Gems & Jewellery

Nov/Dec 2013 / Volume 22 / No. 8

Gem-A Conference report

Munich Show round-up

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Gem-A
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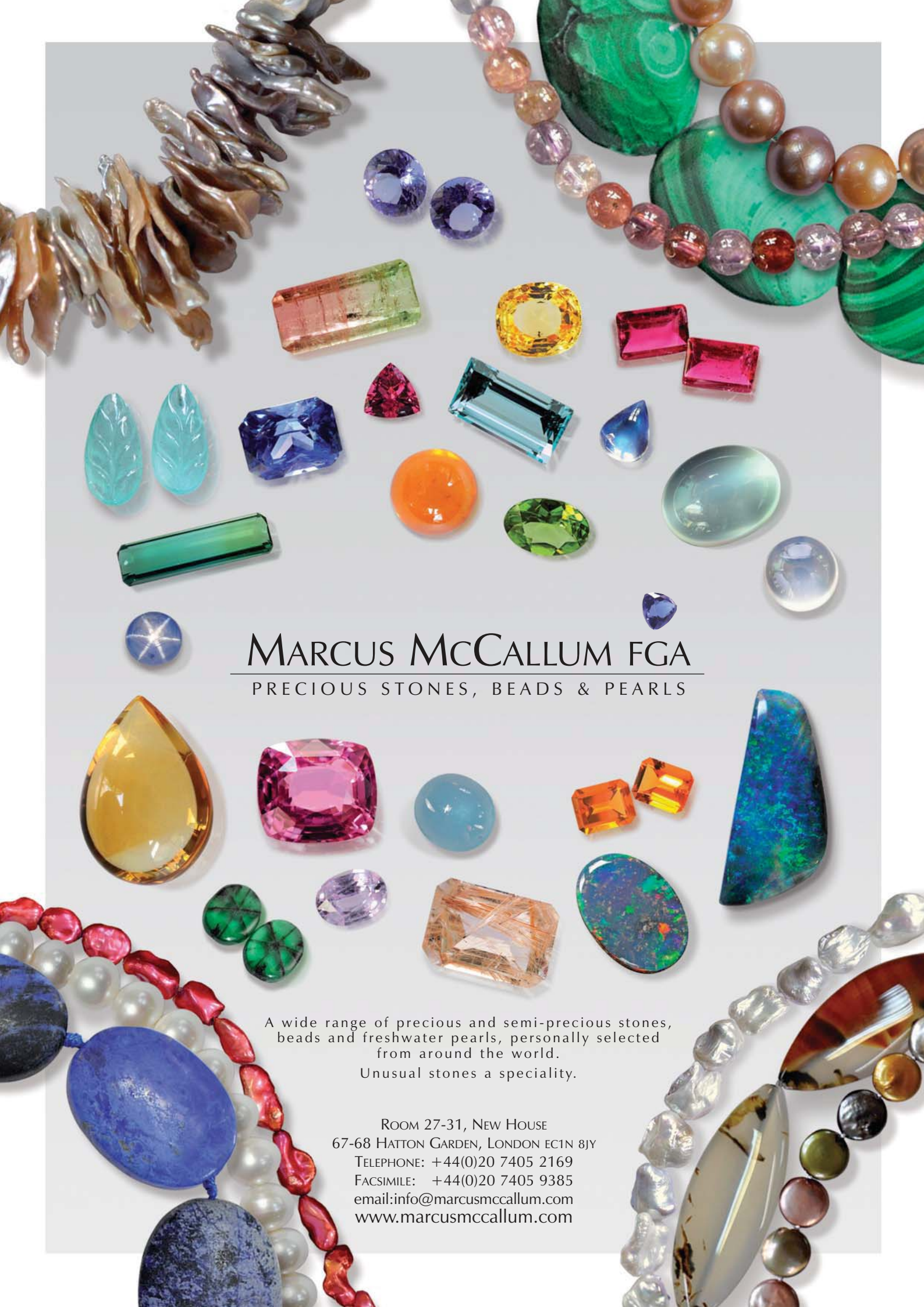

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Editorial

Gems&Jewellery

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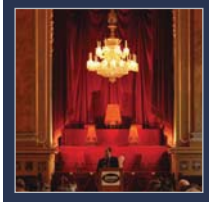

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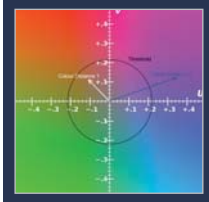

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Never too busy to care…

This is my first proper issue of *Gems&Jewellery* which finds me as editor. In truth it's not really my style — we have a number of individuals working on this magazine who have far more input than I do. Let's just say I sit behind the scenes like one of the press barons of old…

It's been a busy few weeks at Gem-A with shows, conferences, all manner of visitors and new and on-going projects. The thread binding most of these together is integrity. Martin Rapaport very kindly spoke at our conference and presented our awards to graduates – if you didn't make it you really missed out. He said that he felt the key to our business was integrity and that organizations such as ours should uphold the highest standards of morality and lead the way for the industry.

Gem-A has been striving to do that for 100 years and following recent biannual inspections from Ofqual and the British Accreditation Council, I am pleased to report that both were complimentary about our systems and procedures. At a recent Board meeting of the Association it was felt that we should always strive to exceed the expectations of such bodies and continually search for improvements. My point is that the *status quo* is not good enough; we can all improve something in our businesses or lives. It is no coincidence that companies with that ethos are at the very top of their game.

Our conference this year was at Goldsmiths' Hall and we are very grateful to the Wardens for allowing us to use it. Many delegates felt it to be among the best ever… but even here we know we could have made it better. The following day we had the first of our Corporate Social Responsibility seminars — a true eye-opener for delegates and staff alike. The fact is that businesses must engage in this soul-searching and truly look at how they conduct their affairs. Some very large global organizations have embarked on this never-ending process reaping the rewards by improving procedure, cleaning up supply chains, adding extra margin to their products, creating a real point of difference to their competitors and, I suspect, sleeping easier knowing they are doing their utmost to ensure they work in a responsible manner.

We can all be responsible. At the recent CMJ conference I met a group of South American gold miners who were now able to supply Fairtrade gold. A week later the Sudanese minister of mines requested our help and training to exploit newly discovered deposits. Contrary to common belief there is a desire around the world to work in an ethical, sustainable manner whereby the needs of commerce, the local population and the environment can be balanced.

The amazing thing is that we have the luxury to worry about these things and do something about them. We welcomed at our conference our longest standing Fellow, Leonard Baker, who became an FGA in 1948. Over the weekend Len met many former customers and friends from his time in the trade here in London. I learnt that he had written a book about his WWII experiences. He sent me a copy and I have been truly humbled reading it. What is so delightful is that Len, after 65 years, together with several other FGAs of more than 50 years' standing, is as passionate now about gemstones and jewellery as ever.

James Riley

Cover Picture
Gilalite aggregates in rock crystal from Brazil by Michael Hügi FGA.
Winner of this year's Gem-A photography competition (see p19).

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Gem-A news

CEO James Riley FGA gives a round-up of what's happening at Gem-A.

Honouring our past… and our future

The graduation ceremony on Sunday 3 November was a standing-room-only affair. Graduates from 17 different countries attended and were presented with their Diplomas by Martin Rapaport who gave an inspirational speech. Highlights of the evening were Charlotte LeClerc not only getting the highest marks in both the practical and theory papers of this year's Gemmology Diploma examinations and thus being the highest overall candidate, but also having papers which were exceptional enough to merit the award of the Tully Medal. Tay Thye Sun, Ronnie Bauer and Brendan Laurs all became FGAs by redemption while Dr Emmanuel Fritsch was awarded an Honorary Fellowship and Martin Rapaport an Honorary Diamond Membership. The real stars were three members who were granted Life Memberships; Leonard Baker was celebrating 65 years as an FGA while Sarah Riley and David Jones, both FGAs, were celebrating the fiftieth anniversary of being awarded the first ever Diamond Diplomas. The spirit of Samuel Barnett, the first person to qualify in the Gemmology Diploma examinations in 1913, was present with his Diploma being on display for the whole weekend.

Maintaining the standard

Monday 4 November saw the first Corporate Social Responsibility seminar held at Gem-A. Dr Donald Feaver from Melbourne, Australia, introduced the Branded Trust programme which has been supported and inspired by CIBJO. Enrolment into the programme is inexpensive and aimed at small- and medium-sized companies as well as large corporate bodies. Prices start from around £250 to sign up, with the seminars also £250. One attendee was delighted to see he was already adhering to many UN and OECD guidelines in the way he operated his business.

Library

The Sir James Walton Library is now fully open comprising the two parts of the original collection previously split between the NAG and Gem-A, the South West Trust books of Ron Yeo and Eric Bruton, as well as books belonging to Basil Anderson and G.F. Herbert Smith. Members of Gem-A and the NAG are welcome to use the Library at any time subject to it being available, and students can use it by appointment under supervision. Please note it is not a lending library as we don't want books to go astray!

New staff

A warm welcome to two new members of staff, who have recently joined the team. Helen Mayer (top right) joins as our new membership secretary with a background in membership, fundraising and wholesale gem trading. She is an FGA and DGA, and will be working on improving and expanding our membership services. You will all be hearing from her in the near future when you get your membership renewals!

