

Gems & Jewellery

May/June 2016 / Volume 25 / No. 3

Whitby Jet

BaselWorld 2016

Interview with Danny Sanchez



Gem-A
THE GEMMOLOGICAL ASSOCIATION
OF GREAT BRITAIN

IMPORTANT JEWELS

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**A PAIR OF MYSTERY-SET
RUBY 'PAVOT' EAR CLIPS
BY VAN CLEEF & ARPELS**
£80,000-120,000

**A FINE MYSTERY-SET RUBY
AND DIAMOND BROOCH
BY VAN CLEEF & ARPELS**
£100,000-200,000



May/June 2016

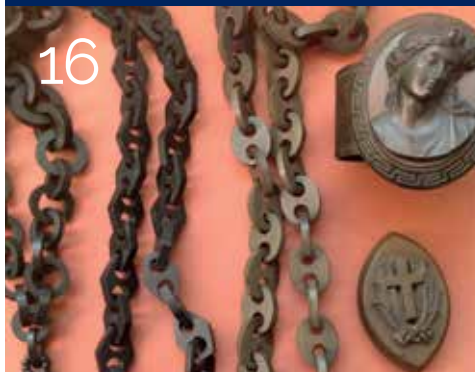
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Cover Picture

Ilmenite and hematite in orthoclase feldspar from Harts Range, Australia. Photo Danny Sanchez. See Danny Sanchez's interview on pages 10–12 for an insight into the wonderful world of photomicrography.

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

The editors would like to issue a sincere apology to Paul Greer for an error in the March/April 2016 edition of *Gems&Jewellery*. The publication contained a typographical error concerning Mr Greer's name. We are deeply sorry for this error.



Gem-A
INSTRUMENTS



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Introducing Alan Hart

As I write my first editorial for *Gems&Jewellery* it is amazing to think that in just a few weeks I shall be CEO of Gem-A, having seen out my last three months as principle curator of Gems and Minerals and head of Earth Sciences Collections at the Natural History Museum. Having had a long relationship with Gem-A over many years, and with Gem-A and the Museum having even greater historical links — many past gemmologists have moved between the two institutions — I find myself in great company. The missions of the Museum and of Gem-A have many similarities — particularly in the education of students and the public, as well as the use of collections and the expertise of people to further develop the study of the natural world. All this, whilst paying particular attention to facts and proper nomenclature to provide a foundation to the knowledge that underpins our applied science and its industries, showing just how similar the two organizations are.

As an educational charity, Gem-A has strong foundations going back to 1908, providing professional education to students wishing to become recognized in the trade — students whose knowledge will underpin many aspects of the gem industry. Applying for membership and becoming a Fellow or Diamond Member of the Association, after completing the Gemmology or Diamond Diploma, ensures that you will be recognized in the trade as someone who is knowledgeable, professional and who has integrity. I remember the hard work whilst diligently studying for my diplomas and how much I learnt going through the process, and how, using this knowledge and by becoming part of Gem-A's growing membership of experts, I was able to move forward with many new aspects of my work.

As I have said on many occasions, I am greatly excited at the prospect of being CEO at Gem-A. Having known many of the staff for years I know they are truly passionate about the mission and goals of Gem-A, and through them I will ensure that we continue to thrive as an organization. When I say thrive, I want all of us — the staff, our students, our friends and colleagues in the industry — to work together to utilize our collective expertise and to continue as the

centre of excellence that is delivering the highest quality gemmological education and training available worldwide. I am a great believer in life-long learning — there is always something new to learn, especially so in our ever-changing industry. Gaining our diplomas is an amazing achievement and I like to think that everyone will be proud to be part of a growing membership of currently over 2,000 national and international members — who, collectively, can be instrumental in both helping each other and our students to all of our benefits.

We live in an age with a remarkable availability of information at our disposal, and with Gem-A I want us to continue to provide information that is both correct and authoritative for the industry. I am excited about ensuring our courses continue to be world-class, but believe that we should also look at how we create and deliver new courses — for example, providing training in new areas, such as advancements and interpretation of applied technology and instrumentation — a growing area of gemmology that is becoming increasingly complex and ever more exciting. My focus for the first few months will be settling in and becoming familiar with the day-to-day operations, as well as reviewing Gem-A's strategy and mission, ensuring we have the right resources in the right areas for what we want to achieve. I am very happy to be able to continue on from my work at the Museum and to travel to conferences and trade shows, and I look forward to attending JCK Las Vegas in June and the Hong Kong show in September — one which I have never been to, but which I know is the premier gem and jewellery show for the Asia-Pacific. I am also looking forward to meeting our many ambassadors and collaborators as I believe that it is very important to meet face-to-face and have the opportunity to listen to feedback so we can improve and evolve where necessary. I urge you, if you do see me out and about, please do not hesitate to say hello — unless I find you first!

Closer to home, I am looking forward to my first Gem-A Conference as CEO. Having both attended and contributed to many previous conferences I know it is a true highlight of the industry calendar, providing



delegates with the opportunity to listen to world experts on a variety of subjects and a chance to catch up personally with one another, as well as to celebrate our students' successes as newly-qualified gemmologists at the Graduation Ceremony and Presentation of Awards. Personally, I would like to open-up the conference to more of our students, whom I know will be inspired by being able to talk with our diverse range of speakers, leading figures in the industry, and to other members. Our line-up this year is exciting, engaging and thought-provoking, and one which all at Ely Place are looking forward to. To keep up-to-date with the latest from the Conference visit our website at www.gem-a.com/news--events/gem-a-conference-2016.aspx.

I would like to close with a number of thanks. First to the staff at Gem-A, who have worked exceedingly hard and, in some cases, under a great deal of pressure, to ensure Gem-A has continued to deliver through times of uncertainty. I would also like to thank Nick Jones, our interim CEO, who, as a self-professed person with "some gemmological knowledge", has done an excellent job in steering Gem-A since being appointed, and who has made me feel very welcome. Lastly, I would also like to thank the Trustees for the opportunity to lead this great organization. I relish the challenge in delivering a bright future for Gem-A and look forward to meeting and working with you all. ■

Alan Hart
Chief Executive Officer

Gem News

HATTON GARDEN BID PLANS REVEALED

A £2.5 million investment plan to champion Hatton Garden businesses has been published revealing ambitions to enhance the area's iconic status and harness commercial opportunities, including Crossrail. The Hatton Garden Business Improvement District (BID) published its plan ahead of the ballot of local businesses this summer. If a majority of businesses support the proposals, the BID will go 'live' this October and run for a first term of four and a half years.

The BID's aim is to see Hatton Garden grow as a world-renowned business and visitor destination, through amplifying the revitalization of the area, enhancing its iconic status as London's famous jewellery quarter, and developing the experience of working, living, doing business and visiting the area.

Gary Williams, Chair of the Hatton Garden BID (pictured), said: "I am proud of Hatton Garden's jewellery heritage, but equally proud of how the area is evolving and the diverse mix of businesses the area is attracting. There are significant opportunities on the horizon but also challenges — partly driven by the rapid change we are seeing locally, but also as a result of rising competition from areas across London. Through the BID the business community will have a stronger and more influential voice to develop and shape the Hatton Garden agenda."

Networking opportunities, mentoring and training programmes and projects to showcase the creativity and skills within Hatton Garden are proposed to support businesses, protect the jewellery sector and to position the area as a creative hub. Joint procurement programmes are also proposed to save money for businesses in the area.

The BID will be funded by the local business community via a small levy determined by the ratable value (RV) of eligible businesses — in Hatton Garden this will be 1% of the RV of their business unit. Gary Williams added: "The BID offers local stakeholders an outstanding opportunity to invest in a better future, enabling all sectors to benefit from the improvements and the predicted commercial growth of the Hatton Garden area. I would encourage all to seize this fantastic opportunity."



RIO TINTO REVEALS LARGEST VIOLET DIAMOND

Rio Tinto's Argyle Pink Diamonds business has unveiled the largest violet diamond recovered from the Argyle mine in Western Australia. The 2.83 ct polished oval shaped diamond, known as the Argyle Violet, will be the centrepiece of the 2016 Argyle Pink Diamonds Tender, the annual showcase of the rarest diamonds from the Argyle mine.

The stone was polished in Western Australia by one of Argyle's master polishers, Richard How Kim Kam, from a 9.17 ct rough diamond discovered in 2015. The Argyle Violet has been assessed by the Gemological Institute of America as a notable diamond with the colour grade of Fancy Deep Greyish Bluish Violet.

More than 90 per cent of the world's rare pink diamonds come from the Argyle mine and it is the only source of hydrogen-rich violet diamonds. Violet diamonds are seldom seen and in 32 years Argyle has produced only 12 ct of polished violet diamonds for its Tender. The 2016 Argyle Pink Diamonds Tender will commence private trade viewings in June and travel to Copenhagen, Hong Kong and New York.

MOST EXPENSIVE ROUGH DIAMOND SOLD

Last month the Lucara Diamond Corporation revealed the most expensive rough diamond ever sold. The type IIa 812.77 ct stone, named 'The Constellation', sold for US\$63.1 million, breaking all records for a rough diamond. As part of the sale, Lucara has partnered with Nemesis International DMCC, and retains a 10% interest in the net profit received from the sale of the resultant polished diamonds.

Commenting on the sale, Lucara's president and CEO William Lamb said: "This achievement solidifies our reputation in the jewellery industry as one of the most important sources of diamonds of the very highest quality. We look forward to the next stage of Lucara's development with the sale of the spectacular 1,109 ct, Lesedi La Rona diamond which will take place at Sotheby's London on 29 June 2016."

KENYAN GOVERNMENT BURNS IVORY

President of Kenya, Uhuru Kenyatta, used a torch to set ablaze a giant pyre of ivory, one of 11 similar mounds built in Nairobi National Park that will burn for almost a week.

It was part of an effort to incinerate 105 metric tons of elephant ivory and 1.5 tons of rhinoceros horns from the government's stockpile of confiscated material taken from poachers and illegal traders.

The purpose of the burning is to publically demonstrate the government's determination to wipe out the ivory trade and secondly to reduce the stock of ivory that it warehouses. The burn coincides with a meeting of The Giants Club, a forum that brings together the leaders of nations with elephant populations, business leaders and conservationists to discuss initiatives to help preserve Africa's elephants, which have seen increased poaching pressure in recent years because of high ivory prices, which can reach US\$1,000 per kilogram. According to the BBC about 3,000 African elephants are slaughtered for their tusks each year.

Not everyone agrees that incinerating the ivory is the best policy. The president of Botswana boycotted the burn, and some conservationists are concerned that the destruction of the ivory will drive up prices, incentivizing poachers to kill more elephants. ■

Events

GEM CENTRAL

Whether you are a student in gemmology who wants more practical work, a gem and mineral enthusiast who would like the opportunity to handle other collections, or a member of the jewellery trade who is keen on examining some of the new synthetic treated stones on the market, Gem Central evenings are for you.

Gem Central is a regular practical gemmology evening for Gem-A members and students, giving attendees the opportunity to investigate and explore a variety of gem materials. The meetings take place once a month, from 18:00–19:30 at Gem-A Headquarters, 21 Ely Place, London EC1N 6TD. For more information about our upcoming Gem Central events, please contact us via events@gem-a.com.

Ivory Workshop with Eric Fritz

21 June 2016

Organic gems are always misunderstood and puzzling. Now with an increased pressure on illegal animal trade, it is a good time to brush up your knowledge. Fossil ivory is now being regulated alongside modern elephant ivory by individual States in the USA. President Obama has increased pressure on the trade in endangered wildlife products.

Eric Fritz, Gem-A's North American Manager, will be visiting Gem-A headquarters to update us on these changes. The evening will cover a variety of organics, including ivory, bone, tusk, horn and antler. During this hands-on session you will learn how to separate natural, fossil and simulants. Come and explore and challenge your previous knowledge. Please register your place with events@gem-a.com.
Price: Free for Gem-A members and students; £10 for non-members

OTHER EVENTS

NEW: Gem-A South West Branch Meeting

Sunday 19 June 2016, 13:00–17:00
BRLSI, 16–18 Queen Square,
Bath, Avon BA1 2HN.

The South West Branch is back! After a hiatus we are back up and running with our first event, to be held in the beautiful city centre of Bath. This half-day event will get budding gemmologists from the South West together outside London, for both a hands-on session and a fantastic networking event. Kerry Gregory FGA DGA will be running a practical session, accompanied by a short presentation on good testing practice, followed by an 'open session' for attendees — allowing you to practice, play or learn as you wish. There will be exercises available for specific equipment, as well as hands-on demonstrations of how to make the most

out of everyday gem testing equipment, accompanied by a range of testing stones, from popular gems to rarer specimens. This session is perfect for anyone who wants to practise their skills in an informal environment, for those simply wanting to meet like-minded gemmologists in their area, or as revision for any students taking exams or currently studying the Gemmology Foundation or Gemmology Diploma. No prior practical knowledge necessary, although some knowledge of gemstones is advantageous.

Refreshments will be served throughout the afternoon. Stones will be provided and equipment is available — if you do need access to testing equipment please specify when booking, although please bring your own equipment if possible.

Places are limited — early booking is advised. To book a place please contact Eve Symes (Secretary, South West Branch) — 07779 727569 or eve@vidan.co.uk.
Price: £25 per person.

