Gems & Jewellery

March 2014 / Volume 23 / No. 2

Exquisite Mexican mosaics

Tucson show 2014 round-up

Creating corundum

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THE GEMMOLOGICAL ASSOCIATION OF GREAT BRITAIN

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Editorial

Gems&Jewellery

March 14

Contents

Something which both amuses and mystifies me is the regard in which gemmological qualifications and membership are held around the world. By the time you read this I will have arrived back in the UK after a five-week around-the-world trip — one which, fortunately, included some holiday!

At both the FEEG Symposium in Madrid and the Spanish IGE conference I was struck by the professionalism of the delegates and the diversity of speakers. Each was passionate about the genre and all would agree that there is always something new to learn. Young graduates from all over Europe attended both the conference and the awards ceremony. At our own awards ceremony we have graduates attending from all over the world, but often encounter indifference from our UK students. For many, a Gemmology Diploma will be their highest academic achievement and it is something to be celebrated.

At the IJT show in Tokyo I was privileged to meet many of our members and past graduates who were keen to renew their membership with Gem-A, both to retain their FGA status and to share the benefits that it brings. It's refreshing to witness what is clearly a growing market in Japan. The market is still a shadow of what it was in the 1990s, but it is showing healthy signs — good news for the global jewellery market.

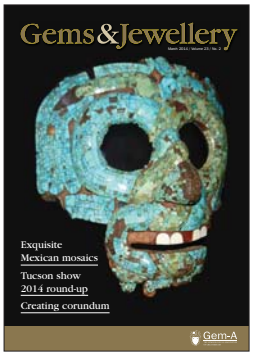
In Tucson where the gem world gathers it was gratifying to see the rigour with which other organizations police their membership and the level of retention they achieve. A great many of us could learn a thing or two from them. We are going to start by indicating on our list of graduates who is a paid-up member and who is thus entitled to use the initials. So don't be afraid to name and shame your competitor who claims membership but isn't one! And please folks, to those of you who passed your exams with distinction, it's the Diploma that it applies to not your Fellowship or Diamond membership.

One thing I was very pleased to do in Tucson was to show people the latest issue of *The Journal of Gemmology* which had just been printed. As this was the last issue in the old format, I am looking forward to the next one with numerous new segments and a sympathetic design update. If you haven't seen the current one, you should. It might mean you need to become a member or take out a subscription but I think you'll find it worthwhile. Congratulations to Brendan Laurs on his maiden issue.

In the meantime if you have anything which you would like us to consider for *Gems&Jewellery* or *The Journal*, please do not hesitate to contact me or Brendan.

James Riley
Chief Executive Officer

Cover Picture
Mexican turquoise mosaic mask of the rain god Tlaloc. Photo by Helen Serras-Herman (see Museum News, page 12).



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Gem-A Events

Show Dates

Gem-A will be exhibiting at the following shows:

BaselWorld
27 March – 3 April, Stand No. N21 / Hall 3.1
JCK Las Vegas
30 May – 2 June, Booth L116

Gem Central evenings

Please note that from April, Gem Central will be held on Monday evenings.

'Fifty Shades of Colour'
with Andrew Fellows FGA DGA
Tuesday 11 March, 18:00 – 19:30
Gem-A Headquarters
Limited spaces available — booking essential
If you missed Andrew Fellows' popular 'Fifty Shades of Colour' seminar in Tucson, the session is being repeated in London. Prepare yourself for a colourful time testing gemstones, and seeing the range of shades and tones of colour that exist within everyday gemstones. Come to see the colours your brain doesn't want you to see!

Free for Gem-A members and Gem-A students; £5 for non-members.

Workshops

Introductory
Our range of introductory 'Understanding' workshops are ideal for jewellers with no gemmological background, or for anyone who needs a refresher.

Intermediate
The Intermediate 'Investigating' workshops are for gemmologists and jewellers with gemmological knowledge.

Understanding practical gemmology
Friday 14 March 2014
Gem-A Headquarters, London

Investigating gemstones treatments
Friday 14 March 2014
School of Jewellery,
Birmingham City University

Understanding diamond simulants
Friday 21 March 2014
Gem-A Headquarters, London

Understanding diamond grading
Friday 11 April 2014
Gem-A Headquarters, London

Fees for workshops:
Gem-A/NAG/BJA members and Gem-A students: £100. Non-members: £120

Heat-treated sapphire.
Photo Pat Daly © Gem-A.

Investigating Ruby, Sapphire and Emerald
Friday 9 May 2014
Gem-A Headquarters, London
Amanda Good FGA DGA will host an informative practical day covering all aspects of these beautiful and important gemstones. Attendees will begin by looking at the properties of natural ruby, sapphire and emerald, followed by their treatments (including lead-glass filling of ruby), their simulants and synthetics. Participants will handle and examine a wide range of these stones from Gem-A's extensive collection.

Gem-A/NAG/BJA members and Gem-A students: £110. Non-members: £130

Understanding fluorescence
Friday 14 March 2014
Gem-A Headquarters, London
A one-day workshop taught by two of the UK's leading mineralogists from the University of St. Andrews' Department of Earth & Environmental Sciences.

Dr Adrian Finch and Dr Richard Taylor will give a one-off opportunity to gain an academic insight into the world of fluorescence in luminescence.

Participants will learn the basics of absorption and electromagnetic radiation in gems — discovering how different forms of energy, light and radiation are emitted from some gems under differing conditions.

Gem-A/NAG/BJA members and Gem-A students: £300. Non-members: £320

Gem-A Midlands Branch meetings

Pearls and lab equipment
by Stephen Kennedy
Friday 28 March

Organics by Maggie Campbell Pedersen
Friday 25 April

All meetings to be held at Fellows Auctioneers, Birmingham B18 6JA.

For further information, please contact the Midlands Branch chairman, Georgina Kettle: georgekettle@hotmail.com
Students: £4, Gem-A Members: £6
Non-members: £8

The Scottish Gemmological Association events

Conference 2014
2 May – 5 May
Peebles Hydro Hotel, near Edinburgh
The 'early bird' cutoff for the Conference is 14 March. Book now to ensure your place.