Cathryn Hillcoat (above) joins us as our receptionist and to deal with education enquiries. She is an FGAA and has experience in teaching gemmology and diamond grading in Australia. A trained radiographer, she will also be assisting with some of the new laboratory equipment.

Gem-A Calendar

Gem-A Central and Career Services evenings
Monday 2 December, 18:00–19:00
Gem-A's London headquarters
A career in luxury jewellery retailing with Jessica Collins from Garrard.
Free for Gem-A students and members
£10 non-students and non-members

Tuesday 17 December, 18:00–19:30
Gem-A's London headquarters
A Christmas challenge
Free for Gem-A students and members
£5 non-students and non-members

Show Dates

Gem-A will be exhibiting at the following shows:

International Jewellery Tokyo
22 – 25 January 2014

AGTA Show Tucson
4 – 9 February 2014

Gem-A Conference Report

The Scottish philosopher Thomas Carlyle once said: "A century of human life is like a dream, and when the body and material substance of it has altogether vanished — the articulate audible voice of the past is all that can be heard." Of course, Carlyle was referring to the transcendental power of literature and how certain ideas have a lifespan beyond that of one's own life. For gemmologists, the idea of transcendence exists in the specimens, stones and minerals they study every day — it is nothing new to them. However, the celebration of a qualification that has transcended the lives of its founders, to exist over the course of more than one lifetime, must have something special about it. This must be, as Carlyle said, "the articulate audible voice of the past", a voice that can still be heard in the principles of learned honest integrity that the Association has held from its inception until this very day. And it was this idea that was the theme for this year's anniversary conference — a conference celebrating 100 years since the Gemmology Diploma was awarded and 50 years since the Diamond Diploma was introduced.

Gem-A CEO James Riley kicks off the weekend's proceedings.
© Gem-A. Photo Miles Hoare

Over the course of six days at the beginning of November, attendees were treated to a varied selection of talks, trips, exhibitions and hands-on workshops from some of the world's leading voices in the field of gem-mology. Officially starting at Gem-A HQ on the morning of Friday 1 November, the conference opened with workshops taking a deeper look at problematic emerald treatments, the origins of the famous *Somewhere In The Rainbow*® collection and the way to apply Gemworld's *GemGuide* to gemstone identification. The first two also formed part of the main event on the Saturday, and Richard Drucker's *GemGuide* workshop was an update on one of last year's workshops.

Friday

Arthur Groom's talk on emerald treatments emerged as one of the most controversial of the day. With his work in the Clarity Enhancement Laboratory supplying what is termed the 'ExCel Process' — a natural process for the treatment of emeralds — Groom encounters many types of emerald treatments and as a result is indignant about the current state of the emerald industry. His candid style and no-nonsense responses to the raft of Joban, Cedarwood oil and 'resin' based treatments made him instantly entertaining. Furthermore, his confrontational style questions pre-conceptions of deceptive terms like 'oiling' and 'resin treated' — as does his practical workshop, where he physically shows the problems caused by certain new types of treatments. Having worked in Bogota for the last 25 years concentrating his efforts almost exclusively on emeralds (specifically emerald treatments), Groom's experience is wide-ranging and thus his lecture is peppered with examples of both 'traditional' and new types of treatment. Firstly he exposes filled fissures seeping oil, discolouring the stone and creating fractures, before showing some of the worst examples of glues and resins used to cover table fractures and, in one case, even to reattach a corner that had been broken off. The more startling revelations were his examples of how some of these problems had been caused by emeralds being treated in the rough.

The famous paraíba tourmaline from the Somewhere In The Rainbow® collection was a talking point of the weekend!
© Gem-A. Photo Miles Hoare

Richard Drucker's lecture on GemWorld's *GemGuide* led attendees through the simple steps required to assess a gemstone's price based on colour and quality. The detailed guide, available for both PC and mobile, gives gemmologists an up-to-date, interactive price list relating to a wide range of different stones. Drucker nailed home his ethos for pricing — 'colour is key' — as he believes that one of the most important factors in pricing a gemstone is colour, as it's one of the main indicators to a gemstone's quality in the first instance.

While Drucker preached the importance of colour, attendees trotted down the yellow-brick-road to gain an insight into the origins of the *Somewhere In The Rainbow*® collection. The session, taken by Craig Lynch (with the assistance of Shelley

Recent Events

Sergent and Bruce Bridges) told the story of the development of certain rock formations that allowed for the natural creation of some of the world's rarest and most beautiful gemstones. Entwined within the history of the collection was the story of the vanadium-bearing grossular garnet, tsavorite, discovered by revered gem expert, the late Campbell Bridges. Father of Bruce Bridges, Campbell's memory lives on with Bruce's hard work to maintain the importance of his father's amazing discoveries, including stones such as the Scorpion King, the largest specimen of tsavorite in existence at 20.20 ct.

The famous 20.20 ct tsavorite 'The Scorpion King' discovered by the late Campbell Bridges.
© Somewhere In The Rainbow®. Photo by Michelle

Saturday

Festivities moved to the magnificent Goldsmiths' Hall for two days of lectures in the presence of some of the world's leading gemmologists. The programme began with Chris Sellors discussing the history of Blue John from the fluorite-rich hills of Castleton in north Derbyshire, one of the best examples of fluorite in the world. British Blue John gets its name from the French *bleu-jaune*, meaning 'blue-yellow' as it was reportedly exported to France and used by *ormolu* workers during the reign of Louis XVI (1774–91). However, Sellors says that this, as well as the idea that it was used in Roman times, are myths, as the earliest recorded treated piece was discussed in 1671 by George III — and the early *ormolu* ornaments which use Blue John were actually being manufactured by Matthew Boulton of Birmingham in the 1760s, rather than by the French.

Sellors went on to talk about the works of Boulton and the neoclassical architect and interior designer Robert Adam, who both worked with Blue John from the end of the 1700s. He discussed how the use of Blue John grew into the early nineteenth century when it was widely used for ornaments like knife handles and ornate chalices. However, by that time output was restricted to 20 tons per year and later reduced to only three, resulting in a decrease in the number of fluorite ornaments produced, with the exception of Chinese fluorite and the re-establishment of Blue John as a premium product by Sellors himself.

Sellors was joined by Rebecca Tucker who recounted the history of jet and, in particular, Whitby jet. Originating in the Stone Age, jet (formed from the monkey puzzle tree) is one of the oldest gemstones in recorded use and has been ascribed different meanings and uses over the years. A large part of Tucker's talk was devoted to the Victorian period when jet's use rose dramatically following the sudden death of Prince Albert and Queen Victoria's subsequent adornment of jet in her long period of mourning. This grew into a booming industry, which eventually turned some elements of mourning jewellery into a new style of gothic jewellery — in the form of ornate jet brooches and memorial photo lockets. Tucker concluded with the re-opening of the W Hamond Whitby Jet workshop in 1997, which now works with naturally eroded stone (it's currently illegal to mine jet) from the Whitby coastline, to take a traditional British trade to a modern market.

Following Sellors and Tucker, Sonny Pope of Suncrest Diamonds, spoke about its unique HPHT and irradiation treatment for coloured diamonds. Pope discussed how Suncrest used irradiation along with HPHT processes to treat (mainly) brown type IIa diamonds with a process known as 'annealing'. He explained how enormous amounts of pressure and heat — as high as 2,600°C — replicate the forces that produce diamonds in nature and use the minute amounts of nitrogen contained in brown type Ia diamonds to change the diamond's colour. Pope discussed how "a stone's colour grade can jump dramatically

Some great examples of Victorian mourning jewellery from W Hammond/C W Sellors.
© Gem-A. Photo Miles Hoare

with the right amount of irradiation" while illustrating brightly coloured blue, green and yellow stones. He went on to explain how certain levels of irradiation on stones with two nitrogen atoms could split the atomic bonds and create diamonds with a distinct pink colouring.

Diamond discussions continued with Gary Roskin's talk on clarity grading in diamonds. He started with an outline of the factors affecting clarity, in relation to Roy Huddlestone's first system for grading clarity in diamonds. However, there are grey areas in clarity grading, he warned. As is normal with certification, Roskin contests that "Most of us try to get close to GIA standard diamond grading, because that's the most popular set standard." However, he added, this could be somewhat limiting when talking about clarity as some clarity gradings given by labs can lack… well, clarity. Roskin showed how many of the clarity gradings could sit on the boundaries between VVS2/VS1 or how an SI2 could also be classified as I1. He admitted that although insurance companies require single grades for pricing purposes, he did raise concerns about some of the standardization of diamond grades and how this affects our knowledge and appreciation of the stones.