UPCOMING SHOWS

JCK Las Vegas

3–6 June 2016

Mandalay Bay Resort & Casino,
Las Vegas, Nevada, USA

Sainte-Marie-aux-Mines

Mineral & Gem Show

23–26 June 2016

Sainte-Marie-aux-Mines, Alsace, France



Gem-A
THE GEMMOLOGICAL ASSOCIATION
OF GREAT BRITAIN

Rough Diamond Workshop

11 October 2016

£150 Gem-A Members and students • £180 non-members

Are you interested in rough diamonds? Why not attend our **Rough Diamond Workshop**, an exclusive one-day workshop delivered by **Dennis Terry**, an independent rough and polished diamond consultant. Terry, currently Rough Diamond Valuer for the UK Government Diamond Office, has a wealth of knowledge on rough diamonds, having worked as a rough diamond valuer and negotiator for De Beers, as Senior Government Diamond Valuer to the Republic of South Africa and as a diamond buyer in Sierra Leone.



You will learn a basic understanding of rough diamonds and the diamond industry as well as a practical grounding in the handling and recognition of the various diamond qualities, shapes and colours. The workshop also covers related topics including conflict diamonds, KPCS Certification and rough diamond valuation and pricing theory.

For more information or to book your place contact education@gem-a.com.

Please note: Previous knowledge in diamonds is essential (such as Gem-A's Diamond Grading Identification Certificate or attendance at one of Gem-A's one-day diamond workshops).

Notes from your Board

As an Association, we are entering an exciting and dynamic new era. Your board elect was brought together with a challenging task at hand. Gem-A had experienced an unprecedented series of events and the new board had a series of mandates to get things back on track. One of our early tasks was to bring in Nick Jones as our temporary chief executive officer (CEO). Nick has been an effective interim CEO, working with staff and the board to manage daily operations, as well as to clarify financial and organizational structures of the company for the board. We want to thank Nick for his efforts and his time with us.

In addition to a number of less significant, yet still important activities, our primary task was to search for and recruit a new CEO to take the helm of Gem-A and lead it and our team into the future. After an extended process,

Alan Hart was selected. Alan resigned from his position on the board to apply for this post and he had decisively risen to the top of candidates. Alan demonstrated the experience, intelligence, vision and drive that we were looking for, and we are all very pleased that he will be our leader as of 1 June. The wave of goodwill and support from staff, members and the greater industry from around the world following Alan's announcement has been truly humbling to witness and experience.

Under Alan's governance, we are confident that Gem-A will continue as a premier educational authority in gemmology, bringing renewed vigour and vision. Additionally, we fully expect the influence and impact of Gem-A, our courses and Fellows around the world will only continue to grow and expand in key markets.

Under Alan's governance, we are confident that Gem-A will continue as a premier educational authority in gemmology, bringing renewed vigour and vision.



Over the past several months, we have also been hearing from staff, members and others who have been coming forward with suggestions and recommendations for how to improve the Association and the benefit to its members. We have listened and are looking into several useful propositions. One in particular related to how we may be able to make our annual conference more accessible to our students. Our conference is a cornerstone of Gem-A's commitment to gemmological education. This well-attended event brings a wide range of knowledge and expertise from professionals around the world.

We are very pleased to announce that in order for us to continue to foster the motivation and drive of our students, we have decided to encourage the attendance of all current students and 2016 Diploma graduates with a special rate of £50 per day for this two-day event. More information will be released on social media and on the Gem-A website soon. The Gem-A Conference is seen by many in the industry as an essential event, delivering as it does a broad range of speakers, topics and knowledge, from the latest laboratory research to new treatments and synthetics to talks that show us the beauty and excitement of the gems we study. As well as the world-class speakers there are a number of practical workshops and tours that can be accessed by attendees to the conference, and it must not be forgotten what an important role the social and networking side of the conference has. This year we hope that even more people can use this event to widen their gemmological circle.

At this stage we as a board will transition our role from one of more direct hands-on involvement in daily operations to a more traditional role of oversight and advisory. We would like to thank Gem-A staff and members for their support and patience throughout this process. It is you who collectively make Gem-A such a great organization to be a part of, and we are proud and honoured to be given the responsibility bestowed upon us. ■

Sincerely,
Your Board of Trustees



Gem-A

THE GEMMOLOGICAL ASSOCIATION
OF GREAT BRITAIN

SPECIAL
STUDENT RATE FOR 2016



Save the Date

Gem-A Conference • 5–6 November 2016

The Gem-A Conference will be held at the prestigious **Royal Institute of British Architects (RIBA)** in Marylebone, London.

This year will feature talks from the following renowned gem experts:

- Jim Clanin, mining engineer
- Pat Daly, valuer and Gem-A Tutor
- Ian Harebottle, Gemfields
- Bill Larson, Pala Gems
- Helen Molesworth, Gübelin Academy
- Danny Sanchez, photomicrographer
- Robert Weldon, GIA
- Dr Michael Wise, Smithsonian Institute

Plus more to be announced...

To keep up to date with the latest from the Conference and for information on how to book please visit the Gem-A website.

Creating gemmologists since 1908

Join us.





Up (very) close and personal

We're excited to announce that one of the speakers at the Gem-A Conference later this year is Danny Sanchez, an award-winning photographer specializing in photomicrography. We spoke to Danny about how he got started with photomicrography, his equipment and his favourite gemstones to photograph.

What got you started in photomicrography and gemmology?

I was a working musician in Los Angeles and wanted a change of pace. I'd always loved gems and minerals and when I discovered that you could study them, their origins and applications, at the Gemological Institute of America, I couldn't enrol quickly enough. The day I opened the course material and saw an inclusion photomicrograph, I was hooked.

What special equipment do you use?

I might be a little biased so I feel like a lot of my equipment is special. I think my most unusual piece of equipment is a vertical stepping rig that moves the microscope mere microns at a time.

Explain stacking for those who do not know it; how indispensable has it become? Do you look at images from earlier and wish you could retake some of the spectacular ones to add the 'dimension' it offers? If you're measured in your use of 'stacking', do you think it's overused? What other ways can you 'add' to a shot?

Microscopy deals in very narrow focal planes. A single photo has very little that is actually 'in focus'. Focus stacking is a technique that allows one to merge multiple photos, each with different focal planes, into a single photo with greater depth of field. This is stacking. Using this technique, one is able to 'manufacture' depth.

There is definitely a way to overuse stacking. Besides the visual residue that can be found in some photo 'stacks' (a group of photos merged into one), if a photo is rendered with too much depth, the viewer can lose perspective. Simply put, but somewhat counterintuitively, a photo with too much depth can look flat.

I definitely understand the impulse to go back and re-do a shot, but it's not a strong one for me. I'm always trying to look forward, and to reproduce or re-tool an image I've already made seems like a step backward — particularly in light of how many dynamic subjects this industry offers.

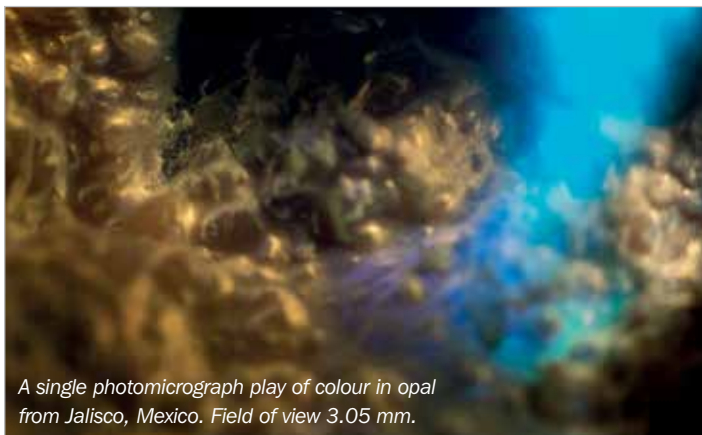
(For more information on stacking see Prince, N., 'Use of Stacking Software for Expanding Depth-of-Field in Inclusion Photomicrography', *The Journal of Gemmology*, 2014, 34(3), 188–89).

Do you have any advice for gemmologists wishing to try photomicrography at home?

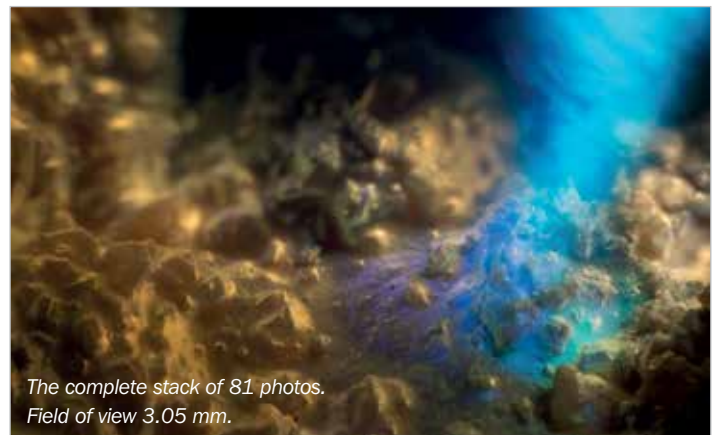
There is an overwhelming number of details to consider while trying to take a successful photograph through the microscope and it's hard to see the forest through the trees. The simplest recommendation I can make is: buy more light than is necessary. Gemmologists are used to using a specific type and amount of light during observation and imagine that will be sufficient when they sit down to take a photograph. It never is. Light is everything in photography; it's even more important in photomicrography.

Do you have any particular favourite inclusions or gemstones to photograph that always yield unusual and beautiful photos?

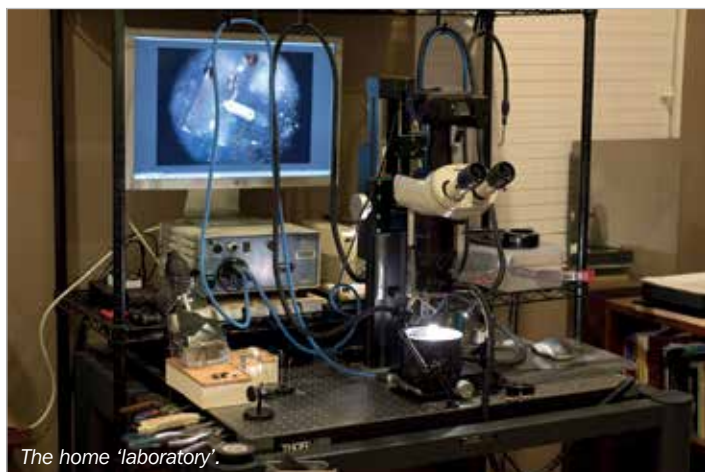
This past year I've immersed myself in opal with matrix. I have yet to find a mineral more dynamic that so readily yields actual landscapes. Part of what I look for in my own work is the feeling of being transported somewhere 'other'. I enjoy the challenge of finding that in quartz or corundum, but when I work with opal in matrix, it's almost like the photo takes itself.



A single photomicrograph play of colour in opal from Jalisco, Mexico. Field of view 3.05 mm.



The complete stack of 81 photos. Field of view 3.05 mm.



The home 'laboratory'.

How do the public react to your photos? Do you find that people are more interested in gemstones as a result?

Most (non-gemmological) people don't know what they're looking at when standing in front of my photos. Once I tell them that it's a photo of the inside of a gemstone, more often than not, they don't believe me. Finally, when they do, they have a million questions. It's really great to see people so invigorated about gems and minerals. I'm sure they're much more interested when they leave than before they arrived.

How do you source the stones that you work with?

Mostly, I'll buy at trade shows, looking through dealers' backstock inventory — stones that, for one reason or another, have been passed over. Part of the joy of my process is these little discoveries and bringing something out of them that no one could have imagined.

There's something about owning the stones I work with (and hopefully producing an image from them) that makes the final product that much more satisfying. I'm not sure I can satisfactorily articulate why. Maybe, like every other gemmologist, I just like to hoard stones.

Do you see your photos as an educational tool or as an art form?

Art is an inherently selfish act and mine is certainly no exception. All I ever wanted was to capture in my images a sense of mystery and wonder. It is purely self-serving and in this regard, it's very 'artsy'.

But as the earlier question suggested, when people look at my images and discover that they are photos of actual minerals inside other minerals, there is an immediate spark of curiosity. The moment that happens, my photos become educational.

Most of my work for the past few years has focused on atmosphere, the space within the stone and not any particular inclusion or the capturing of inclusions. That's what interests me the most... capturing and creating the space within gems.



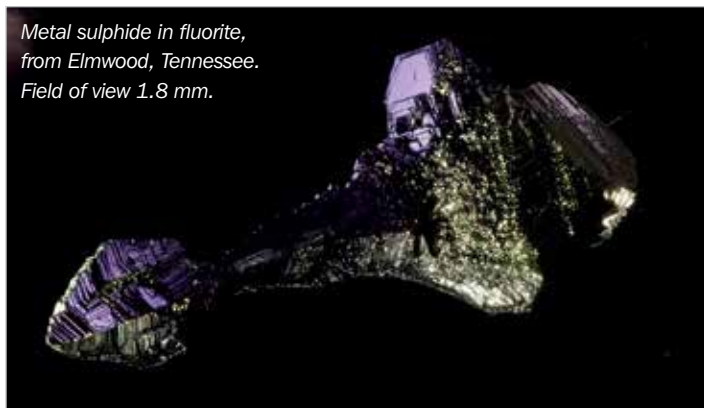
Opal from Magdalena, Jalisco, Mexico. Field of view 3.05 mm.