To book for any Gem-A Events call 020 7404 3334 or email events@gem-a.com

Centurion 2014

Olga Gonzalez FGA reports on this year's Centurion show, held in Scottsdale, Arizona.

Every gem show has its memory. Remember the year of the Polar Vortex? That will be the marker for the Arizona Gem Shows of 2014. Flights were cancelled or delayed; exhibitors and buyers were either 'lucky' with their timing, or not so much, and New York's Diamond District competed for standby flights with those stranded after the Super Bowl. But no storm is a match for the jewellery trade, and the shows did go on: in style and with networking charisma.

Scottsdale was the first stop. The Centurion show has established itself as one of the most important powerhouse trade shows in the United States. Notoriously selective, this invitation-only fair attracts some of the best buyers across the country, and is small enough to provide a country club atmosphere, with exhibitors and buyers having plenty of time to catch-up, attend provocative talks and enjoy gourmet meals together.

1: Blue topaz 'Pangea' ring with opal, peridot and diamonds in 18ct gold by Kara Ross. Image courtesy of Kara Ross.

2: Split pendant with raw rubellite, smooth amethyst and diamonds in an 18ct gold mount by Kara Ross. Image courtesy of Kara Ross.

Booth after booth, exhibitors raved about the show, their new clients and the fantastic atmosphere. Attending on Tuesday, I was surprised by the constant buzz in the room and the buyers ordering from all corners. Perhaps the tide has completely turned? Kara Ross, a first-time exhibitor at the show, said of the experience: "I was thrilled to be a first time vendor at Centurion. I thought the show was done well, from the morning lectures for retailers and vendors to the evening events. The response to our collection from the market was very enthusiastic. People appreciated that we have a distinct point of view, which is a huge selling point when so much out there is 'the same'. The people who visited our booth specifically spoke about our 'Pangea' rings, hand-carved mosaic collection and our raw/polished pieces. The uniqueness of the pieces, the collection and its point of view made our booth a very popular one!" Kara's 'Pangea' ring (**1**) is certainly impressive, featuring five moveable pieces which fit together above the blue topaz cabochon like a jigsaw, as are her raw/polished pendants (**2**).

On the evening of 3 February, Centurion presented the Centurion Design Awards. Twelve designers won awards, with one of my favourite pieces being a diamond and Ethiopian opal necklace (**3**) by Spark Creations, which won the Colored Stone Fashion category.

3: Ethiopian opal necklace with spessartine and diamonds by Spark Creations. Image courtesy of Spark Creations.

Centurion has traditionally been a show for diamond jewellery, but this year opal, coloured opaque sapphires and large baroque pearls were the gems that seemed to be gaining popularity in design. Gemstone-encrusted watches also appeared alongside jewellery in many cases, such as the award-winner in the Watch category by Marco Moore.

4: Grand Entrance Ring by Mihran and Esin Guler, featuring sapphire, pink tourmaline, white diamond, sapphire and rose-cut champagne diamonds in 24ct yellow gold and oxidized and polished silver. Photo courtesy of Rhyme & Reason.

Stealing the hearts of editors at the show was an Emerging Designer booth Rhyme & Reason, Armenian brother and sister design duo — Mihran and Esin Guler. Their Renaissance-inspired bridal line, 'Sacred Story', gave a refreshing look, but what really stood out was their 'Grand Entrance Ring' (**4**), a silver and gold three-dimensional ring that allows you to wear the stage — perfect for the woman who loves drama and makes a statement wherever she goes.

Consistent trends in the jewellery cases were the use of sliced diamonds, opaque sapphires in fine jewellery, white and fire opals in fine jewellery and stackable, artistic wedding band designs. The energy of Centurion was fantastic, and captured what I hope to see globally as stores and end-consumers show confidence in luxury purchasing power.

Tucson 2014

Andrew Fellows FGA DGA discusses the new and interesting featured at the Tucson Gem and Mineral Show 2014.

The Tucson Gem and Mineral Show is, as always, not a single event, but an amalgamation of over 40 individual shows, covering all aspects of jewellery, gemmology and mineralogy, from the cheapest rough quartz crystal to fine gem-quality Paraíba tourmaline and diamond jewellery. Anyone unfamiliar with Tucson would be amazed at the vast array of materials on offer, and the sheer number of exhibitors and stands that spread out across the city.

Sphene was in large supply, appearing on more stands than in previous years, with several suppliers exclusively providing material from Spanish sources. The ever-present Ethiopian opal was in abundance in rough, fashioned and 'smoked' forms, although new to the table was Ethiopian opal with added dyes, creating vivid pinks and blues.

New this year was a find of fire opal material (**1**) from Laverton, Western Australia. Manning the stand were Alan Chapman and Jason Wallett, who explained that the material was found on both the surface and up to three feet underground in the local granite. This form of fire opal shows the same structure and features as other fire opals, but occurs in colours ranging from colourless to orange and brown. The colourless stones seen were very reminiscent of moonstone, showing similar adularescence. Once faceted, the top quality material gives a beautiful orange colour. Supply at present is limited, as mining only takes place for two hours per day, but the hope is that the material will be available in decent supply within the coming months.

Another 'new' opal on the scene was one imaginatively marketed as 'lemonade' opal, due to its light, translucent yellowish colour (think traditional homemade lemonade). Coming out of Brazil, this material's appearance falls between fire opal and white opal, without giving the full appearance of either.

1: Australian fire opal from Laverton, Western Australia.

2: Blue kyanite, from L. Allen Brown.

New gems were not the only stones on offer. One dealer, L. Allen Brown, produced a deep blue, oval faceted stone, which at first glance appeared to be a fine blue sapphire, but was revealed to be a blue kyanite weighing almost 8 ct (**2**). L. Allen Brown was also anxious to show off the remains of a boule of synthetic yttrium aluminium garnet (YAG) (**3**) of Russian origin, and dated back over 50 years. The sample was probably dosed with 4% vanadium (deduced from the writing on the boule) and produced an interesting colour change from pink to almost colourless. Several stones had already been cut from a similar boule, with the largest in excess of 100 ct.