A buffet lunch followed and a chance to check out exhibitors from *Somewhere In The Rainbow*®, GemmoRaman, CW Sellors, the ebook *Handbook of Gemmology*, the Scottish Gemmological Association, Fellows & Sons Auctioneers, the IRV and Gem-A branches, as well as view items from the

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Association's collections and the latest books and instruments from Gem-A Instruments. Then Dr Jack Ogden took us on a journey through the history of the gems from the Cheapside Hoard. Discovered in a basement cellar of a house in London's Cheapside in 1913, the Hoard is believed to date from between 1640 and 1666, and is suggested to have been buried and abandoned during the Great Fire of London. Ogden's first clue to the suggested dating is the "interesting new supply of gems that appeared around the 1600s", when Gengis Khan's empire building opened up the silk routes from the Ottoman Empire through to Europe. It was around a similar period that a number of gem collections from cathedrals in England started to fall into private hands and these exotic gems made it to private goldsmiths on Cheapside. Origins of the stones also give some clues, with the rubies commonly Burmese, the pearls and amethysts noted in Thomas Nicols' 1652 book *A Lapidary or, the History of Pretious Stones*, as from the Persian Gulf, Panama and West Indies (after the discovery by Columbus of the 'New World'), the opals possibly from Hungary and the turquoise from Iran. Ogden talked about the cut and settings — which were similar to a table cut top, with an uncut bottom, as seen in Ottoman jewellery of the time. However, he noted that although we have clues to the origin and time period of the jewels, it still doesn't give us a better idea of who actually owned them!

The penultimate speaker of the day was current vice-chairman and former president of Gem-A, David Callaghan. His insightful lecture retold the history of the Gem Testing Laboratory through the eyes of its founder, Basil Anderson. He explained how the laboratory was created in response to the challenge of identifying Mikimoto cultured pearls and the problems this produced for the enormous and highly profitable trade in natural pearls in London during the 1920s. Such was the impact of this influx that in 1921 an association of local jewellers and the London Chamber of Commerce established a specialized testing facility in Hatton Garden and employed Anderson as one of the few men equipped to do the job at the time. Armed with a degree in chemistry with mineralogy and the only pearl-testing equipment then available (the 'lucidoscope' which he bought back from a brief visit to Paris) Anderson was installed in an L-shaped room at the top of Hatton Garden's Diamond House.

Callaghan's talk guided us through how the pioneering Anderson developed his technique for testing with the lucidoscope over a number of years. The history of Anderson's methods were dispersed with personal tales of his first experiences with calibrating a balance on a slanted floor and an endoscope that, when plugged in, blew all the fuses in the building. Of course, with Anderson's obvious attention to detail he notes his inventive solution: a rubber mat. Callaghan also pointed out the obvious difference in health and safety aspects — lucidoscope testing required filling drilled pearls with a mercury-based solution… without any of the modern day protections. In all, Callaghan's speech spoke of a man with a pioneering spirit and a passion for sharing knowledge with others, a sentiment expressed in the fondness with which he writes about C.J. Payne, R. Webster and A. Farn, who joined the laboratory in the years to come.

A collection of the Blue John on show at the Conference, courtesy of W Hammond/Gem-A.
Photo Miles Hoare

Saturday's last speaker, Dr John Emmett, presented in-depth study of the issues in testing using a spectroscope — a detailed analysis of how different ways of testing are not independent. He explained the problems with spectra represented with testing with a spectrometer and spectrophotometer — the former doesn't account for absorption and the latter is often presented in gemmological literature with no vertical scale (or absorption-coefficient) and doesn't account for crystallography. "A correct spectrum is independent of one instrument" he asserts and the different ways of cross referencing data still rely on the eyes and the components of the stone.

By the use of such advanced equipment, Emmett showed that the absorption combined with the relative concentrations of colouring elements could be used to predict the shade and saturation of any corundum. He examined how the level of colour changed with the concentration of the different elements, showing that in some cases only a few parts per million (ppm) were needed, such as chromium, but others, like iron, needed a few hundred ppm. Each of the different colouring combinations and mechanisms was discussed, before Emmett concluded by showing how the colour of the beautiful Padparadscha sapphire was caused by a combination of orange from trapped 'holes'

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adjacent to chromium atoms, and red from the chromium itself.

With the day's lectures at a close, delegates attended a drinks reception ahead of the anniversary dinner. Served in the Goldsmiths' Hall's famous Livery Room, this celebration drew some of the most influential names from the field of gemmology and the history of Gem-A. Speeches were given by CEO James Riley and president Harry Levy, and the Association was presented with a ceremonial plaque of praisiolite mounted on Australian gumtree sap from Katrina Marchioni, president of the Gemmological Association of Australia.

Two Matthew Boulton chalices from the ormolu workers in the 1700s.

Sunday

The day began with a study of the various types of lesser-known Scottish gemstones with Brian Jackson, ex-principal curator of mineralogy at the National Museums of Scotland. His talk focused on the areas where a number of well-known gemstones can be discovered in Scotland, starting with Neolithic jade arrowheads from the fifth and sixth centuries BC, and Bronze Age jet and amber (the oldest form ever found) from around 2000–1600BC. Jackson took us on a tour of regions from Loch Avon and Nevis, the homes of Scottish beryl, Glen Buchat, the only known deposit of Scottish tourmaline, to the Isle of Mull and the deposits of corundum and sapphires found by the British Geological Survey in the mid-1980s. He also discussed the highly desirable Scottish pearls, which range from white and silver to lilac and pink in colour and were set in the crown of James IV. Other interesting aspects of Jackson's talk were the lesser-known Scottish stones like the 'Wee Willy' (the largest pearl ever found in Scotland), and the jewellery that resulted from their discovery, such as the Hunterstone Brooch, an eighth-century Celtic design set with Scottish amber and the gem-set pieces of garnet, sapphire, emerald and pearl jewellery from the Medieval period. Some of the more intriguing pieces included MacIver-Campbell of Ballochmyle's amazing sixteenth-century ring brooch and the odd crystal balls made in the twelfth to sixteenth centuries… simply for healing cattle.

Jackson's talk was followed by a particularly challenging topic — Dr Emmanuel Fritsch's talk on luminescence. He explained how he believes that the gemmological community needs some standardization for measuring luminescence. Fritsch detailed these issues by outlining the steps to studying photoluminescence and the absorption of photons (from a UV light source) which cause visible radiation of photons from the stone. He discussed how the detection of HPHT treated, near-colourless type IIa diamonds needed the right UV lamps, as brownish synthetic diamonds give a brighter luminescence under strong light, and could easily be mistaken… He stressed the importance of equipment, maintenance, and the need to keep the surrounding areas as dark as possible by not using white diamond grading machines that are commonplace in laboratories.

Fritsch's main point, however, was how in many cases the luminescence of gems is not identified properly as there is little to no standard set of tests or processes to determine a stone's luminescence. He suggested introducing more descriptive terms such as 'turbidity' and 'chalkiness' when reporting on a stone's fluorescence, and the adoption of a standard timeframe, as some materials take longer to 'charge' than others before displaying the appropriate degree of luminescence. He suggested a number of areas where a standardized form of luminescence test could limit inaccuracies

The beautiful and rare watermelon cat's-eye tourmaline — part of the Somewhere In The Rainbow™ collection.
© Somewhere In The Rainbow™.

in measurements of luminescence and, as a consequence, could become one of the standard tests when grading stones.

Lab tests still a hot topic, Dr James Shigley's *Evolving Challenge of Gem Identification* discussed the current issues facing the labs in the processes of gem identification. In a departure from the worries about synthetics that have been expressed in previous years, Shigley, a research fellow at the GIA's Carlsbad laboratory, warned of the pending problems with the array of treated gemstones, stating "synthetics and simulants are now much less of a problem than treatments". Comparing the issues in gem testing in the 1970s to those faced today, he pointed to the number of diffusion-treated corundums, glass-filled rubies and filled fissures and fractures in emeralds currently appearing in the lab. His main concern was how rapidly this new problem was growing, with the lab seeing stones that had been badly treated several times. One of the other issues he pointed to was the inclusion of synthetics parcels — many of which have been found to contain a small proportion of synthetics, or classic simulants.

Although Shigley seemed cynical about the current state of treatments on the market, he noted some of the steps GIA had taken to test for new ones. Finding cutters and dealers who apply certain treatments to stones, GIA use these as test cases, feeding the information into their knowledge database to help identify similar troublesome treatments in the future.

Within this process they also attempt to verify the origin of the stones allowing them to build up repository knowledge of the component parts of stones from certain regions and to detect treatments that may have affected these stones. The theme running throughout his presentation was Shigley's continued warning that: "Treatments are the newest problem, more so than synthetics and anyone entering the trade now should be warned that treatments will be the big issue of the future."

Martin Rapaport, who was next to take the stage, concurred that synthetics are not the problem and may, in fact, be the solution. His passionate address poured scorn on some sections of the diamond industry and how they continued to skew the playing field in their favour. Rapaport's contention is that synthetics show "God has a sense of humour", as after years of exploitation and monopolization by certain diamond and mining companies, synthetics have completely changed the nature of the industry and may potentially change the major players in years to come. However, Rapaport's talk was really about ethics in the diamond industry and how "I don't know" or "not my problem" is the crux of our current issues. Although his pessimistic outlook on the problems created by the intervention of the Indian government (in pushing up the prices of rough) and the Kimberley Process (for failing to produce trusted certification) show Rapaport's disdain for governmental intervention and non-market-based solutions, his passion in identifying the issues was keenly felt by most members of the audience. In fact, the sense of injustice that pervaded his words was encapsulated when he praised Gem-A as the "keeper of the faith, of the values of honesty, transparency and fairness that have kept the Association going for 100 years" before concluding that "our diamonds can only ever be as good as we are".