Ilmenite and hematite in orthoclase feldspar from Harts Range, Australia. Field of view 3.05 mm.



Opal from Magdalena, Jalisco, Mexico. Field of view 3.05 mm.



*Metal sulphide in fluorite,
from Elmwood, Tennessee.
Field of view 1.8 mm.*

How long does it take you to capture the 'magic' shot?

I'll sit down with a parcel of stones and spend hours turning them over in my hands, changing the lighting environment, trying my best to disappear into the process. Once I've decided on which stone I'll pursue, it could take another hour or so to test shoot dozens of lighting environments. The shooting and processing of a stack of 100 or more photos takes another 30 to 40 minutes. The real work happens over the following several days while I digitally develop the photo, just as I would if I were working in a traditional darkroom.

What's the most frustrating thing about photomicrography?

The most frustrating thing is that I can't do it for a living. My photos don't have to be perfect, but they have to be representative of the view through my oculars, at the same time capturing the feeling of the moment of discovery. If I don't feel I've done that after I've gone through the process of taking the shot(s) and developing the stack, it can be very frustrating.

What are your future plans for your work?

Most of my work for the past few years has focused on atmosphere, the space within the stone and not any particular inclusion or the capturing of inclusions. That's what interests me the most and that's what I see myself pursuing; capturing and creating the space within gems.

If fleeing a burning building, what equipment do you grab?

Do you have favourite lenses?

Luckily for me, I'm not a photographer in the traditional sense of the word. I didn't grow up aspiring to take photos nor did my penchant for gadgetry lean in that direction. My entry into the world of 'prosumer' cameras and lenses began with photomicrography. Because of this, I don't have a collection of lenses or cameras that would make it hard to choose if fleeing a burning building. My most crucial pieces of equipment fit into one small hard case. I'm definitely fortunate in that regard.

Your studio improvisations suggest you have a good eye for engineering solutions to suit your needs...

Everything I have done, I've done on the shoulders of others. Of course, I'd like to think of myself as a tinkerer and problem solver but most of my equipment has existed in some form, on someone else's desk, in someone else's setup. It wasn't easy piecing it all together but with help from a very small handful of people from around the globe, I've put together something that I'm really proud of.

Another big part of the job these days is software. Is the software a tool that you use 'out of the box' or do you find yourself trying every new plugin that you see?

I've mentioned the stacking software and while that's a tricky, nuanced piece of software, it performs one function and is therefore finite in its ability to affect a photograph. Beyond that there is developing software such as Lightroom and Photoshop. Together, they can be used to alter an image in infinite ways. While they are indispensable tools, I try to remain as faithful to the view through my oculars as possible.

What are the 'frontiers' to be explored in photomicrography?

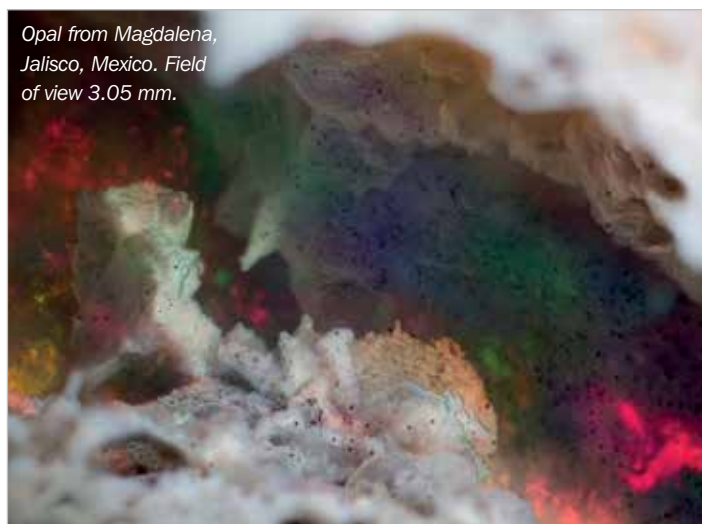
I think the frontiers of photomicrography lay in the direction of software. We're so lucky to be living in a time of amazing advances in what computers can do to aid in our perception of the world around us. One day I hope to be able to pop on a pair of VR glasses and take a flight through a Kashmir sapphire or Mexican opal.

Who are your mentors and heroes in the gemmology/ photomicrography world? Who first encouraged you to be a photographer? Or have you always encountered cautionary advice? Did you ever have a 'backup plan'?

Of course, Eduard Gübelin and John Koivula. Without their work, who knows where I'd be. In 2007, a year or so after I bought my first microscope, I was working at a trade show and was introduced to Edward Boehm. I already knew who he was, both in the trade and his family's importance in gemmology. I shook his hand and told him, with no small amount of youthful hubris, that I was going to be a photomicrographer. He flashed me that great smile and told me to go for it. Every subsequent time I ran into him, he would always ask how it was going and if I'd made any progress with my photos. I was the smallest blip in his periphery but for the next five years he never forgot to ask about my photos.

During that time I struggled with the pursuit itself and a lot of self doubt. It wasn't until 2013 that I was proud enough of my work to share it with the general public. His polite consideration was such a small gesture but it made me think: if this great gemmologist, grandson of the man who helped pioneer this field, hasn't forgotten about me and my pursuit, I can't forget either. ■

All photos © Danny Sanchez.



*Opal from Magdalena,
Jalisco, Mexico. Field
of view 3.05 mm.*



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A bicolour feldspar

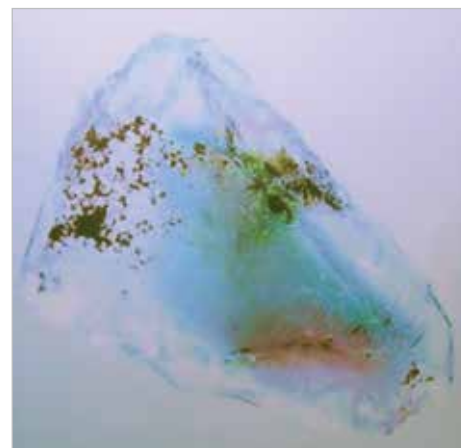
Alan Hodgkinson
FGA DGA takes a look
at an interesting
bicolour feldspar.

Considering that the mineral feldspar makes up more than 50% of the earth's crust, it is perhaps overlooked as a provider of gemstones by the gemmologist, who does not generally think much beyond moonstone. The monoclinic orthoclase member is generally colourless to pale yellow, though a rare exception is the attractive transparent green variety, of which the finest comes from Mogok, an example of which, a 2.74 ct specimen with an RI of 1.518–1.524 and birefringence 0.006, is part of the Paine collection in the Natural History Museum, London. The triclinic plagioclase member, with its six arbitrary divisions, provides the majority of feldspar varieties known to gemmology. Moonstone does not fit neatly into either of these categories as it is mostly the product of micro-layering between the monoclinic and triclinic members.

Three years ago, Robert James, who runs the International School of Gemology in San Antonio, Texas, USA, described some bicolour plagioclase feldspar material from Oregon. I expressed interest, and through the kindness of the Dust Devil mine owners (Don and Patsy Buford) a 19 ct specimen was passed to me via Robert at Tucson.

The two colours were certainly evident, but the frosted surface of the alluvial crystal meant it was difficult to see exactly how and where the colours lay. This is where liquid immersion comes to the rescue, especially if used with a horizontal microscope. The stone's colour layout could now be clearly seen using baby oil (RI 1.46) for the immersion (1). Such a liquid holds no fears for the user, as if and when the liquid strays onto one's fingers, they can be decontaminated by simply wiping them on the cheeks, with possible improvement in one's skin tone!

Now, for a gemstone cutter, I did not have far to search, as Martin Donoghue, the Glasgow lapidarist, accepted the challenge and the results were testimony to his cutting skills (2). I showed the faceted gemstone to the donors at the following Tucson show, who expressed their delight at the resulting display. Several gemmologists suggested I ask GIA photographer, Robert Weldon, to take a photograph which captured not only the bicolour, but the



1: Bicolour plagioclase feldspar.

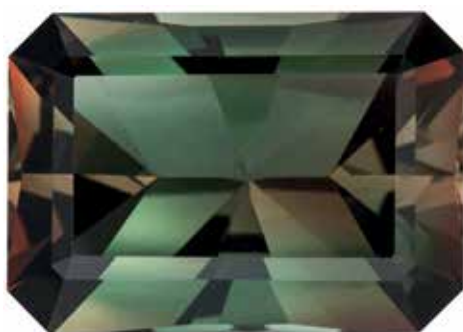
pleochroic nature; the trichroism showing greenish yellow, greenish blue and orangey red — the latter colour exclusively seen along the length of the specimen (3c) corresponding to the higher RI optic axis, confirmed on a polariscope by the biaxial interference figure seen with a conoscope. The photo results were as might be expected, for the gemstone had taken on a beautiful, if ambiguous, appearance. Some asked: "Is it an andalusite?" when shown the 7.53 ct stone, whilst others suggested alexandrite!

The plagioclase series of feldspars, ranging isomorphously from the high calcium end to the low RI albite sodium end, has been divided by the mineralogist into six equal compositional subdivisions: anorthite, bytownite, labradorite, andesine, oligoclase and albite, for which the mnemonic 'a bitter lemon and orange aperitif' of the descending RI might be of help to the student gemmologist.

Then the question arose, "Which plagioclase identity did the specimen have?" Careful use of an Eickhorst refractometer (checked against the ordinary ray of an amethyst at 1.544) collated the alpha, beta and gamma refractive measurements as alpha 1.560, beta 1.566 and gamma 1.571, that is biaxial negative.

However when these measurements are compared with the data given by Webster's *Gems* (6th edition), it really is difficult to determine whether it points to labradorite or bytownite:

LABRADORITE RI range: 1.554 to 1.573,
birefringence 0.008–0.010 B+/-
BYTOWNITE RI range: 1.563 to 1.583,
birefringence 0.010–0.011 B-.



2: Stunning interplay of competing labradorite colours in Oregon bicolour labradorite.
Photo by Robert Weldon.



3: The stone illuminated and rotated with a Polaroid disc in front to show its trichroic colours of (a) yellowish green, (b) greenish blue and (c) orangey red.

The fact is that the refractive measurements obtained from this specimen straddle these two possible identities. A further twist is that the labradorite changes its optical sign from positive to negative at the more calcium end of the range, i.e. towards the higher RI end.

The feldspars really do present a complex mineral family for the gemmologist to grasp. A fuller picture is given of the plagioclase feldspars in *An introduction to rock-forming minerals* by Deer, Howie and Zussman. Even here they write: "The details of structures of plagioclases, other than the end-members, are still not completely known despite much study."

In the book referred to, the authors acknowledge the specific identity difficulty unless a full chemical analysis is obtained from the relative sodium and calcium percentages. They point to using the Becke line effect alongside a quartz in the immersion fluid, but this is not easy to perform or decide. A positive pointer given is to regard only the alpha lowest RI, which would confirm a labradorite identity with this specimen.

Another interesting suggestion may not fit exactly into what might be termed 'duty of care' for a customer's stone, but if the specimen was still in the rough, a small

part could be sawn, cleaved or chipped off. Gently heating the stone in air, the feldspar loses its crystal structure and becomes an amorphous sodium/calcium glass. Polishing a flat on the glass, the RI can promptly be measured on a refractometer. The resultant RI can then be compared to a straight line graph and the identity clearly established — the labradorite glass lying between RI 1.53 and 1.55. This however is for the really dedicated gemmologist. Some might suggest it lies somewhere about labradorite or bytownite. Such an answer would totally mystify most of customers, trade or public. Finally the seller can fall back on the more prosaic description of 'sunstone', the name given to any of the copper-bearing feldspars, but not truly descriptive of this attractive gemstone.

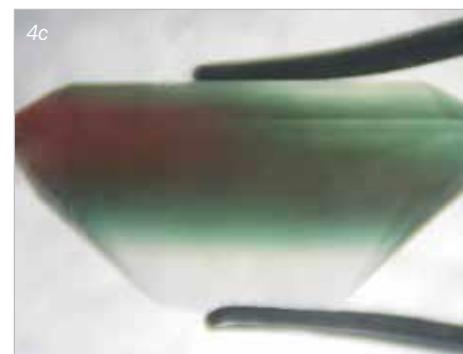
On this safer ground, the thinking gemmologist could easily demonstrate the bicolour of the gem by immersing in baby oil (4a–c), or simply illuminate the gemstone and rotate a Polaroid disc in front of the gem to demonstrate its really striking trichroism (3a–c).

A word of warning for the jewellery workshop if the feldspar is mounted; the calcic end of this isomorphous series is more prone to damage from any workshop acids. ■

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4a–c: Immersion in baby oil shows the bicolour layout and trichroism of the gem.

Back to black

Sarah Steele FGA DGA discusses the many simulants of one of Britain's most famous native gemstones, Whitby Jet.



Fine Whitby Jet cameos including King Oswy and his bride (centre) and Benjamin Disraeli (right).

If imitation is the sincerest form of flattery, then Whitby Jet must be a very desirable material indeed. I can think of perhaps 20–30 different materials, both natural and synthetic, which, at one stage or another over the years, have been described as ‘Whitby Jet’, whether accidentally, or due to intentional deceit.

