 × 3 × 2.9 mm and weights 0.280cts. ■

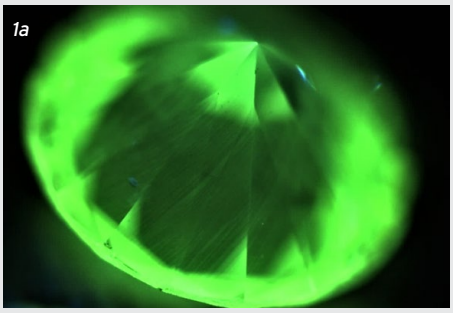
Images courtesy of Charlie Bexfield FGA DGA EG.

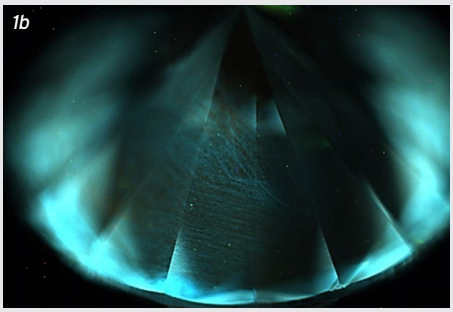
Patterns of Note

Nicholas DelRe and Alethea Inns of Gemological Science International (GSI) have noted a changing trend in the typical growth patterning of laboratory-grown diamonds grown by the CVD method, possibly indicating a change in growth methods to facilitate larger, higher clarity diamonds. This may impact the ease of detection of undisclosed laboratory-grown diamonds if short-wave fluorescence imaging is used as a primary testing methodology.

With the continued growth of the laboratory-grown diamond market (15%-20% increase in 2019, per Bain & Company's 2019 Global Diamond Industry Report), Gemological Science International (GSI) is seeing large numbers of laboratory-grown diamonds in our laboratories. As part of our undisclosed laboratory-grown diamonds, we are noticing trends in growth method.

GSI has been encountering diamonds grown by chemical vapor deposition (CVD) with interesting growth patterns when viewed under deep ultraviolet light, known as UVC light (at about 225 nm). These patterns may make CVD-grown diamonds more difficult to detect if only using growth patterning to separate natural from laboratory-grown diamonds and are appearing more frequently in diamonds submitted to the laboratory.





1a & 1b: A CVD laboratory-grown diamonds with striae — closely-packed parallel lines characteristic of typical CVD-grown diamonds.

CVD-grown diamonds are created when carbon ionized from methane gas (using microwaves or other high-energy source) precipitates on a diamond seed crystal in a sealed chamber. CVD-diamonds grow layer-by-layer on top of the seed crystal. These layers are visible as fine, thin striations when observed in the DiamondView, an imaging device that shows fluorescence by using short-wave ultraviolet light. Striations are typically closely packed and indicate the changes in the growth conditions and uptake of impurities as the conditions in the chamber vary and the crystal grows (**1a** & **1b**). These striations visible in the DiamondView are characteristic of CVD-grown diamonds and are often used as indicators in identification.

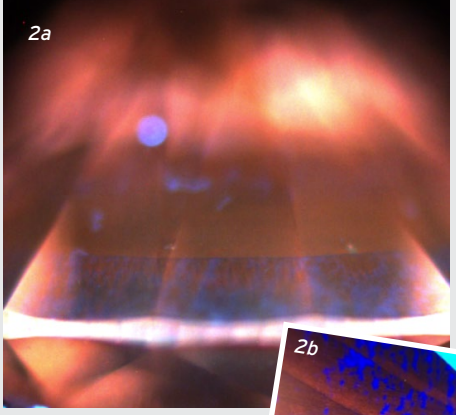
However, lately, GSI is noticing a significant number of diamonds over one carat that show parallel bands in addition and as opposed to thin striations. CVD manufacturers state that this is the result of removing the crystal from the reactor mid-growth, removing any graphitic residues and non-gem polycrystalline diamond, and then returning it back to the reactor for additional growth causing a distinct line in the fluorescence pattern. This 'interrupted' growth process aims to achieve better clarity and larger stone sizes (**2a** & **2b**). To compound the challenge of identification through fluorescence imaging, some diamonds could be cut to hide the fluorescence bands (**3a** & **3b**).

GSI is noticing an increase in size and quality of CVD laboratory-grown diamonds, and they are still reliably identified by GSI with advanced spectroscopy.

CVD laboratory-grown diamonds have important non-gemological applications from surgical tools, laser and electronic components, to medicine delivery. These non-jewellery applications are the driving force behind advances in CVD growth technology, as the need for single-crystal, chemically and structurally pure laboratory-grown diamonds increases. Conversely, there is also a need to engineer optical defects in ultra-pure CVD diamonds to create ultrasensitive sensors for measuring electric and magnetic fields in quantum research.

There is no doubt that as advances in CVD growth technology evolve, so will the characteristic growth patterns of the CVD-grown diamonds in gem-quality diamonds. ■

The authors would like to thank Maria Mrozek, Chief Laboratory and Testing officer at GSI, for her instrumental role in data collection, which supports this article. For more information about GSI, visit: ***www.gemscience.net***



2a & 2b: CVD laboratory-grown diamonds with parallel fluorescent lines indicating the 'interrupted' growth process. They are running parallel to the table of the diamond. Blue luminescence is likely caused by structural defects.

3a & 3b: 'Interrupted growth' banding resembles 'step facets' on this cushion modified brilliant cut CVD-grown diamond. It is interesting to note here is that if the fluoresce image on the left is observed on its own, it may appear growth bands are facet junctions instead.

All photo credits: GSI.

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