Shelly Sergeant began her presentation with the opening scenes from the 1939 version of *The Wizard of Oz*. Sergent, who works as curator of *Somewhere In The Rainbow*®, led us through some of the collection's rarest and most sought-after stones. Starting with beryl, she described some of the 45 types of beryl including emerald, trapiche, aquamarine, morganite, and golden and red beryl contained in the collection, along with various types of chrysoberyl, corundum, fluorite and diamond samples. Obviously, one of the most revered gems in the collection is the Bridges' tsavorite garnet, donated to the collection by the Bridges family in memory of the late Campbell Bridges. Although this is one of the rarest and most startling stones in the collection, the list doesn't end there. Sergent went on to discuss the array of gemstones including pearl, peridot, quartz, rhodochrosites, sunstone and tourmaline, with special mention made of certain stones such as the watermelon cat's-eye tourmaline and the 10 ct bi-colour bleeding heart tourmaline.

John Bradshaw continued the study of rare and sought-after stones with his talk on 'The medium, the medium-rare and the well done'. During this session he discussed some 4,000 mineral species in recorded existence and how only 200 of these have ever been faceted, and just 20 of which are commonly used in jewellery. Bradshaw asked the question: what had happened to the 180 'rare' stones not used in jewellery? To answer he began by discussing the term 'rare' and what it might mean in the context of these jewels. Firstly he noted a distinction between the jewellery and the collectors' markets, discussing how some stones, through their hardness and durability, lend themselves to jewellery making, while the others don't. He then detailed some of these 'rare' stones like benitoite — a stone which has ample properties for jewellery making (as shown in this benitoite butterfly by Robert Weldon. However, as the stone has been found in only one source which has now been closed, it is available in small amounts, once a year, at the beginning of the Tucson show. Similarly, gem-quality sphene (also known as titanate) which can be found in 97 localities (98 if you include the moon) is only generally available in such small quantities that it's not commonly set within a piece of jewellery. The rare earth manganese carbonate mineral rhodochrosite was next on the list — a beautiful rare red gemstone that is also scarcely used due to its limited supply and high price. The same can be said for sphalerite, little of which is now mined and can only be found from old collections and inventories.

Bleeding Heart tourmaline — part of the Somewhere In The Rainbow™ collection.
© Somewhere In the Rainbow™.

However, it's not all doom and gloom; Bradshaw went on to point out some more 'rare' stones that are beginning to see wider use. For example, he notes the growing supplies of blue, green and blue-green apatites from Madagascar and yellow apatites from Mexico — which have seen prices drop dramatically. Similarly, the abundance of Chinese fluorite and the re-establishment of Blue John as a jewellery product have caused a certain revival in these types of low durability, more rarely used stones. Finally, he mused on how the use of certain stones over time always depends on supply, price, popularity and properties for use and thus the story of the rare, medium-rare and well-done will be forever changing.

Bradshaw then handed over to James Riley, who closed the conference by praising the sponsors, supporters, speakers and staff for all their hard work. A special thanks went to Gem-A's Amandine Rongy, who was instrumental in the production of the entire event, including the Friday workshops and the trips to the Pearl exhibition at the V&A Museum, the Cheapside Hoard, the Crown Jewels and the Natural History Museum.

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Gem-A's 2013 graduates gather on the magnificent staircase at Goldsmiths' Hall.
Photograph © Photoshot.

Graduation ceremony

The Conference celebrations continued into the evening with the annual Award Ceremony with graduates from across the globe invited to receive their awards at Goldsmiths' Hall. Those who attended travelled from Australia, Canada, China, India, Japan, Madagascar, Sri Lanka, Taiwan, Thailand and the U.S.A., as well as from Europe and the UK, coming together to celebrate their achievements with a night of networking in the company of some of the industry's leading lights.

During the course of the evening, students who achieved a particularly high level were recognized with the presentation of Gem-A's awards. Given to students who go above and beyond the expected level and continually exceed all expectations, Gem-A's Awards are often a signpost for prospective employers looking for the cream of up-and-coming talent in the industry.

Winners of this year's awards include:

- Nicole Mouralian took home both the Hirsh Foundation Award and the Anderson Medal for her results in the Gemmology Foundation Certificate.
- Stefanus Salomon Weyers, was winner of the Deeks Diamond Prize.
- Caroline Marcus who was awarded the Mok Diamond Practical Prize for excellence in the Diamond Practical Examination.
- Li Ziyue, who was the best overall candidate in the Diamond Diploma, was awarded the Bruton Medal.
- Special mention goes to Charlotte Leclerc, who won not only the Anderson-Bank Prize, the Read Practical Prize and Christie's Prize for Gemmology for outstanding results in the Gemmology Diploma examinations, but also was awarded the Tully Medal. Given to candidates whose papers are of an exceptionally high standard, the Tully Medal is the true badge of excellence for anyone passing a Gem-A course.

Following the presentation of awards and prizes Martin Rapaport took to the stage as the guest speaker, inspiring students to continue on in the industry with the highest ethical and moral code. As well as praising students for their hard work over the course of their qualifications, Rapaport discussed their future role in the industry. He asked them not to rest on the knowledge that they're good at what they do, but to "strive to be excellent". He also urged students not only to be the best, but also to retain and remember the ethics and principles promoted by Gem-A in all that they do.

With those words students retired to the Drawing Room for a drinks reception in the company of some of the world's leading gemmologists. This provided a great opportunity for many of the students to meet the famous gemmologists whose books they had studied during their courses and to kick-start discussions about their future careers…

Our honorary fellows and those granted fellowship by redemption. L – R: Martin Rapaport, Ronnie Bauer, Cally Oldershaw, Emmanuel Fritsch, Brendan Laurs, Tay Thye Sun. © Photoshot.

Leonard Baker (right) who was awarded the Gemmology Diploma in 1948, with Sarah Riley and David Jones who qualified in the first Diamond Diploma examinations in 1963.
© Photoshot.

Instruments

The Sarine Light™ system

Sarine's Akiva Caspi reports on an alternative approach to diamond performance.

The diamond trade accepts that the traditional 4 Cs do not always convey an accurate indication of how a diamond will look in reality. The challenge for any alternative approach has been to develop a scientifically robust way to quantify a diamond's appearance while providing an overall grade that can be understood by consumers. Gem-A recently witnessed a demonstration of the new Sarine Light™ system which offers just such a way to measure how a diamond looks. To help the industry judge the potential for this light performance system, given here is an explanation of how it works.

The concept of the 4 Cs — Carat weight, Colour, Clarity and Cut — is well known and is generally used when evaluating a diamond. However, the 4 Cs and traditional diamond grading are not sufficient to determine the overall beauty of diamonds. As an example, a diamond may have an Excellent cut grade, but a clarity grade of I2. It may be cut perfectly to maximize the light performance, but looks bad because the inclusions obscure the light travelling through it. In the new approach taken by the Sarine Light™ system the factors that determine the beauty of the diamond are measured combined and the diamond is analyzed as one entity. In developing this system, Sarine studied more than 23,000 diamonds from multiple manufacturers and retailers. It became clear that, as any diamond dealer would tell you, diamonds that have identical grades based on their 4 Cs can differ from each other significantly in actual appearance.

1. A zigzag pattern of black and white zones of equal total areas within a hemispherical chamber.

Light

The way in which light travels through a diamond is based on two attributes, refractive index and dispersion. The refractive index (RI), the relative speed of light in the diamond compared to a vacuum, is 2.417 — higher than most other gems. The dispersion, the difference in RIs between the violet and the red, is 0.044, which is a relatively high value when compared to most well-known natural, transparent gemstones.

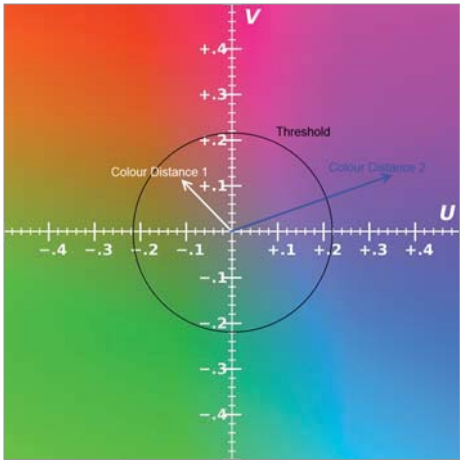
The most common way to describe the diamond's beauty or appeal is a combination of four components: brilliance, fire, sparkle and light symmetry. These are determined by many factors such as polish, symmetry and of course clarity.

Brilliance is the intensity of light that shines from the diamond and it has two sources, external and internal. The internal influence is caused by the light being refracted upon entering the diamond and then reflected from the pavilion facets. The arrangement of the facets determines the path of light inside the diamond. The external brilliance or lustre is caused by light reflected from the surface of the diamond.

The fire in diamonds is a function of its dispersion, the range of spectral colours seen in a polished diamond when it is viewed face-up. This varies according to the illumination conditions and facets arrangement.

The sparkle or scintillation is the contrast of bright and dark reflections from the facets seen when the observer, the illumination or the stone moves.

Light symmetry describes how equally light is reflected from the diamonds facets.