All the usual purveyors of gemmological and mineral equipment were in attendance, with products ranging from cutting and faceting machines through to high tech Raman devices. Several labs were also on hand to test stones for those whose budgets didn't extend to a full lab, but who needed confirmation of a stone's identity. Basic instruments were also given a new lease of life as one visitor to the Gem-A stand explained, as he showed a dichroscope fashioned out of bocote wood (**4**), an unendangered Central American hardwood. Although not produced on a commercial scale, small operations like these are what keep gemmology interesting and accessible to even the newest devotee.

3: Russian colour-change YAG.

4: Dichroscope fashioned from bocote wood.

As usual the Gem-A seminars proved popular, with both 'Spectacular Spectrums' and 'Fifty Shades of Colour' being over-subscribed. Tutors Claire Mitchell and I, assisted by Davina Dryland, demonstrated the use and abilities of both the spectroscope (with and without filters) and the dichroscope to avid gemmologists and newcomers alike. Although only scheduled to be one-hour seminars, the interest of the audience ensured that the questions overran the time slot.

Overall, this year's Tucson show was a great success, particularly for Gem-A, with Brendan Laurs, Editor-in-Chief of *The Journal*, and Ya'akov Almor, Marketing Consultant, being introduced to the public. Members and those wishing to subscribe to *The Journal of Gemmology* and *Gems&Jewellery* provided a steady stream of interest at the stand, and ensured a successful and busy show. Roll on 2015!

All photos by Andrew Fellows © Gem-A.

IJT 2014

Andrew Fellows FGA DGA reports on Japan's International Jewellery Tokyo.

The 2014 International Jewellery Tokyo (IJT) show held in January at Tokyo Big Sight is one of the world's major international jewellery shows, with buyers and exhibitors arriving from all over the globe. For the second consecutive year, Gem-A had a major presence, with CEO James Riley and our retained Japanese ambassador Ayako Naito on the stand, assisted by other Gem-A staff.

As the name suggests, this show is predominantly jewellery-based, with fewer exhibits from loose stone dealers (with the exception of diamonds). Every taste and budget was catered for, from costume jewellery aimed at the younger market, through to high-end unique pieces.

Pearls were in plentiful supply, mounted in rings, pendants and earrings. Some designers complemented pearls with the usual accent diamonds, but others enhanced them by the use of a wide range of coloured stones, including rubies, sapphires and tourmalines.

The show on the whole was well attended, with entrance numbers up for the third consecutive year, and this was reflected in the number of visitors to the Gem-A stand. Membership renewals were high on the agenda, with many members electing to renew in person, and it was a fantastic opportunity for members to meet the team, put faces to names and in some cases names that they had known for years.

Demand was high at the Gem-A stand for gemmological instruments, equipment and books, with everything from loupes and gauges to gem and diamond testers being purchased. There was also strong interest in both the Gemmology and Diamond Diploma courses (the former of which is fully translated into Japanese), and encompassing both the Accredited Teaching Centre and the Online Distance Learning, the Japanese version of which is to be launched later this year.

As with most shows there were several meetings to reinforce our presence and commitment in this part of the world, and to forge new agreements to ensure that Gem-A is a strong gemmological force not only here, but worldwide.

The AGTA Spectrum Awards

Olga Gonzalez FGA rounds up some of the winners from the AGTA Spectrum Awards 2014.

The American Gem Trade Association (AGTA) announced the 2014 Spectrum Award winners during the Spectrum Awards Gala, hosted on Saturday 8 February during the GemFair, Tucson. Launched in 1984, the Spectrum Awards are considered to be the most prestigious acknowledgement of excellence in the jewellery design industry, having become the ultimate prize for jewellery designers wishing to gain recognition for their work. This year marks the 30th anniversary of the Awards, with first place pieces featured in special displays on the AGTA show floor, some of which are shown here.

Objects of Art
'Friendship' sculpture featuring sunstone, black jade, varascite and black, yellow and white diamonds, by Dalan Hargrave of Dust Devil Mining.

Best of Show
Platinum 'Tropical Storm' ring featuring a 22.10 ct emerald, accented with diamonds, by James Currens of J.W. Currens Inc.

Best Use of Color
18ct yellow gold earrings featuring boulder opals and fire opals, accented with orange sapphires and Paraíba tourmalines, by Erica Courtney.

Best Use of Pearls
18ct white gold drop earrings featuring 32 Japanese akoya cultured pearls accented with round brilliant diamonds, by Anil Maloo of Baggins Inc.

Photos by John Parrish, courtesy of AGTA.

FEEG

Amandine Rongy FGA discusses the role of FEEG and reports on the 2014 FEEG Symposium and Graduation Ceremony held in January.

The 16th Symposium of the Federation for European Education in Gemmology (FEEG), including the FEEG meeting and Graduation Ceremony, took place in Madrid, Spain, over the weekend of 17–19 January. FEEG was created in 1995, with Gem-A being one of the founding organizations. The initial objective was to set up a European standard of gemmological knowledge, which was to be run by existing European gemmological institutes. Participating countries include: Austria, Belgium, France, Germany, Italy, the Netherlands, Spain and the UK. Every year the graduates of the participating institutes can sit an exam in their own language, testing their theoretical and practical gemmological knowledge, to achieve the FEEG Diploma. This not only ensures the recognition of the graduates' abilities in their native country, but also allows them a stronger presence on the international gemmology scene. Those who had been successful in the 2013 examinations were presented with their FEEG Diplomas at the Graduation Ceremony held during the Symposium.

The FEEG Symposium

The two-day symposium covered an eclectic range of topics, including scientific presentations such as glass-filled corundum (Dr Karl Schollenbruch, Germany), and the spectroscopic methods in gemmology (Helen Calvo del Castillo, Belgium); current issues in the trade, with a focus on conflict diamonds and international trade (Pilar Diago Diago, Spain); the art and symbolism of gemstone cutting (Viktor Tuzlukov, Russia); and the economical aspects to be considered in gemstone cutting (Geoffrey Dominy, Canada).