We think of a 40-year period during the mid- to late-nineteenth century as the heyday in Whitby Jet manufacture, and from a jewellery output perspective that is unequivocally true. However, the desire for Whitby Jet, and the quest to imitate it, has its roots much further back in time. Following the Scottish Gemmological Association’s Conference this year (see Andrew Fellow’s report on pages 26–28), delegates had the opportunity to visit the ‘Celts’ exhibition at The National Museum of Scotland. I couldn’t resist the opportunity to join them in having a closer look at the museum’s stunning collection of Bronze Age jet neckpieces whilst we were there.

Historically, many of these early pieces containing black beads with a high organic carbon content were described as ‘Whitby Jet’ (1). Modern analytical techniques have shown, however, that these almost always contain a variety of materials — Whitby Jet, certainly — but also oil shales, lignites and cannel coals, often within the one piece of jewellery. Whitby Jet is a material with which

the demand for rough will always outstrip supply in periods of high production, and jet collection requires patience as it is reliant on coastal erosion. Are we then, in the Bronze Age some 4,500 years ago, seeing the first example of a Whitby Jet simulant? It has to be noted that the prevalence of Whitby Jet in the archaeological record during this period suggests that it is arguably one of the oldest economic resources in the British Isles.

Fast forward 2,670 years and the Whitby Jet simulant market is a fascinating and booming industry. British society is participating in a national obsession with mourning. With the death of George IV in 1830, the Lord Chamberlain’s office dictates the dress code for the period, stating unequivocally that: “The ornament shall be jet.” In 1830 the term ‘jet’ meant only one material: Whitby Jet. The death of the Duke of Wellington in 1852 prompted the production of Whitby Jet jewellery into overdrive — the 50 recorded workshops in 1850 swelled to 204 following the death of Prince Albert in 1861 as yet another wave of mourning swept the nation.

Demand for rough Whitby Jet was beginning to outstrip supply and other options were needed. The main attraction of Whitby Jet as a gem material was of course its deep black colour and liquid-like lustre, but more importantly its low SG (1.2–1.3). It was fine to look ‘weighed down’ by the convictions of your expression of mourning, but in reality it was practical if the seven strings of beads that you were wearing to denote that you were the seventh daughter of a deceased father didn’t weigh more than a few ounces.



1: Inchmarnock Bronze Age necklace showing use of multiple black materials. Photo credit Alison Sheridan.

Therefore, to be a convincing simulant of Whitby Jet, the imitation material would need to be light in weight. Whitby Jet is also a poor thermal conductor and so always feels warm, as heat is not quickly transferred away from the surface. Today we often describe jet as feeling 'plasticky', however, in the mid-nineteenth century plastic was yet to be discovered. The simulant therefore needed to be light in weight, black in colour and a poor conductor of heat.

HORN AND TORTOISESHELL

In 1712 John O'Bisset had discovered that horn could, with the application of heat, be moulded into various shapes. When cooled the shape was retained — O'Bisset had discovered the first natural thermoplastic material. Sheets of horn were put between hot metal plates in a press and pressure applied. Placing the warmed horn into moulds before applying pressure enabled the production of horn boxes, beakers and other items.

With the application of black dye, pressed horn looked to be a good candidate for



3a

a Whitby Jet simulant and many jewellery items were produced. Horn has a tendency to delaminate due to its layered structure, so loupe examination often reveals these layers, especially on the reverse of brooches. Any damage to the edges also gives a slight transparency to the damaged area, which is not seen in Whitby Jet. The colour can often seem uneven and it is worth remembering that it is not possible to screw a brooch fitting into jet, therefore a screw, often seen in horn, is always sign of a simulant (2).

It is also worth mentioning that tortoiseshell, like horn, is also a natural thermoplastic. Tortoiseshell, a much-admired decorative material, derives not from a land tortoise but from certain species of marine turtle, principally the relatively small hawksbill. Tortoiseshell is unlikely to be mistaken for jet due to the mottled colour, but the SG and 'plasticky' feel are similar.

BOG OAK

As we know, Whitby Jet is a fossilized wood, so perhaps a wood product could also make a suitable simulant. 'Bog oak' is not a specific species, rather a term that indicates wood that has been buried in a peat bog for thousands of years. The extremely low oxygen conditions of the bog protect the wood from normal decay while the underlying peat provides acidic conditions where iron salts and other minerals react with the tannins in the wood, gradually giving it a distinct dark brown to almost black colour.



3b

3: Bog oak jewellery (a) and reverse of brooch (b) showing concentric rings as a result of lathe turning.

Bog oak occurs in many areas of the United Kingdom but jewellery usually originates from Ireland. It was produced from the early 1800s but became popular in the mid-nineteenth century, reflecting the demand for Whitby Jet, especially after 1852, when techniques to mass-mould and decorate the material (through the application of hydraulic or heated pressure to the dried wood) were invented. Although predominantly used for mourning jewellery as a cheap substitute for Whitby Jet, bog oak was also worn to support Irish crafts, with pieces often carved or stamped with Gaelic motifs such as harps or shamrocks — symbols which would not be considered to be mourning jewellery. Concentric rings are usually visible on the reverse of items as blanks were lathe-turned prior to carving (3). Loupe examination always shows the ligneous nature of the wood and the lustre achieved is usually textured and dull.



2a



2b

2: Pressed horn jewellery (a) and the reverse of pressed horn brooch (b) showing lamination and screw fittings.

GUTTA-PERCHA

In 1843 a more exotic material arrived on British shores: gutta-percha. Gutta-percha is a rubber-like substance made from the sap of the Palaquium tree (*Palaquium gutta*), a native plant of Malaya and Borneo. A thermoplastic material, its use was quickly appreciated, and the Gutta Percha Company was founded in London in 1845. A tremendous variety of objects were made in gutta-percha, although few survive as the material becomes brittle when exposed to air. Its most significant use was in the covering of submarine telegraph cables, although other products included acid-resistant bottles, buckets and tubing, as well as in the making of copies of coins and medals.

The material will smell like rubber when rubbed briskly on fabric, but the most effective way to tell if your item is gutta-percha is to taste it. (Note: please wash the material before and after tasting, and taste at your own risk!) If you do choose to do the taste test, the material will taste salty if it is gutta-percha. In reality, despite the fact that gutta-percha is always listed in literature as a Whitby Jet simulant, I am yet to see it used in a jewellery item. Often, shellac is misidentified as gutta-percha. The only items I have seen made from gutta-percha are golf balls, often described as 'gutties', and with a gutty mark stamped into the pattern on the golf ball (4).



4: A gutta-percha golf ball or 'gutty'.

VULCANITE

In 1839 Charles Goodyear discovered the method of mixing sulphur with rubber to form hardened or 'vulcanized' rubber, called 'vulcanite'. The proportion of sulphur can be increased or decreased in order to vary the required amount of hardening accordingly.



5: Examples of vulcanite jewellery; items on left have had little light exposure and are still black, whilst items on the right show the typical khaki colour due to light exposure.

Between 25–50% sulphur gives a hard product with the familiar feel of plastic. There are many Victorian vulcanite objects, but the most common form is an imitation of Whitby Jet used widely in the production of brooches, bracelets and necklaces. Vulcanite could be produced in almost any colour, although the predominant colours are black (ebonite) and brown. As a result, vulcanite was by far the most widely-produced Whitby Jet simulant.

Unlike pressed horn and gutta-percha, which are both thermoplastic materials which, if heated again, can be re-moulded into a different shape, vulcanite is a thermoset material which, after moulding, becomes brittle and cannot be re-moulded. Vulcanite can be distinguished from jet relatively easily. If the material has been exposed to light over time it loses its black colour and becomes khaki brown (5). When rubbed vulcanite smells strongly of sulphur and, as with pressed horn, brooch pins are usually screwed into position rather than glued. Chain links only show one or two

splits depending on the link style, as the link can be twisted open and then closed. By comparison, in Whitby Jet links every other link in the chain is cut and glued and will always show two or three cuts depending on style of link. As vulcanite pieces were often moulded from jet originals, the same design is seen regularly and, with experience, can be identified easily. Please note that the 'streak' test on vulcanite will reveal a light brown streak similar to that of hard Whitby Jet and so should not be relied on.

BOIS DURCI

In 1855 Francois Charles Le Page secured a French patent for a method of combining blood albumen from slaughterhouses with wood powder to form a plastic, mouldable material he called 'bois durci'. The wood dust (either ebony or rose wood), was mixed with blood, dried and then ground to a fine powder. The powder was placed in a steel mould and steam heated to 400–500° in a powerful hydraulic press. After half an hour the mould was plunged into cold water. The

resulting wood product was an extremely dense, highly polished and resistant thermostet material.

Le Page is reported to have used the marketing strapline “Anything Whitby Jet could do, *bois durci* could do cheaper and in brown.” The most common items available in *bois durci* today are circular plaques showing royalty or statesmen of the time (6). They are generally brown in colour and usefully often have *bois durci* stamped on the reverse.



6: Prince Albert plaque made from bois durci.

SHELLAC

Shellac is a resin secreted by the female ‘lac’ bug on trees in the forests of India and Thailand. It is processed and sold as dry flakes and dissolved in ethanol to make liquid shellac. It is a natural bioadhesive polymer and is chemically similar to synthetic polymers and can thus be considered a natural form of plastic. It has been widely used as a stone-setting medium due to its adhesive nature for thousands of years. Shellac can be turned into a moulding compound when mixed with wood flour and moulded under heat and pressure methods, so it can be classified also as natural thermoplastic. In 1854 it was patented in the USA as a moulding material for making ‘union cases’ — the cases for daguerreotypes — an early form of photograph on glass (7). This moulding

compound shows very fine detail. Although shellac items tend to be dark brown in colour they could also be blackened. It is rare to see shellac pieces of jewellery that would be confused for jet, but it’s worth pointing out again that many shellac items are mis-labelled as gutta-percha.

PARKESINE

In 1862 the first man-made plastic, nitrocellulose (branded ‘Parkesine’), was created by Alexander Parkes from cellulose treated with nitric acid and a solvent. In 1868, American inventor John Wesley Hyatt developed a plastic material he named ‘celluloid’, improving on Parkes’ invention by plasticizing the nitrocellulose with camphor so that it could be processed into finished form and used as a photographic film. True

celluloid is made according to the original formula using cotton fibres, nitric acids and camphor. However, vulcanite seems to remain the most widely-produced simulant. If cellulose nitrate was widely used as a Whitby Jet simulant then very few pieces have survived. However, if there are some surviving pieces, it is worth noting that they will smell of camphor if kept within a sealed container before testing. Cellulose is only commonly used today for the production of ping-pong balls.

8: The back of a Vauxhall glass earring showing mirror back of glass on edges and japanned metal mount.



FRENCH JET AND VAUXHALL GLASS

As far as Whitby Jet imitations go, French jet is, along with Vulcanite, one of the most common. Glass items were also produced in large quantities during the Whitby Jet heyday, primarily faceted black glass beads referred to as ‘French jet’. Its higher SG, vitreous lustre and glass moulding marks mean that it is unlikely that French jet could be confused with Whitby Jet, but because many of the designs were so innocuous, finding a nineteenth-century piece of French jet and identifying it from a piece of black glass used all the way through to the 1940s can be difficult for collectors of the material.

Vauxhall glass is often referred to as the English equivalent of French jet — however not all French jet was produced in France. This thin, highly reflective mirror glass was produced by a silvering process (in a similar way to the production of mirrors). The silvering is often seen on the reverse — either intact or in residual traces (8).



7: Shellac daguerreotype cases.



9: Three faceted bead necklaces, showing (left) cracked and crazed beads — most probably Spanish jet — whilst (right) French jet showing chips and abraded facet edges, and (centre) Whitby Jet, displaying the highest lustre and sharpest facet edges.

SPANISH JET

Although all of the simulants above must have impacted the Whitby Jet industry, it was natural jet which was finally responsible for its final decline. By 1870 the jet industry had reached its peak and subsequently catastrophically collapsed. There were undoubtedly a number of reasons: some blamed the terrific demand which had outstripped supply and led to a fall in standards of workmanship, as many workers hadn't had basic training in the art of fashioning jet.

The large number of simulants cannot have helped, but the final death knell was heralded by the arrival of Spanish jet from the continent. It is hard to estimate how much of this material was imported from Asturias, but it is first documented in 1874 — and many tonnes seem to have been available. The Spanish jet trade had flourished between the seventh and sixteenth centuries, and whilst the Spanish supply undoubtedly had some very good quality rough material, it seems that Whitby imported a rather poor quality jet, often containing pyrite, making it unstable. Finished pieces degraded quickly, cracked and crumbled. As a result, consumer confidence in an already struggling product sector collapsed (9).

DECLINE OF THE INDUSTRY

In 1889 the *Whitby Gazette* reported that: "It would have been better for the Whitby Jet industry, and better for art development, if the Spanish jet trade had never been known in Whitby." Despite desperate measures to support the Whitby Jet industry, such as a quality mark scheme, the industry didn't recover. The mourning trend was well and truly over.

In 1915 *The Lady* described the Whitby Jet trade as "A somewhat funereal fetish of fickle fashion." Poor recognition for the greatest lapidary trend our nation, and perhaps the world, has ever seen.