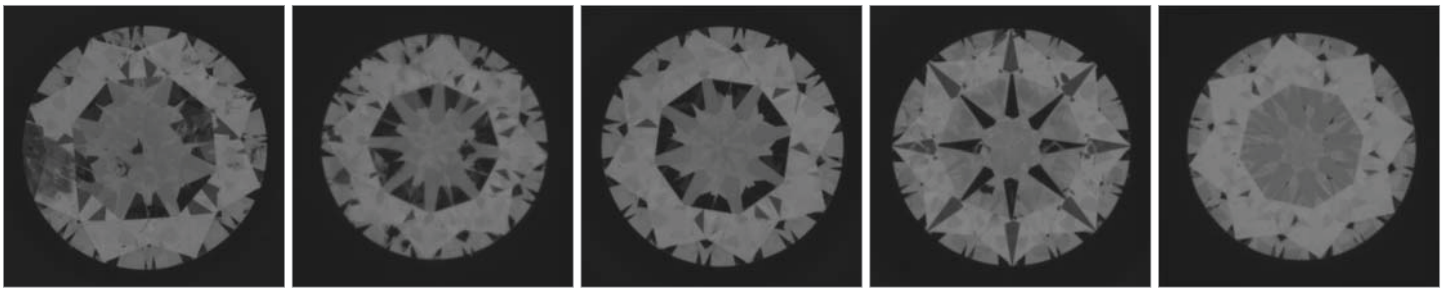


2. A typical UV plate where Y is luminance, the perceived brightness in an image, and U and V are the chrominance (colour) components.

Cut and beauty

The beauty of a diamond, expressed in terms of its brilliance, fire and scintillation, largely derives from the proportions in which the diamond is cut. It can be regarded as being in the eye of the beholder and different individuals will have differing views. However it is necessary to have a set standard to compare stones.

Modern concepts of good cut are largely based on Marcel Tolkowsky's 'ideal' cut, but his calculation is not perfect. For example, Tolkowsky's model has a girdle thickness of 0 and his calculations were based on a two-dimensional representation, thus ignoring multiple reflections. Of course Tolkowsky had no computerized ray tracing or three-dimensional virtual models of a diamond and they are huge achievement for his time.



3. Brilliance images: the five levels of brilliance in diamonds from (left to right) Very Low brilliance to Ultimate brilliance.

There have been many standard cut proportions published over the years and laboratories and appraisers today may use some of these or have proprietary cut grading systems, such as those used by the GIA and AGS diamond grading laboratories.

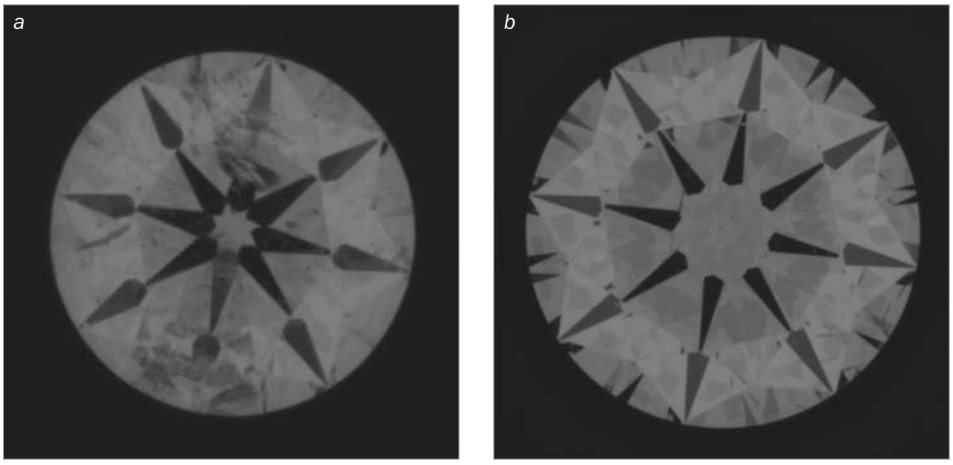
Light performance of diamonds

The direct approach to determining light performance of diamonds, as used by Sarine Light™, measures light performance in actual diamonds. Included are all the factors that affect the appearance of the diamond, including movement since the appearance of a diamond varies depending on the direction of observation, position of the stone and changes in lighting.

To address all the components of light performance Sarine uses (US patent 8,116,552 B2) a zigzag pattern of black and white zones of equal total areas within a hemispherical chamber. The zigzag pattern is shown in **1**. During measurement, the hemisphere rotates so that light hitting the white portion of the hemisphere is returned as diffused white light to the diamond while the other half of the light is absorbed by the black areas. In this way during any phase of the rotation, some portion of a diamond will get just white light, some no light and the rest partial light. Multiple images of the diamond during rotation are generated. For each pixel in a digital image, the system records three components known as YUV; Y is luminance (perceived brightness in an image) and U and V are the chrominance (colour) components. A typical UV plate is shown in **2**.

Brilliance

Brilliance is calculated as the average grey level (the luminance or the Y component) of the composed image (from all images) inside the outer edge of the figure. The images in **3** above show five diamonds with five levels of brilliance.



4a & b. Two levels of symmetry in diamonds; (a) shows a low level and (b) a high level of symmetry.

Symmetry – for round brilliant shapes

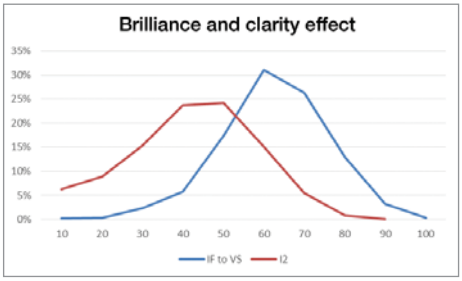
To calculate symmetry, the system composes all the images into a single grey-level image. For a brilliant-cut diamond, the system then calculates the difference between the grey level (the luminance or the Y component) of eight pixels at 45° intervals around the image and their average grey level. For example, if the eight pixels have Y values of 100, 105, 98, 102, 115, 90, 103 and 96, their average is 101.25 and the differences between this and the individual pixels 1.25, 3.45, etc. The system next sums these differences and repeats the process for the entire image (for every group of symmetrical pixels). These figures are then added and the higher this total value, the lower the overall symmetry. For a Princess cut, symmetry is based on pixel luminance at 90º intervals.

With this system, clarity has a direct effect on symmetry and thus poor symmetry may derive from non-symmetrical polished facets, the presence of internal inclusions or a combination of both. Two diamonds with two levels of symmetry are shown in **4a and b**.

Fire

The first step in assessing the diamond's fire is to calculate a 'fire value' for each pixel in the multiple images. The fire value is its colour distance (see **5**). If it is below a threshold value (based on research and assessment) it is assigned a value of 0; if above, it is a legitimate pixel for assessing 'fire value' (**6**).

Instruments



5. Brilliance as function of clarity. Note that for a brilliance level of higher than 70, there are 43% of the population with high clarity while in I2 there are only 6% of the population.

The second step is to see if each individual pixel belongs to a cluster of similar pixels or if it is an isolated pixel, possibly an artefact in the digital image, which doesn't actually affect the fire. The system considers only pixels that are within a large enough cluster, if not they get a value of 0.

The system considers two aspects of fire called Static Fire and Dynamic Fire.

Static fire

This is total effect of fire and is represented by the sum of all colour magnitudes from all the images. This total is adjusted relative to the size of the diamond, as measured by the system, so that small stones with small quantities of pixels won't automatically get low static fire values.

Dynamic fire

The system calculates how each legitimate pixel belonging to a cluster changes with different illumination as provided by different positions of the hemisphere. If this change is above a certain threshold, each pixel is considered as contributing to the dynamic fire, and the size of the change is recorded. The total sum of these recorded changes is the dynamic fire.

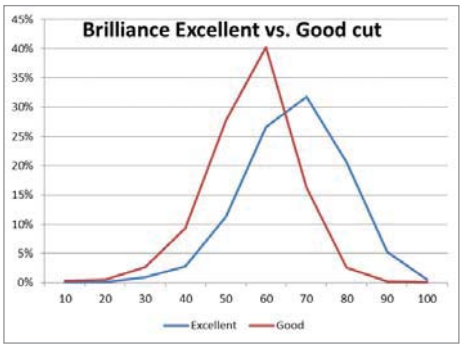
The overall fire is calculated from the static and dynamic fire values by the sum of the two.

Sparkle

Sparkle, the flashes as the diamond moves, is calculated from contrast, dynamic fire.

To calculate contrast, each pixel is analyzed to see how its grey level (luminance or Y factor) changes under different light conditions, that is at different rotations of the hemisphere. If this change is above a certain threshold, this pixel is marked as having a contrast. The contrast is calculated by dividing the number of pixels showing contrast by the total quantity of pixels in the stone. The higher the result, the greater the contrast.

The combination of contrast and dynamic fire determines the sparkle of the diamond.



6. Brilliance as function of cut. Note that for a Brilliance level of higher than 70, there are 58% of the population with Excellent cut grade while in Good cut grade there are only 19% of the population.