The conference was followed by a series of hands-on workshop sessions held by Mikko Åström (Finland) and Alberto Scarani (Italy) covering the use of the Raman and photoluminescence spectrometers for identification and detection of treatments and synthetic gemstones, and gave delegates an introduction to these instruments.

Delegates were also introduced to Gemewizard's analytical and grading tools and GemePrice, the online pricing station for gemstones, diamonds and fancy coloured diamonds, hosted by Menahem Sevdermish of Israel.

The symposium, as with every international conference, gave students and gemmologists the opportunity to increase their knowledge and network with international speakers, as well as delegates from all around the globe. The 2015 Symposium will be held in Belgium.

For more information on the speakers and events, visit http://ige2014.com, or for more information on FEEG and its exams, please contact information@gem-a.com.

Diamonds: changing times

Harry Levy FGA looks at the increasing number of synthetic diamonds on the market and the problems these are causing for the trade.

Production of synthetic diamonds

I started writing this column on several occasions over the past few weeks. On each occasion, by the time I was about to conclude the article its contents had become out of date. This has been due to rapidly changing events on the ground — the main one being the appearance of synthetic diamonds on the market.

I have been writing and talking about synthetic diamonds for many years now. Either people did not believe what I had written, or thought it would come about without affecting them. When news came that synthetic diamonds were now being sold — in most cases with no disclosure and, in particular, with small stones being produced by the chemical vapour deposition (CVD) process — the trade panicked.

Synthetic diamonds have been produced for some years now using the HPHT process, a method emulating nature's way of producing diamonds deep in the Earth's mantle where material is subjected to high pressure and high temperature. These synthetic diamonds are mainly yellow and brown due to the presence of nitrogen in the diamond structure. It is expensive to remove this nitrogen, so white stones are not produced.

The other method of producing synthetic diamonds is through CVD, which imitates the conditions under which diamonds are formed in space: in a vacuum with no temperature. This method was developed to produce diamonds for use as computer chips for the IT industry. Computers have traditionally been made containing silicon chips, but as greater processing speeds are being demanded, it has been found that the silicon chips melt. Diamond chips can be used as an alternative, but they arrived too early for the computer industry; there is still too much money invested in the silicon chip. So other uses for these synthetic diamonds have been found. The chips are produced as thin flat crystals, which makes them ideal for cutting and polishing into small stones. The original crystals are brownish in colour, but using HPHT they can be made white.

In the past year trade journals have reported stories of several hundred stones being sent to laboratories for grading, but proving to be synthetic. Various conclusions were made, one being that the owners of these stones were trying to sell them with no disclosure and trying to pass them off as natural. I think it was more a case of them testing the ability of the laboratories to detect them as synthetic.

The trade continued to look at this as a passing phenomenon and little action was taken. The trade press then came out with stories that parcels of stones were being sold by prominent, large diamond companies, some of them DTC sightholders, which contained synthetic diamonds with no disclosure.

At this juncture the trade began to take notice and the leadership panicked. Meetings were held with leading diamantaires, diamond organizations and laboratories, but interestingly not with the producers of synthetic diamonds.

Synthetics and the trade

Over the years the trade and trade organizations have regarded producers of synthetic stones as outsiders, who are (at best) tolerated, and with all rules and regulations being formulated by the dealers in natural stones. No consultation or agreement with the producers of synthetic stones has ever been sought — they have been thought of as potentially there to deceive the consumer. The gemstone trade has learnt to live with synthetic stones, mainly because they are easy to detect — the Verneuil flame fusion spinels and corundum stones have curved distinguishing colour zoning, while the flux-grown crystals normally look too good to be natural. These stones have always been disclosed by their makers, however. The only problem with them has been over terminology and nomenclature — the producers of these stones do not wish to describe them simply as synthetic. This is an ongoing battle.

Detection of synthetic diamonds is much more difficult, however. One cannot see growth lines in diamonds as they are white, and so the ease and ability with which one can identify synthetic coloured stones do not relate to synthetic diamonds.

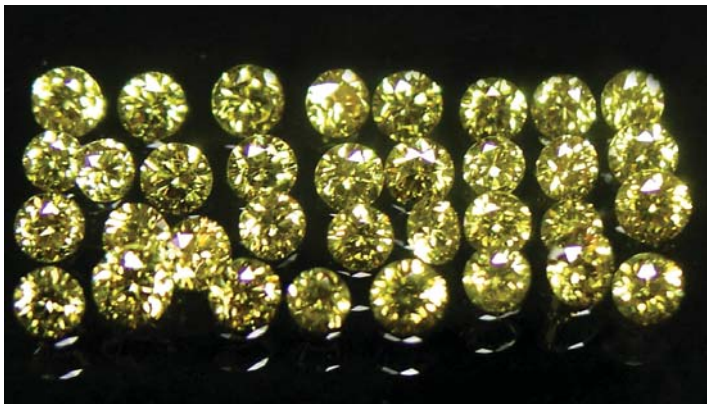
When synthetic diamonds were first mooted as a possibility, the diamond trade tried to ban the production, handling, dealing and selling of the stones. Such action was illegal, falling under trade restriction practices, and banned in most countries. However, recent developments have revived the debate as to how to ensure they are not sold as natural stones.

The methodology now being adopted is to put the onus on traders, demanding they disclose that they are not selling synthetic diamonds through a disclaimer at the bottom of their branded stationery — similar to the KP disclosure regarding conflict diamonds. Unfortunately this will not work as dealers do not know the nature of the stones they are selling. They have to rely on the knowledge of their suppliers, who are probably as ignorant as they are. It has also been suggested that the disclosure should include that the diamonds sold have not been treated. This too is not realizable, as dealers cannot detect a treatment such as HPHT when it is used to improve the colour of a diamond. So these disclosures are meaningless as it is based on wishful thinking rather than reality.