The beginning of the twentieth century may have heralded the end of the Whitby Jet mourning jewellery trend, but it didn't, however, signal the end of the road for the use of plastics in jewellery. In 1899 we saw the introduction of casein formaldehyde; milk curds hardened with formaldehyde giving us such famous trade names as 'Galilith', and in 1907, phenol formaldehyde, which, when used with wood flour or other filler, gives us the trade name 'Bakelite'. Galilith and Bakelite were never used to imitate Whitby Jet jewellery — by this time (and forgive the pun) you wouldn't have been seen dead in this outdated material.

It seemed like the end of the road for Whitby Jet. The last apprenticed jet worker, Joe Lyth, died in 1958, and with him died the secrets of the Victorian era. However, in the last 30 years or so we have seen a revival in fortunes within the Whitby Jet trade. Today there are 11 manufacturers in Whitby town. As mentioned previously, demand for rough Whitby Jet is high, and patience is required for collection of beach material. This has allowed poor quality materials, primarily Siberian cannel coals and Georgian jet (both often referred to as 'gagate'), with their poor stability and high porosity to enter the supply chain.

Georgian jet is being seen more predominantly in finished contemporary-style jewellery made by Baltic amber manufacturers, and within the last 12 months, as antique-style beads from an undisclosed source. Attempts were even made to sell rough to unsuspecting workshops in Whitby. Experienced lapidaries however quickly identified the new foreign imposter. In Whitby we have no issue with Georgian manufacturers producing items from their indigenous jet, but lack of disclosure of origin leads to the material being retailed as 'Whitby Jet' somewhere along the pipeline.

Nomenclature and appellation of origin is, as always, crucial to price, and to the integrity of the industry. A good Whitby Jet string of Victorian beads is worth £300 upwards — the Georgian imitation probably nearer £20, so *caveat emptor!*

As a lapidary in Whitby, I know that the Whitby Jet trade will, as always, fight back against the latest simulants. A true jet to rival the beauty or stability of Whitby Jet has yet to be discovered, but it does make me proud to think that for the last 4,500 years Whitby Jet has been held with such reverence that many have tried to emulate it. With the desire of the Victorians to find the perfect simulant, Whitby Jet was in part perhaps responsible for the birth of the modern plastics industry, and therefore the modern world as we know it. ■

All photos Sarah Steele, unless otherwise stated.

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The Journal of Gemmology

Guy Lalous ACAM EG
summarizes three
articles from
Volume 35
Number 1 of
*The Journal of
Gemmology*.

Nature of Oriented Inclusions in Chrysoberyls*

Summary of 'Characterization of Oriented Inclusions in Cat's-eye, Star and Other Chrysoberyls' by Karl Schmetzer, Heinz-Jürgen Bernhardt and H. Albert Gilg.

The present study identifies inclusions and delves into the apparent differences between cat's-eyes, four-rayed stars and six-rayed stars, comparing chatoyant and asteriated natural and synthetic alexandrite/chrysoberyl samples.

Needles, platelets and inclusion clusters examined by micro-Raman spectroscopy in combination with electron microprobe techniques (qualitative point analysis, BSE imaging and Ti compositional mapping) were identified as rutile. Four characteristic Raman bands at approximately 142 cm^{-1} (weak), 239 cm^{-1} (medium), 445 cm^{-1} (very strong) and 611 cm^{-1} (very strong) were detected.

Immersion microscopy of gem materials at low magnification, and optical microscopy

of polished thin sections cut in preferred orientations at high magnification (up to $1,000\times$) in both reflected and transmitted light, showed that two primary groups of rutile inclusions existed in the chrysoberyl and alexandrite samples. Their concentrations varied among the different sources. One group was characterized by needles and platelets on planes perpendicular to the a-axis [100], whilst the other group consisted of needles and platelets elongated parallel to the a-axis. The inclusion pattern may represent both of these groups.

Synthetic asteriated alexandrite from Kyocera showed a dense network consisting of three series of distinctly smaller needles. When cut as cabochons with the base parallel to the a {100} pinacoid, the stones showed six-rayed asterism. If the base of a synthetic alexandrite cabochon was different from this particular orientation the stones showed only one light band.

Inclusions in the four-rayed star chrysoberyl from Sri Lanka were identified as ilmenite (FeTiO_3) needles based on Raman bands at approximately 225 cm^{-1} (very strong), 370 cm^{-1} (weak) and 683 cm^{-1} (very strong). The b-axis in these stones was almost perpendicular to the base of the cabochons. The ilmenite particles were seen parallel to the c-axis [001]. Also present were needle-like inclusions parallel to the a-axis that could not be identified as mineral inclusions by the methods applied. These inclusions are therefore possibly elongated channels.

Rutile (TiO_2) is the main mineral inclusion that gives rise to chatoyancy and asterism in chrysoberyl.



This pendant features a cat's-eye alexandrite, presumably from Sri Lanka, and is shown in daylight (left) and incandescent light (right). The stone measures $13.62 \times 13.72 \times 9.05\text{ mm}$ and weighs 14.52 ct. Courtesy of David Humphrey, Pacific Palisades, California, USA; photo by Erica and Harold Van Pelt.

* A summary of an article published in *The Journal of Gemmology*, 35(1), 2016, 28–54.

Is it the Great Mughal or the Orlov? Or both?*

Summary of 'The Great Mughal and the Orlov: One and the Same Diamond?' by Anna Malecka.



The 189.62 ct Orlov diamond is shown here in the Imperial Sceptre, part of the Diamond Fund collection of the Moscow Kremlin. Photo © Elkan Wijnberg.

Jean-Baptiste Tavernier (1605–1689), French diamantaire and traveller, described one of the largest diamonds in the collection of the Mughal emperor Aurangzeb — a specimen weighing 286 ct, known as the Great Mughal. The diamond was reportedly cut by a Venetian, Hortensio Borgio, from a rough stone that weighed about 790 ct and was given in 1656 as a gift to Aurangzeb's father, Emperor Shah Jahan. The diamond had a rose cut, was round and very high on one side. On the lower edge a slight crack and a little flaw were reported. The 'water' of the stone was 'fine'.

The Orlov diamond, which weighs 189.62 ct, is presently kept at the Moscow Kremlin in Russia. It was taken from the Persian city of Isfahan to Amsterdam by an Armenian merchant. In Amsterdam, it was

sold to Catherine II, the empress of Russia. Both the Great Mughal and Orlov diamonds have the same type of cut and there is a small indentation in the Orlov.

Malecka's research on these stones has been largely based upon court texts from the Mughal Empire in Persian and sources in Russian. It was discovered that Shah Jahan indicated in a letter that the weight of the Great Mughal was '9 tanks', which, according to several sources, is equivalent to 216 rattis or surkhs. One ratti corresponds to 0.179 g or about 0.896 metric carats. According to this metric carat conversion, a weight of 216 rattis equals 193.5 ct.

Due to the large discrepancies regarding the weight of the diamond from Persian language sources as compared to

Tavernier's work, the author deduces that Tavernier did not actually see the stone. During his visit to the Mughal court the diamond was most probably in possession of Shah Jahan and this excluded the possibility of being examined by the Frenchman. It is known that Tavernier did include in his work drawings and descriptions of gems that he did not examine personally. The weight was apparently overstated due to the fact that knowledge of the stone was gained on the basis of accounts given by others. Since the stone must have been presented to Shah Jahan in a polished form, the story about its being cut by Hortensio Borgio cannot be true.

The similarities in weight, shape, cut and flaws are, according to the author, strong evidence that the great Mughal and the Orlov are the same diamond.



Tavernier's drawing of the Great Mughal diamond appeared in his 1692 monograph.

* A summary of an article published in *The Journal of Gemmology*, 35(1), 2016, 56–63.

An Unusual Corundum Doublet*

Summary of 'A Lead-Glass-Filled Corundum Doublet' by Supparat Promwongnan, Thanong Leelawatanasuk and Saengthip Saengbuanglam.

This Gemmological Brief describes a 1.75 ct pink sapphire, which was submitted to the Gem and Jewelry Institute of Thailand's Gem Testing Laboratory.

The examined sample consisted of a doublet formed of two distinctly different pieces: pink sapphire for the crown and near-colourless sapphire for the pavilion. These two pieces were joined together along a contact layer located slightly below the stone's girdle.

Microscopy at high magnification showed that the contact layer was filled with glassy material that locally contained randomly-oriented fragments of corundum. Inclusions consisted of minute particulates and planar 'fingerprints', suggesting that the corundum pieces were of natural origin. Further examination revealed a blue flash effect associated with filled fractures/fissures, which were seen in both the pink and near-colourless portions. Several trapped gas bubbles in the filled fissures completed the story. These features are typical of lead-glass-filled corundum.

When exposed to the DiamondView's deep-UV excitation, the glassy material was inert and appeared as dark areas along the contact layer and in fissures and cavities, in

contrast to the strong red fluorescence of the host corundum.

The X-ray image of the stone revealed that the contact layer consisted of a high-density, dark-appearing material. This material was also present along many fractures inside the host corundum and in cavities on the stone's surface. FTIR transmission spectra compared the tested corundum doublet with a lead-glass-filled ruby reference sample. Both spectra displayed similar broad bands at approximately 3500, 2597 and 2256 cm^{-1} that are commonly seen in lead-glass-filled materials.

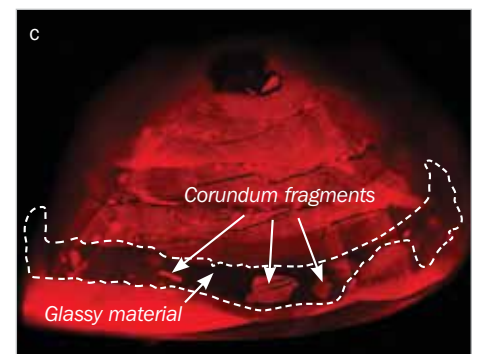
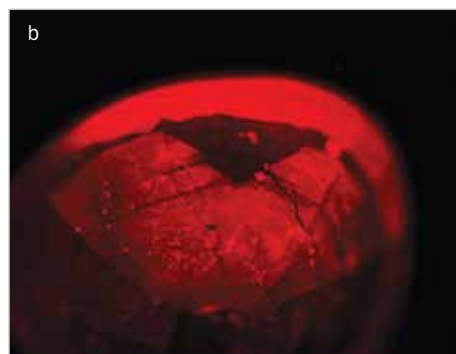
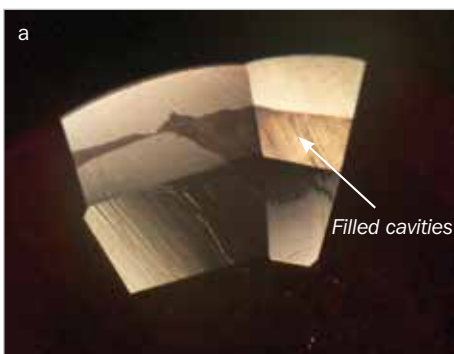
EDXRF spectroscopy of the crown and pavilion showed expected traces of Ti, V, Cr, Fe and Ga. The additional presence of significant amounts of Pb and Si in both portions of the stone confirmed that it was lead-glass-filled.

The presence of small, angular corundum fragments within the glass-filled contact layer suggests that these two pieces were brought together during the lead-glass treatment process. This stone should be referred to as a lead-glass-filled corundum doublet. To the best of our knowledge, this is the first lead-glass-filled corundum doublet identified by a gemmological laboratory. ■



This 1.75 ct pear-shaped stone proved to consist of a sapphire doublet containing fissures and cavities filled with lead glass. Photo by S. Saengbuanglam.

The DiamondView images (below) of the 1.75 ct lead-glass-filled corundum doublet show the sample in reflected light from the sample chamber illuminator (a), and exposed to ultra-short-wave UV radiation (b and c). The glass filler has a low lustre in reflected light, and is inert to UV radiation — in contrast to the strong red fluorescence of the host corundum. Note also the presence of some angular fragments of corundum in the glassy material along the contact layer between the crown and pavilion (particularly in image c). Photos by S. Promwongnan.



* A summary of an article published in *The Journal of Gemmology*, 35(1), 2016, 64–68.

An All-American AGS Conclave 2016

Eric Fritz FGA DGA, Olga Gonzalez FGA DGA and Claire Mitchell FGA DGA discuss the spectacular 2016 AGS Conclave.

This year's American Gem Society (AGS) Conclave was held in the historic capital of the USA, Washington D.C., at the Hyatt Regency Crystal City Hotel from 13–16 April. This illustrious event had an all-American theme and featured a few political heavy-hitters; timely and relevant to the current political landscape.

One of the best events in the trade for continuous education, Conclave is the largest gemmological conference in the world — with over 650 people attending in 2016 alone. For those not familiar with this particular association, AGS was founded in 1934 by Robert Shipley, founder of GIA, and a small group of leading jewellers. Their goal was to create an organization that could help protect the jewellery-buying public from fraud and false advertising. Today, their vision has become a reality. Since its inauguration, approximately 3,400 jewellers, retailers, suppliers, individual titleholders and affiliates have joined AGS — dedicating themselves to knowledge and promotion of consumer protection and ethical business practices, as well as the development of superior gemmological skills and knowledge. Gem-A is proud to be a Sustaining Firm Member of AGS, providing and supporting educational training at key AGS events — providing not only educational development but also raising the profile of Gem-A in the jewellery sector, as well as in associated trades in the USA.