Method of research

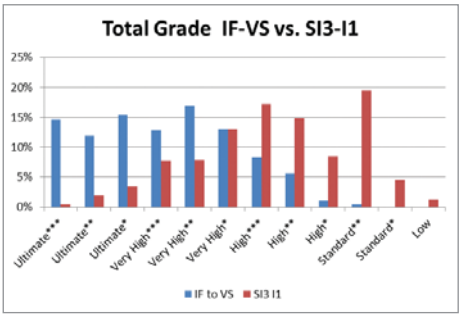
A total of 23,652 diamonds were examined from companies in Israel, Belgium, India and Japan. Information from the traditional diamond grading of each diamond was recorded, including symmetry and polish grades, rough origin (if known), along with notes as to the presence of features such as clouds, brown tint or milkiness. Where companies had a number of product lines with different qualities, they shared with us their internal quality systems including pricing schemes in terms of price per carat. The clarities of the stones studied ranged from IF to I3 and most were sized between 0.25 and 1.00 carats, with some above and some below this. Most of the stones had cut grades of Excellent, Very Good or Good, with a handful of Fair and Poor.

Each diamond was then measured using the Sarine Light™ and DiaMension™ HD systems. This comparative study provided a huge wealth of information. For example, that the clarity of a diamond mainly starts to affect the light performance from SI1 and lower clarity grades; **5** shows the brilliance of diamonds with clarity of IF to VS and I2 and clearly shows a correlation between the brilliance performance and clarity grade. On the other hand although, as expected, the brilliance of Excellent cut diamonds is better in general than those with Good grades, there are some diamonds with Good cut grade that have better brilliance than those with Excellent cut grade for diamonds with high clarity. **6** shows the brilliance performance with cut grade of Excellent vs Good.

Grading the individual parameters

Each one of the four light performance parameters has a range of possible values. The range was divided into five sub-ranges from high to low.

The borderlines were defined based on examination of all the diamonds, computer analysis and a process of trial and error, plus comparison with traditional grading results to ensure consistency and that a sensible result is achieved.



7. In this chart, 42% of the diamonds with clarity of IF–VS are graded with Ultimate and less than 6% of diamonds with clarity of SI3–I1

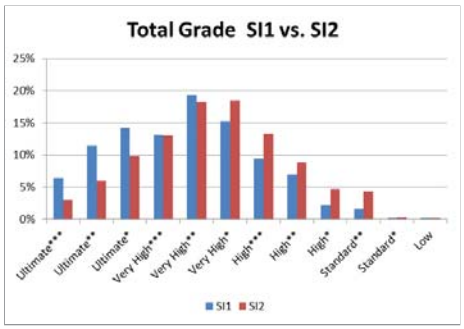
The subgrades were named: Ultimate, Very High, High, Standard and Low.

To summarize, each diamond has four parameters (brilliance, fire, sparkle and

symmetry) and each parameter may have one individual grade (Ultimate, Very High, High, Standard and Low).

Total light performance grading

The aim was to develop a single 'score' that would summarize the light performance of a diamond and enable trade or consumers to easily compare two or more stones. In cases where two diamonds have a similar overall score, a final distinction could be based on personal preferences for factors such as brilliance or sparkle. The challenge was to convert the four individual grades, each of which might have five levels, into a single overall grade. Sarine's approach was



8. In this chart, 32% of the diamonds with clarity of SI1 are graded with Ultimate and just 18% of diamonds with clarity of SI2.

to work on the assumption that the best looking diamonds will have the best light performance in all four parameters; when some measured parameters have lower grading, the total grade will be less.

The final patented grade is described with the terms Ultimate, Very High, High, Standard and Low, combined with a number of stars. Thus if all four parameters of a diamond are Ultimate it is graded as Ultimate ***; if a diamond has three Ultimate parameters and one Very High it is Ultimate ** (Very High can be any one of the four parameters — they are all considered equal); Ultimate* are for diamonds with three Ultimate grades and one Very High or for diamonds with two Ultimate grades and two Very High grades; and so on all the way down to the Low* awarded to a diamond with all four parameters Low. There are a total of 70 parameter combinations, giving a total of 12 possible overall grades.

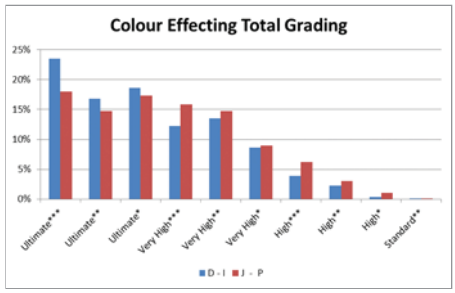
Diamonds and total grading

Our research made it clear that, as shown in **7**, high clarity diamonds have a better chance of getting a high total score (Ultimate ***) than diamonds with low clarity, although there are exceptions. There is even a clear advantage in SI1 over SI2 as shown in **8**. Better colour diamonds in general receive a higher overall grade than diamonds with poorer colour, although the effect is less marked than with clarity (**9**). With regard to cut grade, diamonds with better cut grade have a better chance of scoring a high overall grade, but there are again exceptions (**10**).

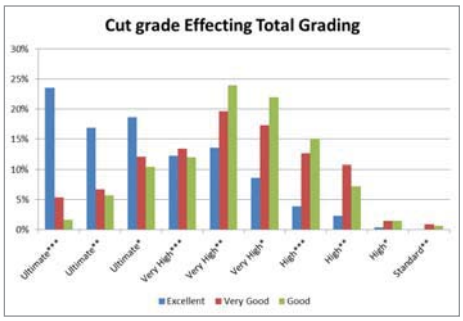
A further test was to compare the diamonds from a manufacture offering high priced diamonds with those from a manufacturer offering a lower quality. Most of the diamonds of the high quality manufacturer were found to have the top total grading scores. Two groups of diamonds from the same manufacturer but at two different price levels, were also tested using the system. In most cases the higher priced diamonds received higher scores than the lower priced stones.

The Sarine Light™ can output results in various report formats, including credit card format. Reports can be added to any trade platform or to social media sites such as Facebook. The equipment can be located anywhere in the world and once the diamond is measured and the optional additional information input, the results are uploaded to the Sarine online server and the information is processed and presented to the user in the desired format.

An iPad application allows sellers to show buyers Sarine Light™ diamond reports, a video of the multiple images taken by the Sarine Light™ and to compare two diamonds side by side.



9. In this chart, 59% of the diamonds with D to I colours are graded with Ultimate and 51% of diamonds with colours J to P.



10. In this chart, 59% of the diamond with Excellent cut grade are graded with Ultimate, 24% with Very Good cut grade and 17% of diamonds with Good cut grade have Ultimate. Note that there are diamonds with Good cut grade that have better light performance than diamonds.

Manufacturers use traditional proportion instructions to cut a diamond in an optimal way. With light performance there is no certainty that what is planned is what will be achieved because clarity and to a lesser extent colour, will also affect light performance. However, Sarine can provide guidance to cutters to help them achieve high light performance.

So far the system has focused on round brilliant-cut diamonds — a substantial portion of the market — but future development will extend to introducing a grading system for fancy shapes and modified round diamonds, where the concept of light performance and cut grade has received little attention or standardization so far.

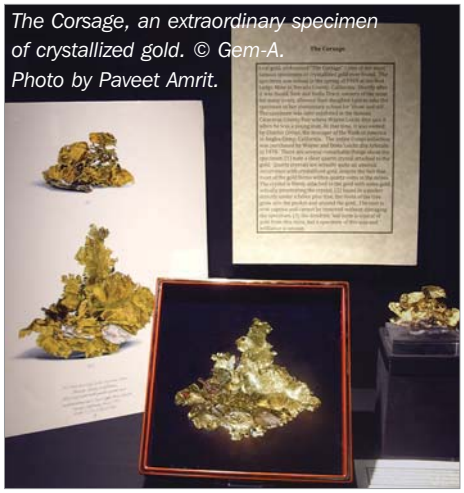
All images in this feature © Sarine Light™

The Munich Show

Andrew Fellows FGA reports on Munich's gold-themed 50th anniversary show.

As the world famous Munich Mineral Show enters its 50th year, its reputation for being Europe's premier show appears well-founded. With over 1,250 exhibitors catering for all tastes from rough to faceted stones and from minerals to fossils, it seems there is something for everyone, all under one roof.

The theme for the 50th anniversary show was gold and, as might be expected, this was in evidence on a wide range of levels. Gold jewellery was, as usual, on show, but this gold-themed year bought together some of the premier specimens from around the world, both from public museums and private collections.



The Corsage, an extraordinary specimen of crystallized gold. © Gem-A. Photo by Paveet Amrit.

Amongst the more noted and famous pieces in the 'gold pavilion' was the Latrobe Nugget. Originally found in Australia but now resident in London's Natural History Museum, the Latrobe weighs in at an amazing 717 g. Alongside the Latrobe was 'The Corsage', one of the most famous and best specimens of crystallized gold in the world, known for having a tree-root trapped within it which cannot be removed without damaging the gold *(above)*. On the more frivolous side, Elvis Presley's gold telephone and keys were also on view, as were many golden dinosaurs *(right)*.

As usual, a vast range of gems and minerals was available, but most noticeable for this year were the specimens of larimar, lapis lazuli and (mineral wise) crocoite, which could be found in abundance in most halls. Rare gemstones such as benitoite and hauyne also had their place, becoming more widely recognized by their increased supply and availability, and by their saturated colours. Treatments were also well-represented, with quantities of 'highlighter' coloured crystals and coated stones.