The '4Ds'

What we need is accurate, reliable detection. To this end there are machines, but they are screening instruments, not ones used for detection. A detection machine is one that will pick out a synthetic diamond or an HPHT-treated diamond, whereas a screening machine will pick out a group of diamonds, amongst which will be the troublesome stones. The screening machines function on separating out Type I from Type II stones; 97% of natural diamonds are Type I. To date no synthetic diamonds or HPHT-treated diamonds are Type I, they are all Type II. (For the purposes of this article I have greatly simplified this differentiation.) Because of this, the screening machine will isolate a much smaller group of diamonds to be tested. These stones should then be sent to a laboratory to separate the synthetic ones. The laboratories use spectroscopy to do these final tests; ideally a sophisticated spectroscope such as a Raman Scope needs to be used. However, as these are extremely expensive and specialist training is needed to operate them, such tests are not available through some smaller labs. In the case of synthetic CVD stones however, growth patterns can sometimes be observed under high magnification.

The bourses, under the World Federation of Diamond Bourses (WFDB), have (very generously) been offered free of charge a new screening machine developed by the GIA. The advantage of this machine is that it is much faster to use for small diamonds. This makes detection far simpler for bourse members. There are cheaper screening machines on the market, in the region of about $3,000, but these are effective only for stones over 0.15–0.20 ct. Tests are needed for stones as small as one pointers.



Synthetic diamonds found after testing a parcel of melee diamonds. Photo: Thomas Hainschwang, GGTL Laboratories.

We are now operating under the '4Ds' principle; detection, differentiation, disclosure and documentation — as formulated by Martin Rapaport. But what have still not been advocated are discussions with the producers of these synthetic stones.

The way forward

For my sins, in late January 2014 I was nominated to be the new chairman of the International Diamond Council (IDC). This is the technical arm of the WFDB and IDMA, responsible for rules and nomenclature. At first I refused the nomination — I am getting too old and have enough on my plate — but I then realized that as a past-president of the CIBJO Diamond Commission (I am still vice-president with close links to the current president), chairing an EU Commission on nomenclature for diamonds to differentiate and explain the different types for the consumer, I would be in a very strong position to bring about change.

For years I have believed that there should be one diamond manual for the trade and the consumer. Whenever I have asked for this I have been told by the IDC that they would be happy for CIBJO to adopt their rule book, and CIBJO stated that they would be happy for the IDC to adopt the CIBJO Diamond Book as the standard text. This them-and-us attitude has prevented the trade from speaking with one voice. When I was asked to chair the EU Commission I carefully chose the team to consist of IDC and CIBJO members. This manual will eventually become a European Commission for Standardization (CEN) document and eventually an ISO Standard. So it needs a small push to bring CIBJO and the IDC together.

The other important issue is to offer the ability to differentiate between natural and synthetic diamonds. To this end I want to bring in the producers of synthetic diamonds as a group within the industry. In any other trade the innovation of a synthetic product would have been greeted with admiration and respect. This has not happened with ours. With their help I hope differentiation and detection will become easier. CIBJO has agreed to host a symposium on this issue at its next Congress in Moscow in May 2014, when all parties will be asked to contribute.

I would like to look at many issues such as treatments, disclosure, nomenclature and terminology again, and try to bring the industry into the present day. In this age of mass, effortless communication, no group should be able to hide itself as a small sector acting outside the main stream. To achieve this I will need to overcome long-held prejudices and rivalries and bring some harmony and co-operation to our trade.

Museum News

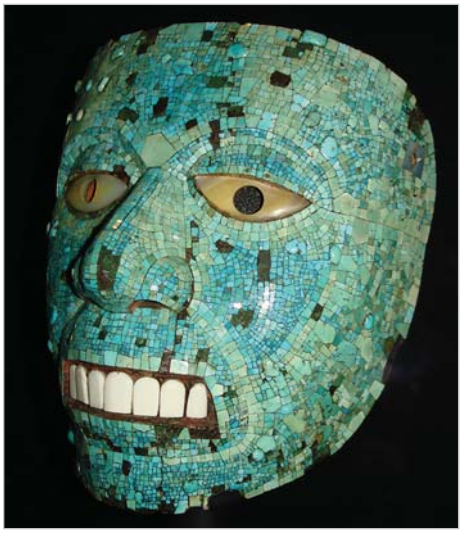
The exquisite turquoise mosaicwork of Mexico

Helen Serras-Herman FGA discusses the history and artistry of exquisite turquoise mosaic pieces on display at the British Museum, London, and Museo Nacional de Antropología, Mexico City.

Origins

For any art and archaeology lover the British Museum is the place to go. It is enormous, containing several miles of galleries filled with more than six million artifacts from all around the world. A wealth of antiquities from far away and long-ago civilizations overflow the halls and the glass cases, in the form of sculptures, vases, paintings, seals, jewellery and many other treasures.

While the museum is renowned for its Greek, Roman, Assyrian and Egyptian galleries, tucked away in another section is the hall containing antiquities from Mexico. There are sculptures and reliefs from the classic Maya world dating from AD 250–900.



1: The impressive mask of Xiuhtecuhtli, the Aztec god of fire, showing turquoise cabochons placed on top of the mosaic, creating a 'wart' effect.

2: British postage stamp celebrating the British Museum's 250th anniversary featuring Xiuhtecuhtli — a sign of the important standing of the mosaics within the museum's collections.

The pieces that really caught my attention however were the incredible turquoise mosaics from the late post-classic Aztec period, crafted by highly skilled Mixtec artists.

I am quite familiar with ancient Greek mosaics and Native American mosaic inlays, especially intricate artwork by Zuni Pueblo and Navajo artists, but nothing prepared me for the exquisite turquoise mosaics at the British Museum. These artifacts are large, three-dimensional with high reliefs, and their bold style and vibrant colours are breathtaking. There are nine pieces in the British Museum known as the 'Turquoise mosaics', all acquired in the nineteenth century. Four of them are masks, while the rest comprise a knife, shield, helmet, pectoral and cup. They were brought to Europe after the Spanish conquest of the Aztecs in 1521 and, although archaeologists are still unsure as to how many of them reached Europe, amazingly 25 pieces still survive and are known to exist around Europe. According to Michael D. Coe in his book *Mexico*[1], some of these mosaics may have been broken up and reused in the famous *pietre dure* workshops in Florence, Italy (see *Gems&Jewellery*, Autumn 2010, **19**(4), pages 16–17).