The 2016 Conclave provided three full days of keynote speakers, networking opportunities, lab classes and evening events, starting with breakfast sessions through to social and networking events in the evening, along with eminent keynote speakers during the lunchtime sessions. The first keynote speaker of the event was General Colin Powell. With a degree in geology, and a genuine appreciation for the industry and all it does, there couldn't have been a more perfect speaker to discuss taking charge as a leader today. As the Conclave brochure stated: "General Powell demonstrates how to remain focused, take responsibility, and work toward improving processes, organizations, and people" —

an inspiring speaker, and well-received by all at Conclave.

The week of Conclave also celebrated the twentieth anniversary of AGS Laboratories. AGS Labs provide diamond grading reports in a clear and concise format — understandable by both trade and consumer.

With over 80 breakout sessions available, Conclave is certainly what you make of it, with something to suit everyone. Ruth Batson, CEO of AGS and AGS Laboratories, urged Conclave-goers to seek education beyond their comfort zone — good advice which many took heed of. Enriching self-improvement and training sessions are offered across several disciplines, including sales, marketing, gemmology, mindfulness, analytics, trends and the overall state of the industry.

Gem-A also gave two new well-received presentations on organics by Eric Fritz, Gem-A's North American manager, and Claire Mitchell, Gem-A's teaching manager. With laws coming into place in America concerning restrictions to trading in ivories (both modern and fossil) and other associated organics, Eric Fritz provided a lab class on this challenging legislative subject, introduced by Sara Walker, executive director of the US Wildlife Trafficking Alliance, a body which works closely with the jewellery industry. It is worthwhile noting here that in some USA states it is prohibited to trade in ivory, whilst permitted in others, with lots of variation in between. For more information on the new legislation sign up for Eric's Gem Central, to be held at the Gem-A Headquarters, London, on 21 June. See Events, page 7, for more information.

Claire Mitchell also led two popular lab classes for delegates, titled 'Identifying Similar-Looking Gemstones' and 'Spectacular Spectrums'. These hands-on practical sessions allowed each delegate the chance to observe and handle the materials and equipment in question. All seminars were extremely well-received by delegates and trade press. In addition to providing seminars, Gem-A also had a manned booth during coffee/networking sessions, allowing members of AGS to speak with some of



General Colin Powell, one of Conclave's keynote speakers, addressing delegates. Photo Anthony Magani, courtesy of American Gem Society.



Claire Mitchell and Eric Fritz manning the Gem-A stand. Photo Anthony Magani, courtesy of American Gem Society.

the Gem-A team about our world-renowned courses and membership opportunities, as well as providing an opportunity to catch up with many of our current members and students.

During the Conclave, awards were presented to honour excellence, professionalism and a commitment to ethics and consumer protection in individuals and organizations. Ruth Batson, who will be retiring from her position as CEO in the summer of 2017, was presented with the Shipley Award, AGS's highest honour, reflecting the many milestones of her gemmological career with the Association. Batson, who has been with the Association for 23 years, has overseen the formation of AGS Laboratories and the society's ownership of the lab, and has also taken part in the integral AGS Light Performance Cut Grade strategy. Ruth is currently chairing the Ethical Initiatives Committee for Jewelers of America and is the immediate past chair of Jewelers for Children.

Other awards were presented to Marc Nanasi, who was honoured with the 2016 Young Titleholder of the Year award; Marc Altman, the guilds' national treasurer, who received the Sallie Morton Award; the St. Louis Guild, which received the Guild of the Year award; and FBI Special Agents Jay Bartholomew and Eric Ives, who were

presented with the John J. Kennedy award — an award presented as a tribute to its namesake's leadership in the Jewelers' Security Alliance.

Also held during Conclave was a silent auction for the charity Jewelers for Children, which raised an incredible US\$50,000. Since 1999, Jewelers for Children has donated more than US\$48 million to help children who are the victim of catastrophic illness or life-threatening abuse and neglect. Gem-A was proud to donate a Gemmology Foundation Course to the auction. The successful bidder, Mary Carlson, from Houston, Texas, said: "I have been looking at doing the Gem-A course for years. I did long distance training through the GIA, and wanted even more in-depth study.



Delegates attending Eric Fritz's workshop on organics.

When I bid and won, it felt nice to make the commitment to learning. The fact that the programme had to be completed by a certain date inspired me to go ahead and delve into gemmology class again!" Carlson will begin the course in August 2016.

As well as all the hard work there was some fun to be had as well, with a Jewelers of America fashion show and an All-American President's Party on the Saturday evening — a rather fitting theme considering the majestic location and the US presidential elections. Time was also available prior to Conclave to visit the world-renowned Smithsonian National Museum of Natural History and its amazing collections, and Claire Mitchell was given the opportunity to interview the head curator Dr Jeffrey Post about his position and experiences at the museum. See the July/August 2016 issue of *Gems&Jewellery*, available from Monday 18 July, for the exclusive interview.

Conclave is the largest gemmological conference in the world — with over 650 people attending in 2016 alone.

Eric Fritz said of the longstanding partnership between Gem-A and AGS: "Gem-A is happy to partner with AGS and provide hands-on workshops during Conclave. Claire Mitchell and I were able to provide spectrums, differencing similar stones and a brand new workshop on organics to standing-room-only crowds. Practical gemmology with hand-held equipment is always a hit."

For Mitchell, a first-time attendee of Conclave, the event was an inspiration. "I was proud to represent Gem-A at Conclave," she said. "It was great to touch base with students and members, as well as to forge new acquaintances and professional relationships. The motivational aspects and networking opportunities were *par excellence* — something I think the British trade would do well to consider."

To learn about next year's event, keep an eye out for information on the AGS website: www.americangemsociety.org. ■

Lore, learning and laughter at the Scottish Conference

Andrew Fellows FGA DGA reports on the 21st annual Scottish Gemmological Association's Conference, held from 29 April–3 May 2016 at the Peebles Hydro Hotel.

As always with the Scottish Conference, this year's event treated delegates to an interesting array of talks from world-renowned speakers, as well as useful practical workshops and social opportunities, with chances to learn and catch up with friends and colleagues old and new.

FRIDAY

After the customary registration and drinks reception the conference was launched by Clare Dorrell, who gave an interesting historical perspective entitled 'From Pollokshaws to the Winter Palace — The life and works of James Tassie', in which Clare outlined the work and influences of this well-known engraver. Tassie (1735–1799) was a master at working with a vitreous white resin, which he used to great effect in the creation of cameos, which could be considered as being the photographs of their day. Tassie produced a wide range of cameos of the rich and famous of the time and was a highly sought-after craftsman, his work being bought by such figures as Russia's Catherine the Great, who collected over 15,000 of his pieces. According to Clare, if Catherine couldn't obtain an original piece, she would commission Tassie to produce a copy.

SATURDAY

Saturday morning saw the first presentation by this year's keynote speaker, Dr Karl Schmetzer — world-recognized and needing little introduction. Karl, whose specialities include the mineralogy of gemstones and the characterization of natural and synthetic gem materials, chose to talk about the synthesis of emeralds in Germany from 1912–1972. One of the main companies producing during this period was I.G. Farben, whose product was known as 'Igemerald'. First revealed in 1935, this early producer announced that it had successfully grown emerald, but, according to Karl, the production level was disclosed as not being on a commercial scale, but rather just as a PR tool. The actual method wasn't disclosed as being a flux-growth method until 1960, with an added ingredient of nickel to create their standard yellowish-green coloration.

Around 1929 Hermann Espig began producing larger crystals by a flux method, with emerald forming on colourless seed plates, but this method involved the use of a platinum net, and, as highlighted by Karl, the crystals were often small and intergrown through the net, limiting their usability. By the 1930s they were growing in the region of 20 ct of facetable synthetic per month.

Following a coffee break, the audience was treated to a presentation entitled 'Diaspore — A colour-change gem unique to Turkey' by Cigdem Lule from GemWorld. Having studied the geology of the same region of Turkey as part of her early mineralogical/geological studies, Cigdem was well-acquainted with the region from which this gem hails. The area itself contains limestone, metamorphosed to marble, in which bauxite and occasionally diaspore forms or is found. In much the same way as the geology of Tanzania created a small pocket of tanzanite, so this area of the Menderes Massif created the unique colour-change diaspore.

Cigdem went on to explain the chemistry of diaspore, highlighting the high chromium content (upwards of 200 ppm) and the presence of increased levels of rare earth elements, which are thought to contribute to the colour-change effect. Initially under the control of the Turkish government, these mines have been under private ownership since 2000, during which time various names have been used to market the stone, including 'Zultanite' and 'Csarite'. Whatever label is used, this truly is a unique Turkish delight.

Saturday afternoon started with a light-hearted presentation from Rui Galopim de Carvalho on Brazilian gems in Portuguese jewellery from the eighteenth century. Rui began by showing how in medieval times the supply of gems flowing to (and available in) Portugal was limited, both in variety and quality. This changed with the opening up of sea routes in the sixteenth and seventeenth centuries, whereby a greater variety of stones became available — in particular in the eighteenth century, when diamonds became more popular.



Alan Hodgkinson, President of the SGA, addressing delegates after the Saturday evening dinner.
Photo Kim Foxwell.



The Peebles Hydro Hotel. Photo Ewen Taylor.

Initially Portuguese jewellery relied on detailed scrollwork and artistic use of filigree gold to produce fine items, but with the new sea routes and therefore more available gems, this was replaced more and more by gems, with less visible metalwork. Foil backing was common in order to create more uniform colours and to promote light back through the stone. Colourless topaz was popular through the eighteenth and nineteenth centuries as diamond simulants, to replace the more expensive natural diamonds that were available.

Completing Saturday's programme was Dr Thomas Hainschwang of GGTL Laboratories, Liechtenstein, who discussed diamonds in the Aurora Collection (now housed in 'The Vault' at the Natural History Museum, London) and other historic museum collections. Thomas began by showing a slide of a 12.03 ct blue diamond that had been auctioned through Sotheby's in 2015 and which achieved US\$48.5 million. This equated to US\$4.03million per carat — an amazing US\$20,157,938,487 per kilo. This highlighted just how desirable fancy coloured diamonds are, and the amazing prices people pay for them.

In the gemmologist's world, however, these fancy diamonds are more interesting for their properties. In the course of his work, Thomas has isolated numerous absorption peaks, each associated with a different defect within the crystal lattice, and each potentially having an effect on the final colour of the stone. The challenges nowadays, he explained, are twofold: diamonds need to be separated between natural and synthetic, and then, for the colour, need to be determined whether the colour was of natural origin or the result of

treatment. Further to this, Thomas listed seven combinations of treatments that were potentially available (although within each of these there are variants). Thomas gave a brief overview of these treatments, from simple coatings to multi-stage irradiation and annealing, before moving on to his work testing museum diamond collections.

Thomas's reason for using museum collections was simple: traceability. As museums rarely (if ever) allow their stones out on loan, their lack of treatment could be guaranteed. Thomas tested and compared two museum collections: the Naturhistorische Museum Wien (Natural History Museum, Vienna) and the Natural History Museum in London. Both trips involved dismantling his laboratory and loading it into a car for the journeys to the museums. Thomas recorded 179 low temperature UV-Vis spectra, 171 photoluminescent tests, 325 spectra and 250 fluorescence images... showing the level of detail and work involved in research testing today.

On the Saturday evening delegates were treated to the full Scottish experience with

a traditional ceilidh and evening meal, and had plenty to discuss over dinner after the interesting talks of the day.

SUNDAY

Sunday commenced with the second of the keynote talks by Dr Karl Schmetzer, this time on historical garnets excavated in India and Sri Lanka. Many of the early garnets that were used for adornment were small flats, set in a cloisonné style within a gold matrix. Karl showed how the early styles of jewellery could have their garnets mapped in terms of both chemistry and chemical properties and how, from this, certain localities could be discerned. One area highlighted was the Czech Republic, which typically provides pyrope garnets with a higher chromium content. He showed how the combination of elements, when mapped against each other, could be used to analyse possible localities. One notable element seen was calcium, which was found in early garnets, but the source of these calcium-rich stones is now mined out. The problems with this type of analysis include the overlapping of the chemical properties of the different garnets and, in some cases, the lack of analysis of the inclusions within them. According to Karl, this key feature was overlooked in favour of more complex tests in early works. Some of the early literature also compared results of older garnets to currently known localities, thus ignoring some of the more likely ancient sources. To finish, Karl detailed how this method of analysis could help to identify the provenance of older jewellery, if used correctly.

Joanna Whalley, senior metal conservator at the V&A, brought the presentations to a close with an interesting look behind



Gem-A's Charles Evans, Dr Thomas Hainschwang of GGTL Laboratories and Stuart Robertson of Gemworld. Photo Kim Foxwell.



Delegates enjoying the conference. Photo Ewen Taylor.

the scenes at the V&A's recent exhibit entitled 'Bejewelled Treasures: the Al Thani Collection'. This collection of over 100 items of Moghul jewellery (and associated items) was on display in London between 21 November 2015–10 April 2016, and from all reports was exceptionally well-attended. Joanna explained that this exhibition hadn't had the usual five-year lead time for organization and set up, but had nonetheless received incredible attention to detail. Security was of utmost importance, given the value of the pieces involved, and she explained that it was almost as difficult to get the pieces into the cabinets as it would have been for anyone to try to remove them. As part of the organization of the exhibit Joanna embarked on a fieldtrip to India, where she visited setters and workshops, and learnt about the unique, traditional method of setting known as 'kundan', a masterful technique relying on the ability of pure gold to bond to itself by pressure alone. This style was seen widely across the Al Thani collection and was a key feature of the era. This style is also the inspiration behind some of the modern pieces being produced in India today. As a final presentation, this rounded off the conference perfectly, leaving guests ready for an afternoon of workshops and short talks.