This year also saw the launch of the New Design Forum, showcasing a selection of up-and-coming designers, giving them an opportunity to exhibit and market their creations. Many unique and creative pieces were on show ranging from architect-turned-designer Katerina Pimenidou's structural pieces, to art student Kat Chrysou's whimsical and playful items. Rough gemstones were the main feature of Isabelle Keller's collection, which combined simple elegance with easy to wear designs *(top right)*.

Friday is reserved for traders and collectors, and it is on this day that some of the more exclusive stands can determine whether the show will be a success or not. Hundreds of thousands of euros are handed over in exchange for some of the rarest specimens, which we were lucky enough to be able to handle, and we discussed why they were highly sought after by collectors.

Golden dinosaurs. © Gem-A. Photo by Andrew Fellows.

Rough opal on matrix ring by Isabelle Keller. © Gem-A. Photo by Paveet Amrit.

Many small gold nuggets were also widely available, ranging from €140 upwards, with high quality native samples on matrix reaching over €30,000.

Saturday and Sunday are the days when the show opens to the public with the crowds forming well before opening time, everyone trying to be the first to find that special or unique stone. The event is geared to cater for all ages and it was interesting to see how family-friendly the show was, with an array of interactive workshops such as geode splitting and gold panning. Young, enthusiastic potential gemmologists were visibly wowed by some of the hands-on experiences and the many beautiful minerals on display. It was refreshing to see how the show catered for those young and old — allowing a wider appreciation of the specimens on show and opening up the worlds of mineralogy and gemmology to a completely new audience.

Such was the enjoyment of all these activities that, when the show finally closed on Sunday, it was with a mixture of relief and dismay that we headed for the airport. Munich is one of the largest shows but also the longest, with each day starting at 9 am and going on until 7 pm. However, that said, it's also one of the most enjoyable — so we're really looking forward to a return trip next year!

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Fellows Auctioneers | 19 Augusta Street
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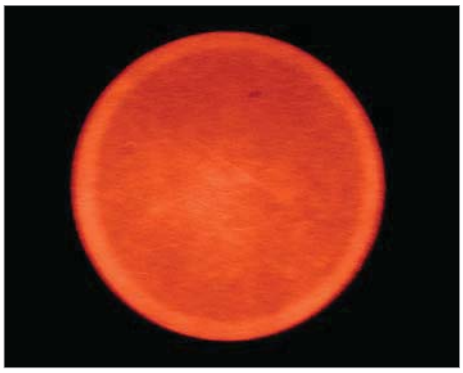
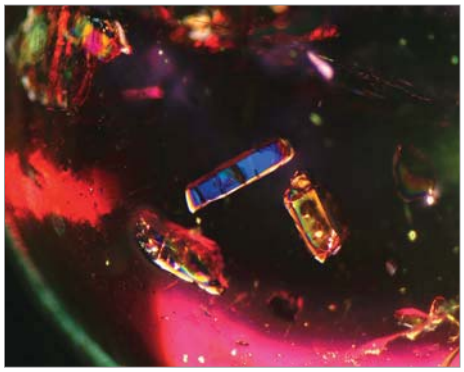
The Winners 2013

Each year Gem-A invites members to submit their best gemmological photography in four categories — natural, treated, synthetic and melange. Since this year's competition opened, we've been inundated with entries ranging from still life images of gemstones to photomicrographs of interesting inclusions, fillings and fragments. From the many entries received, the following are this year's competition winners.

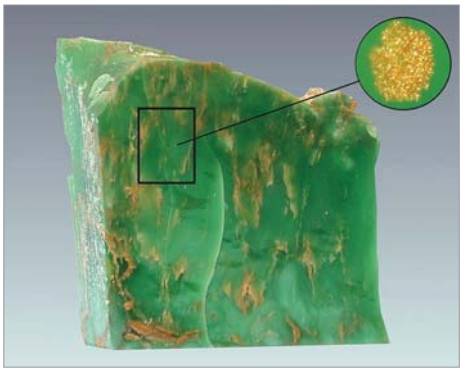
Winner: Natural category and overall winner
Michael Hügi FGA — Gilalite aggregates in rock crystal from Brazil.
Gilalite is a rare hydrous copper silicate (Medusa quartz).



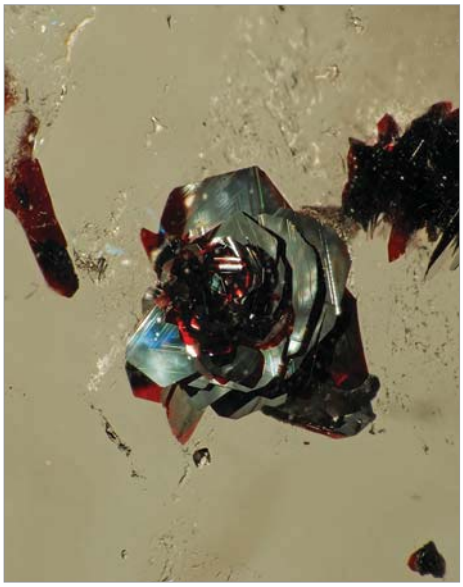
Winner: Melange category
John Harris FGA — 'Energy'
The background is the fluorescence spectrum from a natural ruby. The disc is a ground glass diffusion filter showing the e-ray transmission from an orangey-pink sapphire.



Winner: Treated category
Edward Ferder FGA DGA —
Almandine garnet seen under crossed-polars. The photo shows vivid interference colours from two doubly refractive crystals.



Winner: Synthetic category
John Harris FGA — 'Twilight'
A photomicrograph of a polished section of Australian variscite in oblique incident light. In the centre, an inclusion of gold contributed to the impression of a moonlit landscape.



Honourable mention
Conny Forsberg FGA —
Hematite rose in quartz from Brazil.

Trumpeting the type IIa

Why, all of a sudden, are we seeing the words 'type IIa' in descriptions of important diamonds at auction? Gary Roskin FGA explains all.

Simply put, type IIa diamonds are the most pure form of crystallized carbon of all diamonds as they do not contain readily identifiable trace elements of colouring elements like nitrogen or boron.

So when we see that a large, natural, untreated diamond is type IIa, like the most recent auction of a 118.28 ct D colour oval brilliant (**1**), we make a mental note that this diamond is of the purest kind. In addition the diamond is flawless (no blemishes can be seen on the surface or inclusions inside the diamond at 10x magnification), and is of excellent polish and symmetry. We can therefore, by definition and the U.S. Federal Trade Commission regulations, call this diamond 'perfect'.

Now, you might think that with a diamond grading report stating D colour and flawless, one would not need to go any further. But noting that the diamond is type IIa just catapults it into a whole new category.

An exceptional pear-shaped diamond weighing 74.79 ct, D Colour, VVS1 clarity, potentially internally flawless, type IIa. Property of a private collector. Est. $9/12 million, sold for $14,165,000 at Sotheby's New York, Magnificent Jewels Auction, 17 April 2013. Image courtesy of Sotheby's, New York.

The first awareness

I remember it well. It was early in 1999, and the venerable diamond manufacturing company Lazare Kaplan International had announced that its Pegasus Overseas Limited division, working with General Electric, had processed top light brown coloured diamonds, removing the brown colour and creating colourless diamonds. According to Kaplan, these diamonds were virtually unidentifiable as having been treated. The professional diamond grading labs had missed identifying their high pressure high temperature (HPHT) treatment. The gasp was heard around the gemmological world, and it marked the beginning of professional laboratory diamond typing.

What is diamond typing?

In an overly simplified description of diamond typing, there are basically four diamond types (Ia, Ib, IIa, IIb) with variable sub-categories of each, sorted by how nitrogen or other colouring trace elements are found within the diamond structure.

Type I diamonds have variable combinations of nitrogen atoms and are defined as those diamonds containing enough nitrogen to be measurable by infrared (IR) spectroscopy. Type I diamonds are divided into two major categories, type Ia and type Ib, and then each one of these also has subdivisions. All of this 'typing'

1. A magnificent oval diamond 118.28 ct, D Colour, Flawless, type IIa stone of Excellent Polish and Excellent Symmetry. Est. $28/35 million (HK$220/280 million), sold for $30.6 million (HK$238.68 million). Sotheby's Hong Kong, Magnificent Jewels and Jadeite Auction, 7 October 2013. Image courtesy of Sotheby's, New York.

is merely trying to describe just how the nitrogen atoms are distributed throughout the diamond crystal, giving rise to the common yellow body colour.

Type II diamonds, on the other hand, have either so few nitrogen atoms that they are not easily identified (type IIa), have no nitrogen at all (also type IIa) or have trace amounts of boron — creating grey and blue diamond (type IIb).

The type IIa exception

The brown in brown diamonds is created by vacancies and not a colouring element. So as it doesn't have a colouring element, it too can be a type IIa diamond.

According to Dr Wuyi Wang at GIA's Gem Lab, the brown colour is attributed to a defect of vacancy clusters. And the reason

HPHT works so well with type IIa top light brown diamonds is that it can destroy that vacancy cluster. That explains the colour change after annealing.

If you had previously thought that the brown colour was attributed to plastic deformation (i.e. strain), research has proven otherwise. While a vacancy cluster is closely linked to plastic deformation, plastic deformation is not the cause of brown colour. To prove the point, if plastic deformation were the cause, then HPHT annealing would not only remove the vacancy cluster, it would also remove the plastic deformation. But it does not. And that explains why we still see plastic deformation (i.e. Tatami graining) after HPHT annealing (**2**).