Incredible mosaic masks made of jade were the hallmark of the earlier Maya culture in Mesoamerica, but in the late post-classical period turquoise became the material of choice. Since the early classical period (AD 250–500) turquoise has been traded from what is now northern Mexico and the southwest United States, and by the end of the classical period (around AD 900) its use was widespread.

The turquoise mosaics on display in the British Museum were created around 1500 by Mixtec artists in the Oaxaca region of Mexico under the influence of the Aztec culture. The Aztecs, or 'Mexica people' as they referred to themselves, settled in the Valley of Mexico and founded their capital, Tenochtitlan (now Mexico City), in 1345. It was one of the biggest cities in the world when Conquistador Hernán Cortés arrived in 1519, and it was destroyed after the Spanish defeated the Mexica ruler Moctezuma II in 1520. It has been very difficult for archaeologists to determine the mosaics' exact place of origin, time of creation or their precise use, although mosaics from recent excavations at the Templo Mayor (Great Temple) of Tenochtitlan, as well as in the ancient Toltec city of Tula and in the Maya city of Chitzén Itzá in the Yucatan, have provided information that sheds some light on these unique objects.

3: Mask of the rain god Tlaloc.

Gem materials and lapidary work

Although they are known as turquoise mosaics, several other gem materials have been used in their making, including malachite, pyrite, lignite and shell. Most of the malachite used is dark green, while some is banded. Pyrite has been used for the eyes, which shows a dark metallic lustre when tarnished. Three main types of shell have been used: the pink or white conch shell (*Strombus gigas*), which has been used mostly for the teeth; the bright red, orange or purplish-red thorny oyster shell (*Spondylus*); and the white mother-of-pearl oyster (*Pinctada mazatlanica*). These shells are found in the Gulf of Mexico and the Caribbean, as well as along the Pacific coast all the way up to the Gulf of California. All of these materials are still used in modern contemporary mosaics.

The backing material is mainly hard wood from the Mexican cedar *Cedrela odorata* (aromatic cedar), and the stones are held in place with pine tree resin or copal tree resin (*Bursera*), while beeswax has been used in places as a filler. The masks are hollowed out and were possibly worn over the face — drilled holes at the temples suggest the masks were possibly used with a strap and worn by priests during ceremonies.

The turquoise used in these mosaics is believed to have come from as far as the Los Cerrillos mining district of New Mexico, according to a 1992 neutron activation analysis[2]. The research proved that the colours and chemical composition are a close match to turquoise from this area.

Most of the turquoise and gemstone pieces are not equal-size square tesserae, rather they are pieces with irregular outlines, cut precisely with bevelled edges to closely fit the next tile, very much like intarsia work. This must have been extremely time-consuming considering the size and number of the pieces and impossible to mass-produce. Unfortunately, there is very little information about the lapidary shops, their tools and techniques used.

Spirits and serpents

One of the most impressive and unique masks is the one believed to be of Xiuhtecuhtli, the Aztec god of fire (**1**). Measuring 16.5 cm in height and 15.2 cm in width, turquoise cabochons have been placed on top of the mosaic tiles, creating a 'warty' effect. One theory says that this detailing represents a leper god, who fell in the fire and rose as the sun. Whether the 'wart' effect was symbolic, for grotesque effect or as a talisman, we do not know. The eyebrows on this mask have also been shaped with darker turquoise, complementing the elliptical eyes made of mother-of-pearl. In 2003 this fascinating mask was featured on a British postage stamp celebrating the British Museum's 250th anniversary (**2**), a sign of the important standing of the mosaics within the museum's collections.

Probably the most mesmerizing mask is the one titled 'Two entwined serpents representing the rain god Tlaloc' (**3**). Measuring 17.3 cm in height and 16.7cm in width, the serpent is entwined, curving over the nose, going behind the cavities, emerging above the hollow eyes and creating the eyebrows. It adds movement to the design, while the hollow eyes create a pulsating sense of space. It was believed

4: Double serpent turquoise mosaic pectoral cleverly imitating snakeskin.

Mexican Mosaicwork (cont.)

5: One example of several mosaic discs featured at the Museo Nacional de Antropología in Mexico City.

to represent the 'feathered serpent' Quetzalcoatl, but the 'goggles' feature (the way the snake circles the eye sockets) is associated with the god Tlaloc. Both blue and green turquoise are used.

The fabulous 'double serpent' turquoise mosaic pectoral (**4**) is an iconic example of the snake imagery used throughout Mesoamerica. Measuring 20.5 cm in height and 43.3 cm in width, it is associated with the Mexica deities Quetzalcoatl or Xiuhcoatl, the mythological serpent — the spirit form of the god Xiuhtecuhtli. Snakes were venerated in all ancient cultures, from Mesopotamian to Greek to Mesoamerican, possibly because they represent the constant renewal of life and their symbolic connection between the Earth and the underworld. In this piece turquoise is placed ingeneously, creating a pattern that imitates snakeskin, and masterfully contributing to a slithering and flowing 'snake-like' movement of the entire design. The teeth and fangs are made of white conch shell and the gums are reddish-orange spiny oyster shell. The reverse side of the body is not decorated, but the heads of the serpents are worked in mosaic style on both sides.

6: Jaguar mosaic mask.

7: A contemporary mosaic mask made by Mexican artists. Compared to the ancient masks they seem simplified, but they are still beautiful and unique in their own way.

The Museo Nacional de Antropología, Mexico City

The Museo Nacional de Antropología (National Museum of Anthropology) is a state-of-the art contemporary museum, continuing the tradition of the first museum built in Mexico in 1825. There are several turquoise mosaic pieces on display, some of which are masks, while others are discs (**5**).

They are displayed together with gold jewellery and jade bead necklaces and carvings, although regrettably with very little information. The 'Jaguar' mosaic mask (**6**) featured here represents another favoured image — one revered by all Mesoamerican cultures — that of the jaguar. Darker coloured turquoise is used for the cheeks, adding a further three-dimensional effect.