The range of workshops on offer was up to the usual high standard, catering for all tastes and abilities. Gem-A's Claire Mitchell provided a review of the current treatments applied to diamonds and how some of these could be identified by the everyday gemmologist without access to lab equipment. In her own inimitable style, Kerry Gregory provided a practical look at gem-set jewellery and the limitations of using testing equipment. Tips and hints on how to achieve the best results and gain sufficient information for identification

were forthcoming, and all attendees left feeling that they had been enlightened on real-world scenarios. Cigdem Lule discussed coatings on gemstones — from the simple, basic forms, to the high tech effects of metal ion deposition. Sarah Steele, of Ebor Jetworks in Whitby, provided an in-depth look at Whitby Jet, and how it was unique in a world of woods and imitations. In an intensive session, jets from all corners of the globe were introduced and their differences to true Whitby Jet explained. By the end of the session, all were aware of how unique British Whitby Jet truly is. For more information on Whitby Jet imitations see Sarah's article on pages 16–20.

In the final workshop, David Callaghan presented his intriguingly-titled talk 'It ain't necessarily so', which delved into the world of fakes and imitations and showed how some attempts had been made to copy works and pass them off as genuine pieces of the era, whilst others were merely marketed as reproductions. By the conclusion, a full range of styles had been expounded, along with pointers on how to decide if something was as advertised. As David said, the old saying "If it's too good to be true, then it probably is" is still as applicable to jewellery today as it ever was.

Monday saw the official closing of the conference with a field trip to the 'Celts' exhibition at the National Museum of Scotland, an exhibit tracing the development of art, jewellery and carvings over a period of 2,500 years — an exciting opportunity to look back into the history of Scotland and Scottish jewellery.

This was another successful and exciting conference hosted by our wonderful friends at the SGA — one which reunited old friends, brought together old and new acquaintances, and which assembled world-class speakers, the trade, and gemmologists and students of all abilities. Roll on 2017! ■



CATRIONA ORR MCINNES AWARD

This year the Conference was humbled by the introduction of a new award, the Catriona Orr McInnes award, which was struck in memory of Catriona, who sadly passed away on 20 May 2015. Catriona was a well-known figure in Scottish gemmology and was the Secretary and an inaugural member of the Scottish Gemmological Association.

Detailed inside with the words: "We have lost a precious gem, but her luminescence and adamantine lustre will continue to shine on Scottish Gemmology", the award will be presented annually at the Scottish conference to those who have contributed significantly to Scottish gemmology. Presented by Catriona's husband, John McInnes, the first recipient of the award was Brian Jackson. Brian has remained a committed member of the SGA, acting as Chairman of the Association for many years. He has contributed significantly to the field through his work as Principal Curator of Mineralogy at the National Museum of Scotland, and has also been deeply involved in the wider gem community. The author of the famed *Agates: Treasures of the Earth* and of chapters of *Webster's Gems* (gemets and feldspars), as well as many papers on gems and gemmology, Brian has also been invited to speak at many conferences around the world.



Brian Jackson receives his award from Catriona's husband, John McInnes.

Plus ça change

Jack Ogden FGA revisits valuable advice for jewellers from a century ago.

"It should be axiomatic in our industry that the jeweller should be a specialist in his line and that his knowledge of gems should be more than rudimentary, or at least far in advance of that of the general run of his customers..." Hard to disagree, especially with the internet providing the gem-buying public with a wealth of information, but that was actually written 100 years ago, in 1916, in the *American Jewellers' Circular Weekly*. This was quoted in May 1916 by an anonymous writer in the *British Retail Jeweller* magazine in an article titled 'The Jeweller as a Gem Specialist'. The article went on to say: "If the customer feels he has as much knowledge of gems as the jeweller has he will try to buy in what he believes is the cheapest market, whether it be the jewellery shop, department store, catalogue house or anything else. It is because he realizes his ignorance on this subject that in many instances he is willing go to the jeweller and pays the latter's price in the belief that the jeweller knows what he is selling and is able to give the customer the benefit of this knowledge."

The article continues by urging jewellers to "take the trouble to learn all that they

should know on the subject of gems generally, and upon these we again urge the importance of continuous study of the subject, both from a scientific and trade standpoint." Even today that is an important reminder that in the jewellery industry the gem knowledge to best help a sale is more than just an essential grounding in gemmology; it involves an understanding of the gem market, gem history and even some lore. Gems have great stories.

"If the customer feels he has as much knowledge of gems as the jeweller has he will try to buy in what he believes is the cheapest market, whether it be the jewellery shop, department store, catalogue house or anything else..."



Those entering the gem and jewellery business are often torn between studying gemmology and studying business and marketing. This may seem like a very modern dichotomy, but again a century ago our writer noted that gemmology "is also especially urged upon the assistants growing up in the business who may be devoting their time solely to the study of advertising and merchandising methods and neglecting the essential part of the real jeweller's training. We do not wish to urge them to give less time to advertising and merchandising, but we urge them to give more time to the study of gems and gem minerals."

So nothing has really changed — except, as eagle-eyed readers might have noted, back in 1916 the *American Jewellers' Circular Weekly* spelled 'jewellers' with two 'l's'. ■



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BaselWorld 2016

Charles Evans reports on this year's BaselWorld show, held from 17–24 March.



Gem-A staff Claire Mitchell and Claire Downes manning the Gem-A booth.



1: Clam pearls from Ambra Greco.

BaselWorld is, by a significant degree, the most expensive show that Gem-A attends. The decision to exhibit there was made in an attempt to increase our presence in our own European back garden. There are several large gem shows in Europe, such as Venice, Idar-Oberstein, Munich and Paris, but most have a distinctive regional flavour. Some, like Sainte-Marie-aux-Mines, are much more focused on mineral dealers and enthusiasts. However, at all of those venues, the lack of foreign language speakers among us makes life difficult. As Europe's largest, most prestigious and richest gem-show, Basel is the show with the most international flavour.

Sadly, BaselWorld's growing affiliation with the watch industry has led to the complete marginalization of the gem dealers and jewellers who are not large and supremely commercial. The watch stands dominate and make Hall 1 look like an indoor, carpeted mall of flagship stores. However, anecdotal reports from jewellers and gem traders at BaselWorld reported very good sales of high-end goods, with 'bread-and-butter' dealers badly hurt by the lack of attendees. Good footfall would normally ensure a steady, but sustaining, trickle of the more 'incidental' buyers.

For the Gem-A booth, the low numbers were a disappointment. During 2015 we also attended Martin Rapaport's Diamond Show to lend support to the diamond industry

and Rapaport's efforts to break the Basel stranglehold and offer smaller dealers the opportunity to display their wares to a larger European market, as well as attending Freiburg (which, in all honesty, probably contained more 'Gem-A potential' than BaselWorld). There were more amateurs, more small dealers and more people new to the industry, with curiosity and enthusiasm coaxing them along to a show that had over 400 stands to cater for every budget. With a footfall of less than 5,000 over the four days of the BaselWorld show, it was clear that people were not exactly swamping the place.

Our little corner spot in Hall 3, where we were neighbours to GIA and SSEF, gave us good company in the quiet moments and allowed us all to share the special must-see items that we discovered when we went for a lunchtime stroll.

All eyes were drawn to some wonderful pearls on display through a number of dealers. Ambra Greco is a pearl dealers from Milan which has been operating for over 40 years — 25 years ago they were the first natural pearl dealers to show at BaselWorld. Today they maintain two distinctive market streams: the day-to-day cultured pearls which they supply to consumers and dealers around the world and then a very carefully selected inventory of the very best to reach the market. This is what we got a taste of at BaselWorld.

My eyes were drawn to an incredible selection of melo, conch and clam pearls, mostly loose, but with some specially commissioned pieces made to their designs by goldsmiths in Milan (1). The size and



2: Ruby and diamond necklace, originally designed by Dreicer & Co., from Zembrak.



3: Tiepins from Global Gems, featuring (from l-r) natural pearl and old mine cut emerald and diamond, 1920s; 1950s Colombian emerald and old cut diamond; two Art Deco old cut diamonds with white enamel, 1920s; Belle Époque piece with two emeralds, a diamond and opal, 1920s; Art Deco with Kashmir sapphire and diamonds set in platinum.

quality of some items was staggering. When pressed about price trends, they said that the high-end pearls offered outstanding value for money in the current market, with prices for the very best of melo and conch staying steady, but flat over the last four or five years. When one compares prices for the best of pearls to the best of ruby, sapphire and tourmaline, this makes them a very tempting prospect. Incidentally, in its early days Ambra Greco was also the first to bring Dominican Blue Amber to the market in conjunction with a well-established name in the UK jewellery industry.

One of the interesting aspects of visiting shows abroad is that feeling of irony you get when you are stopped in your tracks by an article of staggering beauty at a booth, you then step back to read who the booth belongs to, and you realize it is an intrepid British dealer standing proud on the world stage. So it was that my eyes were drawn to the most magnificent ruby and diamond necklace in its original Dreicer & Co. box (2). I had to get a closer look and so it was that I walked into Zebrak's BaselWorld booth and sat down with Adam to admire the piece. Dreicer, he told me, was a well-known American designer and maker at the turn of the nineteenth century. When Cartier opened in New York it recognized J. Dreicer and Son as its main competition. Renowned for only using the very best stones in their pieces, this led to Cartier buying it out — purely for the inventory when the business stumbled, in around 1925. The remarkable piece we were admiring was previously owned by a Boston socialite and conjured visions of Great Gatsby elegance and excess. The workmanship was exquisite and the rubies were certainly of the very highest grade. The diamond setter would have had to have viewed the piece as a *magnum opus*. My photographs will not do it justice at all. It is of great relief to me, as

a male gemmologist, that I can look at and admire many remarkable items that it would never be appropriate for me to own, and therefore I do not covet them, even just a little. So when I see something for men, I want a closer look. This took me into the Global Gems booth where I had spotted some tiepins and where I ended up talking to Vinit Rakyen, the proprietor, a seventh-generation

jeweller who has been based in Idar-Oberstein for 35 years and whose family still maintains businesses in Delhi and Bombay. Vikram explained that tiepins were something he had a soft spot for and therefore he went out of his way to acquire some of the special ones he had on display (3).

If ever there was a statement piece, it was the ivory elephant (4) that was at the Swiss Pearl stand, a Meiji Period piece from circa 1880. The Meiji period ran from 1868–1912, where the young prince Mutsuhito was part of Japan's enlightened period where they opened their world to the eyes of others and the outside world got to glimpse the magnificence and uniqueness of their creative arts. The technique of the inlays in this elephant is known as 'Shibayama' and fuses pearl, ivory, mother of pearl and coral. The globe atop is quartz crystal — ask yourself, how, 100 years ago, they managed that.



4: Carved ivory elephant featuring Shibayama-style inlays of pearl, ivory, mother of pearl and coral and a globe quartz crystal. Photo courtesy of Swiss Pearl.



5: World's largest blue grown diamond, 5.03 ct (left) and world's largest colourless grown diamond, 10.02 ct (right).

As ivory continues to be a hot topic in the news, it is worth mentioning that Gem-A does not condone the killing of creatures for use in ornamental materials, but it must be noted that, as gemmologists writing in a trade or academic publication to a membership audience of gemmologists, we should not be dismissive of a product that we will still encounter regularly in antique form. We need to know what it is and in what forms it may be encountered — customs and excise need educated gemmologists too!

We were also lucky enough to see, first hand, the rather attractive amaranth rhodolite garnet that made the front cover of *The Journal of Gemmology* for Volume 34 Number 8. We were fortunate enough to see this material at Nomad's booth, among a dazzling array of exotic and fascinating materials sourced from all over the world, and through a network of contacts that has been decades in the making. Amaranth refers to the colour — named for a genus of annual or short-lived perennial plants with a striking fuchsia colour. The material for sale was from Mozambique where it first appeared about a year ago and has only been making it to market in the last three to six months, according to Slavik Grygorenko, CEO of Nomad's. This remarkable stone is priced in the trade at between \$90 and \$550 per carat for faceted stones between 3–4 ct, and likely to go higher as demand grows.

If people in the world of diamonds lose sleep over anything, it is probably the appearance of synthetics; how they are priced and marketed and where their

If people in the world of diamonds lose sleep over anything, it is probably the appearance of synthetics; how they are priced and marketed and where their traditional, natural counterparts stand in relation to them.

traditional, natural counterparts stand in relation to them. Do you subscribe to the heavily marketed idea that 'Millennials won't like them'? Do you say that they are much more ethical because they come from a factory and not from potentially exploited people and environment? Or do you suggest that an industry that indirectly supports almost 10 million people, mostly in the third world and mostly some of the poorest alive with no alternative means of feeding themselves, should take ethical preference over a product that is an off-shoot of first world defence technology? Either way, synthetics aren't likely to go away, and are being found in ever-increasing sizes (5). As recently as 2012 literature suggested that it was very difficult to grow CVD diamonds that were larger than 3 mm 'deep', showing that technology is advancing at a rapid pace. Can the diamond world keep up?