From the Sotheby's auction catalogue

The four largest D colour Perfect diamonds ever sold at auction:

The Mouawad Splendour
101.84 ct
Modified pear shape, D colour,
Internally Flawless
Sold for US$12.8 million
Sotheby's Geneva, 1990

The Star of Happiness
100.36 ct
Rectangular shape, D colour,
Internally Flawless
Sold for US$11.9 million
Sotheby's Geneva, 1993

The Star of the Season
100.10 ct
Pear shape, D colour,
Internally Flawless
Sold for US$16.4 million
Sotheby's Geneva, 1995

The Winston Legacy
101.73 ct
Pear shape, D colour, Flawless
Sold for US$26.7 million
Christie's Geneva, 2013

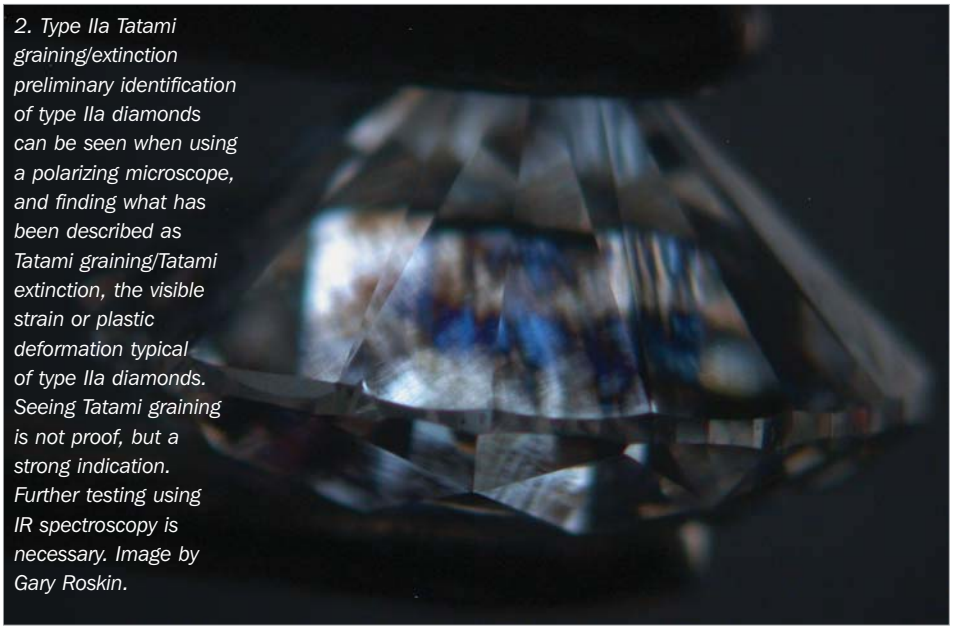
Notes from Sotheby's

The following notes were made by Sotheby's: "Accompanied by GIA report numbered 2155581489 dated 21 August 2013, stating that the 118.28 ct diamond is D colour, Flawless clarity with Excellent Polish and Symmetry; also accompanied by diamond type classification report stating that the diamond is determined to be a type IIa diamond. Type IIa diamonds are the most chemically pure type of diamond and often have exceptional optical transparency.

"Also accompanied by a letter from GIA stating that the 118.28 ct diamond 'is the largest Oval Shaped D colour, Flawless or Internally Flawless diamond we have graded as of the date of this letter and the report issued'."

Add to that 'Golconda'

As stated on its Diamond Type Classification Report, GIA notes: "Type IIa diamonds are the most chemically pure type of diamond and often have exceptional optical transparency.



2. Type IIa Tatami graining/extinction preliminary identification of type IIa diamonds can be seen when using a polarizing microscope, and finding what has been described as Tatami graining/Tatami extinction, the visible strain or plastic deformation typical of type IIa diamonds. Seeing Tatami graining is not proof, but a strong indication. Further testing using IR spectroscopy is necessary. Image by Gary Roskin.

Type IIa diamonds were first identified as originating from India (particularly from the Golconda region) but have since been recovered in all major diamond producing regions of the world.

"Among famous gem diamonds, the 530.20 ct Cullinan I and the Koh-i-Noor are examples of type IIa."

For gems of this importance, the Gübelin Gem Laboratory (GGL) also provides diamond type classification information on its grading reports. For type IIa colourless diamonds cut in antique styles, the GGL states: "In addition, this diamond is classified as type IIa (a chemically very pure type of natural diamond). It displays a colour and degree of transparency particular to these unique gemstones. Diamonds of this type, exhibiting an antique cutting style as well as a fine quality, are very rare and will certainly evoke references to the historic term of 'Golconda'."

Final point

Just to make it perfectly clear (pun intended), type IIa D colour diamonds are not 'white' diamonds. 'White' diamonds are actually snow white, milk white. This is a true colourless diamond. **GR**

Special thanks to Gary Schuler, senior vice president, director of jewellery, Sotheby's New York, and to Shannon Demers, Sotheby's press office, New York.

Stone Scoop

Mountain and molehills

The Koh-i-Nur — the Mountain of Light — is one of the best-known gems in the English Crown Jewels, but it is fun to strip away some of the fawning admiration and see what was actually said about it by the humorous magazine *Punch* when it went on exhibition in 1851.

This little light of mine

In addition to criticism, then as now, that recutting the great Moghul gem into a shallow brilliant was a travesty of sense and taste, public reaction when the gem was exhibited in a large, gilded cage at the Great Exhibition in Hyde Park, London, in 1851 was generally one of disappointment. It was smaller than expected and didn't sparkle much. *Punch* asked: "If you are a diamond, why don't you behave as such?" The press had noted the presence of fire extinguishers in the Great Exhibition, leading *Punch* to quip that this would "account for there being so little fire in the Koh-i-Noor [sic]". In the same vein we have a Frenchman noting that the Koh-i-Nur shines with as much brightness as the sun in England, and mirth generated by the fact that the diamond "disdains to shine" unless lit by gas and thus "There is something touching in the fact of a sick diamond calling in the assistance of one of its poor relations." (Gas was generated from coal, which, like diamond, is carbon.) This undercurrent of political radicalism is also seen in the suggestion that Queen Victoria might be best advised to sell the Koh-i-Nur and the money be invested in education — making it a more useful Mountain of Light.

Molehills of lustre

Punch's coverage ranges from a poetic dialogue between the Koh-i-Nur and a piece of coal (complimenting a cartoon that suggests that coal might actually be a better provider of light for the general population) to a suggestion, in a satirical piece about England becoming a Republic, that this great Mountain-of-Light, "should be broken up into little Molehills-of-lustre".

Size matters

The longest piece was an imagined dialogue between two policemen guarding the diamond while on exhibit. They noted that women visitors clustered around the diamond like moths around a candle, but most of them expressed their disappointment in the size of the diamond. Retorts by the policemen included: "Well, yes ma'am; Primrose Hill is bigger. But, you see, it's one o' those mountains that people make out of molehills." And "Come again next week, and it may be bigger."

Blood diamond

The policemen also discussed its history:
Policeman 1: "Well it can't brag of its company afore it came to us; that is — as I've read. It was found in Golconda and sent to the Great Mogul; stole from him that stole it; the next thief being killed by the next thief; who was again robbed of the Mountain; that was stolen again and again until —"
Policeman 2: "Yes — go on."
Policeman 1 (with emotion): "Until it became the lawful property of the British Crown."
Policeman 2: "Hallo. What, did we buy and pay for it?"
Policeman 1: "Bought it with the brave blood of armies, and the gold of the soldier's pay! Paid I don't know how much in blood, and gold, and gunpowder, and bayonet cold iron."
Policeman 2 (scratching his head): "Well, I dare say it's alright… But I say if there was only a sort of upper Police force big enough to tackle 'em, what a lot of kings, and conq'rors, and generals, with their green laurels, would have found themselves in the station-house."

Crowd around the gilded cage containing the Koh-i-Nur diamond at the Great Exhibition, 1851. From Punch, *vol. 21, 1851.*

The gem replies

There was a rumour, of course, that the stone exhibited was not the true Koh-i-Nur, but an imitation. So *Punch* published a letter from the Koh-i-Nur insisting on its genuineness: "After having passed from throne to throne, dynasty to dynasty, unsullied for a moment by the breath of suspicion, to have my pretentions called in question by the populace in Hyde Park is too much."

I'm not sure just how much of the original diversity of opinion you might pick up today in a visit to the Jewel House at the Tower of London, or in many books on the Crown Jewels, but it is always useful to remember that, like a diamond, healthy scepticism and satire are for ever.

J.O.

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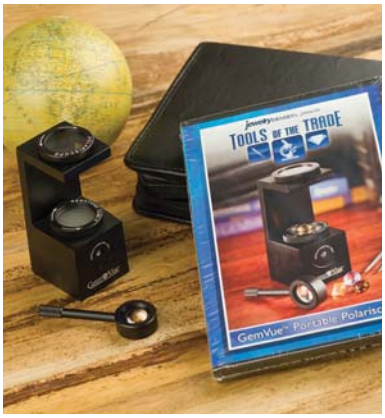

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