It is also of worth to note that at the archaeological site of the pyramids at Teotihuacan, 31 miles northeast of Mexico City, local artisans were selling very attractive mosaic turquoise and gemstone masks (**7**). Compared to the ancient masks these descendants seem simplified, but they are still beautiful and unique in their own way.

All photos in this article by Helen Serras-Herman.

Museum info

The British Museum is located in Bloomsbury, London, and is open daily from 10:00 – 17:30, Fridays until 20:30. For more information visit the British Museum's website at www.britishmuseum.org

The Museo Nacional de Antropología is located within Chapultepec Park in Mexico City, Mexico. For visiting hours and admission info please visit their website at www.mna.inah.gob.mx.

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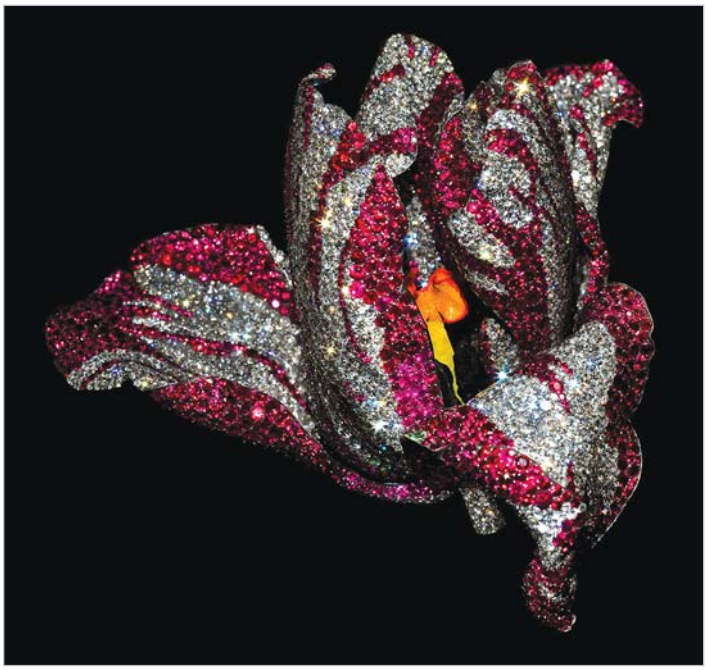
About the author

Helen Serras-Herman is an acclaimed gem sculptor with over 30 years of experience in unique gem sculpture and jewellery art. A 2003 National Lapidary Hall of Fame inductee, Helen's award-winning artwork has been exhibited worldwide and published in over 130 trade magazine articles and books. Visit her website at www.gemartcenter.com.

Jewels by JAR

Olga Gonzalez FGA reports on the recent blockbuster retrospective exhibition of the work of master jeweller JAR, which was held in New York.

It's probably true to say that every generation has the privilege of having at least one jewellery-making genius in its midst. It might have been René Lalique or perhaps Fortunato Pio Castellani or Louis Comfort Tiffany — all rising stars with exceptional vision, talent, an eye for detail and a signature style. Without question, one of the designers who will be looked back upon from our day will be Joel A. Rosenthal. And to highlight his significant contribution to the jewellery world, the Metropolitan Museum of Art in New York has delighted locals and international crowds with its exhibition: 'Jewels by JAR'. Over 400 pieces from the revered designer were displayed, showcasing exceptional craftsmanship and colour



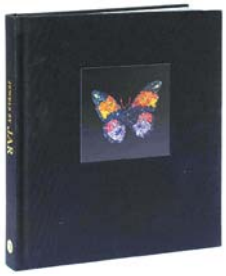
1: Tulip Brooch, 2008. Rubies, diamonds, pink sapphires, garnets, silver, gold and enamel. Photograph by Jozsef Tari. Courtesy of JAR, Paris.

2: Zebra Brooch, 1987. Agate, diamonds, a sapphire, silver and gold. Photograph by Katharina Faerber. Courtesy of JAR, Paris.

combinations. The exhibition is the first retrospective of his work in America and the first at the Metropolitan Museum to be devoted to a contemporary artist of gems.

Born in New York and educated at Harvard University, Rosenthal moved to Paris shortly after graduating in 1966, and has worked there, together with his partner Pierre Jeannet, for over 35 years under the name JAR. It didn't begin with jewellery however. In 1973 he and Jeannet — having spent much time at antique shops, museums, galleries and auction houses learning about jewellery and gemstones — opened a needlepoint shop. For Rosenthal needlepoint meant 'painting', mainly flowers, on a white canvas and playing with the palette of the colours of the wools. But the passion for jewellery was there and he wanted to "play with stones", as he later explained. He was encouraged to re-design clients' jewels and turned his attention more fully to jewellery. In 1976, Rosenthal moved back to New York to work at Bulgari, but returned to Paris and opened his own jewellery business.

His one-of-a-kind jewellery and gemstone-encrusted artworks have developed an international cult following. The rarity of his pieces coming to market, combined with high demand from collectors, result in soaring auction prices. His trademark naturalistic look often plays with the forms of flowers, butterflies, fruits and vegetables, and he graduates gemstone colours to produce



Jewels by JAR by Adrian Sassoon, Metropolitan Museum, New York. 144 pages, hardcover, with slipcase. US$40.

Published to coincide with the Metropolitan Museum's Jewels by JAR exhibition, this new volume provides an elegantly designed retrospective of the best of Joel A. Rosenthal. Featuring nearly 40 pieces from JAR's successful career, it is both a celebration and keepsake of a mesmerizing designer.

magnificent plays of colour, giving the illusion of shadow. Three-dimensional forms are meant to be taken in from all sides, and every once in a while he enjoys adding humour by making a mundane object, like a scoop of vanilla ice cream or a bagel, look good enough to eat.