A pleasant little diversion to our trip to Basel was a visit to the new premises of SSEF in the city. Julia Griffith and I attended a Scientific Gemmology Course in 2014 and saw SSEF in its 'old' premises. Based in the heart of the city, it reminded us of our own old premises at Greville Street. Spread over a number of floors and a bit of a labyrinth, we found it exciting, with the incredible inventory of world-class equipment in dedicated little laboratories, a staggering reference collection and an administration team all in cozy offices. The new premises in Aeschengraben, near the Basel Train Station, is a sharp contrast. The ultra-modern layout resembles a private clinic with space and light where it needs to be and large laboratories filled with new equipment. CEO Dr Michael Krzemnicki gave us a quick guided tour, where we were able to see the additional investment they had made in equipment since our last visit. In pride of place was an enormous new X-ray machine. The very latest from specialist manufacturers, Yxlon, will provide unparalleled acquisition times and image quality, keeping SSEF ahead of the competition and well-positioned to face the challenges of pearl and gemstone analysis. It was a pleasure to witness such a strong statement of confidence in the future of the organization, its staff and their clients.

Whilst BaselWorld is an eight-day show, exhausting for staff, it is also exhilarating, and I would miss the fair if we did not return. I feel it is important that we are there in some form. Gemmology, as a field of science, study and learning, needs to maintain a visible profile in this most prestigious of events. The public needs to make the connection between the component stones in Graff's annual knockout piece and subject knowledge required to make it possible. We do need to see some of the things that may not reach other shows and also be in collaborative contact with other gemmologists and labs which, we know, also wrestle with the BaselWorld dilemma. ■

All images Gem-A, except where stated otherwise

Synthetic green diamond

Anthony de Goutière responds to a letter published in the January/February 2016 issue of *Gems&Jewellery*, concerning an article discussing a natural diamond 'mistakenly' identified as synthetic, originally published in the October 2015 issue of *Gems&Jewellery*.

I keep track of my photos as I take them and, contrary to what Dr Hainschwang wrote in *Gems&Jewellery*, Jan/Feb 2016, the original Figure 2 (1) (de Goutière, 2015) was not photographed through crossed polarizers and Figures 3, 4, and 5 were photographed through crossed or partially crossed polarizers.

Checking through back issues of *Gems & Gemology*, I found two issues (Winter 1987 and Winter 2000) which contained articles about De Beers' synthetic diamonds. Both of these issues show photomicrographs of somewhat similar growth patterns.

The diamond in my article had a very dark greenish-black body colour which appeared to accentuate the growth patterns to the point where polarizers were almost not necessary.

Finally, the cutting of this diamond appeared to follow the shape of the original crystal. For example, a very thick girdle, very large culet and small table. Examples of synthetic crystal shapes appeared in the above mentioned issues of *Gems & Gemology* (Shigley et al., 1987; Johnson, 2000).

Pictured is one final photomicrograph of the diamond taken through the pavilion facets (2).



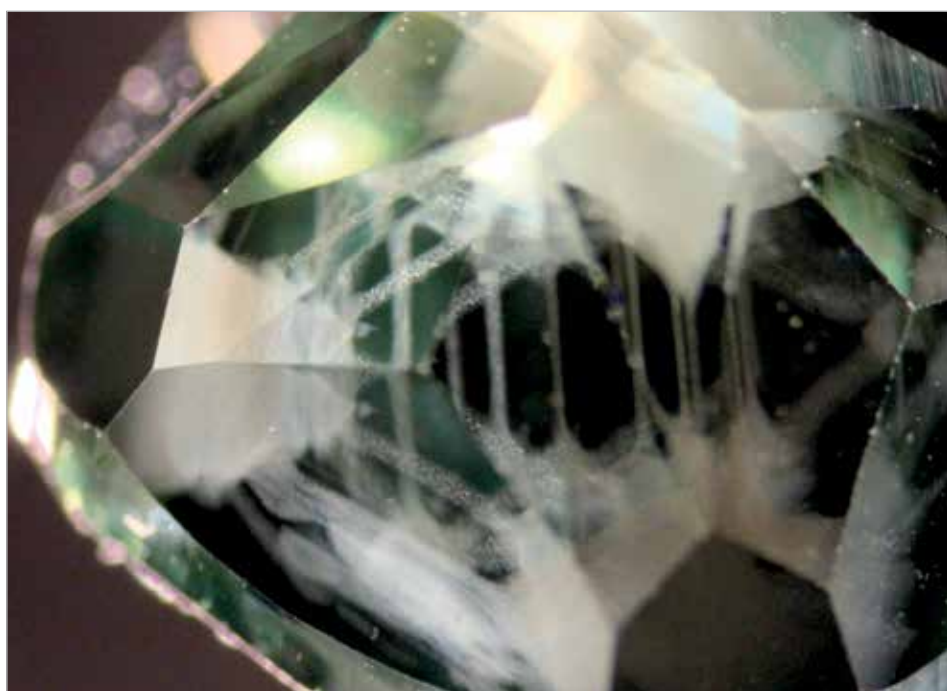
1: The original photo, showing the diamond viewed through the microscope with dark-field illumination.

This photo gives a different view of the growth features and also shows the very large culet and thick girdle.

It would be interesting to see if the diamond turns up in another lab somewhere in Canada or the USA as I would like a third opinion. ■

Anthony de Goutière

All photos Anthony de Goutière.



2: The diamond as seen through the pavilion facets, showing a different view of the growth features.

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Rough Diamonds: A Practical Guide (Second Edition)

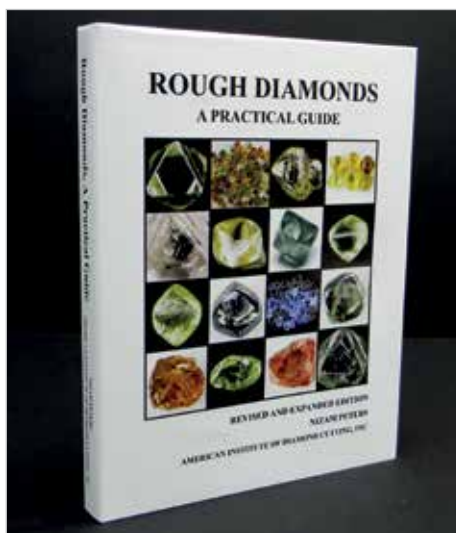
This revised and expanded edition of the original 1998 volume, written by the founder of the American Institute of Diamond Cutting Inc., sets out to provide an updated tour of the world of rough diamonds. Illustrated throughout with high-quality colour and black-and-white images, the author guides the reader through 10 chapters, covering a range of aspects concerning rough diamonds and the rough diamond trade.

The book begins by providing a brief background on the prospecting, mining and recovery of diamonds, then moves onto the main focus of the book, rough diamonds.

The second chapter is devoted to an analysis and explanation of the common shapes and forms of rough gem-quality diamonds. Octahedrons and dodecahedrons are explained as defined forms, before moving into the mining/sorting orientated terms of wholes, irregulars, cleavages, flats and the various forms of twinned crystals that can be found and utilized. For each of these forms, the author then provides information as to the orientation of the rough for optimal cutting.

The third chapter investigates the range of surface and near-surface (as opposed to inclusion) features and how these affect evaluation of the rough. Five categories of external surface are identified, as well as a further five sub-classifications for the near-surface features — each is explained and illustrated with detailed images. Features covered include the more widely-known surface conditions of frosting and water-wear, but also radiation staining and surface cratering. Near-surface features include minor fractures and cleavages, hairline inclusions and evidence of surface twinning, such as twinning lines and herringbone patterns. The author also ventures to explain how several of the near-surface fractures illustrated could be removed during the cutting process.

Coated diamonds are the final category covered in this section, with Peters stating that this surface coating can vary in thickness, from a minor surface through



Rough Diamonds: A Practical Guide (Second Edition)

By Nizam Peters

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to comprising the whole stone, and that this surface can show the same growth structures as seen on non-coated stones.

The fourth chapter considers several features within the internal world of the rough diamond. The larger section is given over to carbon/graphite inclusions, with an extensive range of images shown, and used to illustrate how to assess the depth and potential impact of their positioning. Feathers, pinpoints and clouds are also explained, along with advanced twinning and strain.

The fifth chapter covers the important area of proportions and discusses how assessing these in a rough crystal have significant effect on perceived value. Colour centres are also considered at this stage, but only for fancy-colour stones, where the orientation and proportions can be used to either increase or reduce perceived colour, and so affect the final colour grade.

This consideration of the impact of colour is carried on through into the sixth chapter, which highlights the difficulties of grading rough. The author discusses the use of master stones for rough, in much the same way as they are used for finished stones. However, there are a vast range of factors that complicate this; colour on rough can be throughout the stone, on the surface, or localized in patches or bands, either internally or externally. Interestingly, the master set should, according to the author, be created from diamonds sourced from the local mining area, suggesting that different areas may have their own unique factors affecting them. Again, this section is fully illustrated by colour plates, visually differentiating the different colours and colour factors.

The seventh chapter departs from the discussion on rough material, and instead focuses on the cutting process itself. Both manual/traditional cutting and developments in automatic faceting machines are considered, with the author highlighting possible future developments and uses for technology in this field.

From here, values are discussed, taking into account production costs, and explaining the difficulties when attempting to envisage how the final cut stone will look in terms of colour, clarity, weight, cut, polish and symmetry.

The penultimate chapter discusses alluvial mining, accompanied by extensive images of the process. This provides a good overview and introduces the layperson to some of the background behind diamond mining.

The final chapter, titled 'Documenting the characteristics of diamonds', is a visual reference of a selection of stones that the author has come into contact with. Rough of all grades (from industrial to gem quality) is shown, along with a selection of finished diamonds, providing the reader with an interesting reference section.

Overall, this book provides a detailed and interesting insight into the world of rough diamonds. The second edition has been considerably expanded on the previous 1998 edition, containing an additional three chapters and numerous new and updated images. A must for every gemmologist's library, this useful reference guide is the definitive text for rough diamonds, and bridges a gap in the market. ■

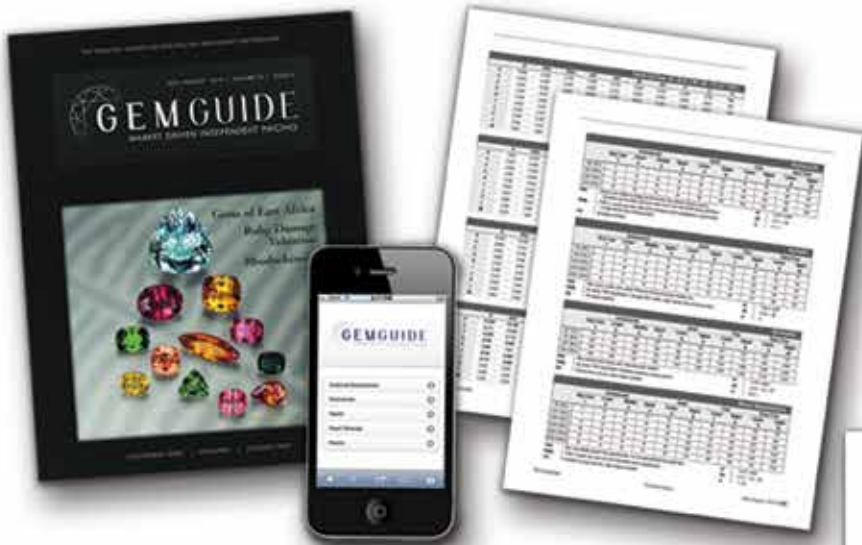
Andrew Fellows FGA DGA



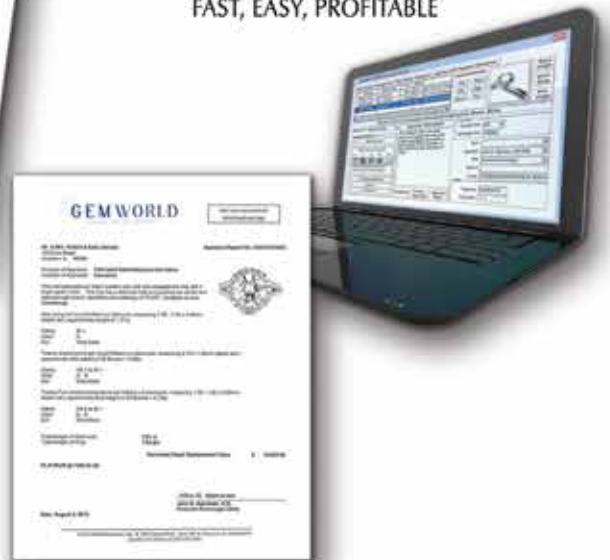
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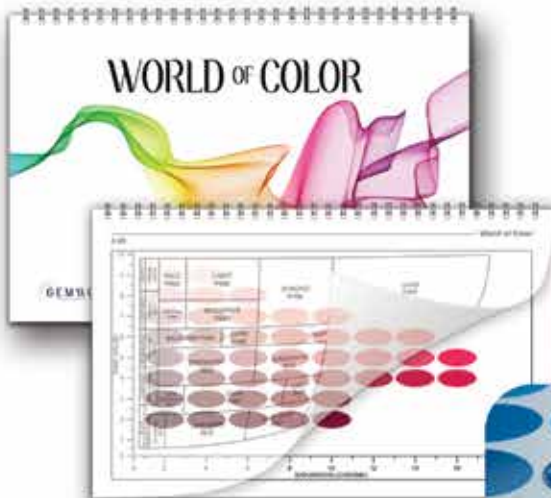
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