Capturing the element of chance in nature, he enjoys adding details like falling petals and flower buds to jewellery. For example, JAR's 2008 Tulip Brooch (**1**), shows some of the petals wilting over, as though the flower is slightly past its prime; elegantly exposing stamens and stigmas with stunning colours, graduating rubies with pink sapphires and garnets. One of the exhibition cases surrounded by amazed visitors displayed his 1987 Zebra Brooch (**2**), composed of agate, diamonds, sapphire, silver and gold. Large and exceptionally detailed, it captures the animal more realistically than most paintings ever could. A third example of his love for realism can be found in

4: Poppy Brooch, 1982. Diamond, tourmalines and gold. Photograph by Katharina Faerber. Courtesy of JAR, Paris

3: Bracelet, 2010. Diamonds, silver and platinum. Photograph by Jozsef Tari. Courtesy of JAR, Paris.

his 2010 Bracelet (**3**), which portrays realistic branches, fashioned from oxidized sterling silver and platinum. In this simple yet stunning piece diamonds are faceted into three-dimensional buds, which sparkle on the wrist. Yet another example is the 1982 Tourmaline and Diamond Flower Brooch (**4**), designed as a poppy flowerhead and bud in pink and green tourmaline, linked by a green tourmaline scrolling stem around a pear-shaped diamond, weight approximately 37.23 ct.

Making exceptional use of the space, 'Jewels by JAR' was hosted within a narrow oval room, leading the visitor around in a spiral order, adding a three-dimensional perspective to viewing. Freestanding cases combined with long cases, but the experience of walking through the room was akin to the experience of taking in one of his pieces — with a focus on seeing the same object from many angles.

As one of the most phenomenal jewellery exhibitions of our time, 'Jewels by JAR', which closed earlier this month, was exceptional. Quite simply, there isn't anything like it!

Creating corundum

The production of synthetic star rubies and sapphires

Martin Steinbach discusses the history of the production of synthetic rubies and sapphires, and visits Djeva, one of the largest producers of synthetic stones.

1a: Synthetic star ruby with artificial cracks and a star resembling Neptune's trident.

In many cases, synthetic gemstones are more beautiful, more perfect and can be bought at a much more favourable price than their natural counterparts. For quite a while I had the intention to pay a visit to the largest producer of synthetic stones, Djeva, based in Monthey, Switzerland. Its produce includes rubies, sapphires, spinels, cubic zirconia (Djevalite), synthetic rutile (TiO_2) and laser crystals. Above all, I wanted to have a look at the famous crystal-growing process of star rubies and star sapphires, as well as get to know the practical Verneuil process. Jules Verne wrote: "Look with all your eyes, look", and this is what I wanted to do.

1b: Synthetic translucent star sapphires with artificially induced fingerprints.

The modest beginnings of synthetic gemstones

For many, ruby is the most beautiful of the top three gemstones, and prior to the nineteenth century it was probably a dream of most chemists (and alchemists) to produce it artificially. In 1837 these attempts became successful when the French chemist Marc Gaudin created the first microscopic crystals from alumina by melting two smaller rubies together. By 1877, the chemist Edmond Frémy had devised an effective method for the commercial manufacture of synthetic rubies with the assistance of his employee Auguste Verneuil. They used molten baths of alumina and yielded the first gem-quality synthetic stones, mainly small rubies, used as jewel bearings for watches. These rubies were called *rubis scientifiques*.

Auguste Verneuil (1856–1913) began work in 1886 on the production of synthetic rubies and within six years had achieved exceptional results. From 1904 he began to publish in detail the results of his work on the flame fusion process, or the Verneuil method, the first commercially successful method of producing synthetic rubies, and later synthetic sapphires, which earned him worldwide fame.

The method is primarily used to produce rubies (in various shades of red) and sapphires (in all colours), including star stones (**1a, b**), as well as diamond simulants, such as synthetic rutile and strontium titanate (Fabulite). Synthetic spinels of all colours have also been produced using this method since the mid-1920s.

2: Raw aluminium oxide (Al_2O_3).

3a: Hydrogen (H_2) and (b – inset) oxygen (O_2) are added.

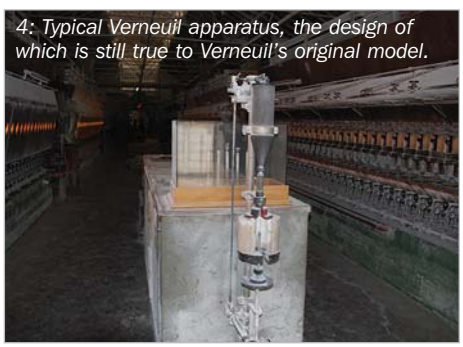
Djeva and the flame fusion process

The creation of the synthetic ruby and sapphire boules requires the following constituents:

- The starting material: alumina particles (aluminium oxide, Al_2O_3) with a very high purity of 99.9%, which melt at approximately 2,100°C (**2**).
- Small amounts of metal oxides to influence the colour of the boules. This is dependent on the colour of corundum required; for red rubies chromium oxide is added, for blue sapphires titanium oxide and ferric oxide are used, and for pink sapphires chromium oxide and manganese are used. A yellow colour is caused by nickel and magnesium oxides, green by cobalt and vanadium oxides, and the alexandrite effect is caused by vanadium oxide. A colourless sapphire (a possible diamond imitation) is pure aluminium oxide. In order to produce asterism, approximately 0.1 – 0.3% of TiO_2 plus the colour-causing substance(s) are added to the starting material.
- Water, which, at Djeva, is now split by electrolysis into hydrogen (H_2) and oxygen (O_2), and stored in large tanks (**3a, b**).

In the upper part of the Verneuil furnace (**4**) a cylindrical receptacle containing the starting material is suspended from a spring mechanism. At the bottom of the receptacle is a sieve. At regular intervals a small electric hammer knocks onto the receptacle, causing a small amount of the powder to fall out, and oxygen is piped in through a tube. In the melting furnace the oxygen and the aluminium oxide combine with hydrogen, which is piped into the middle part of the Verneuil furnace by a second gas tube. The gas reacts with the oxygen and forms oxyhydrogen.

In the heat of this oxyhydrogen flame, the powder that trickles down with every



4: Typical Verneuil apparatus, the design of which is still true to Verneuil's original model.

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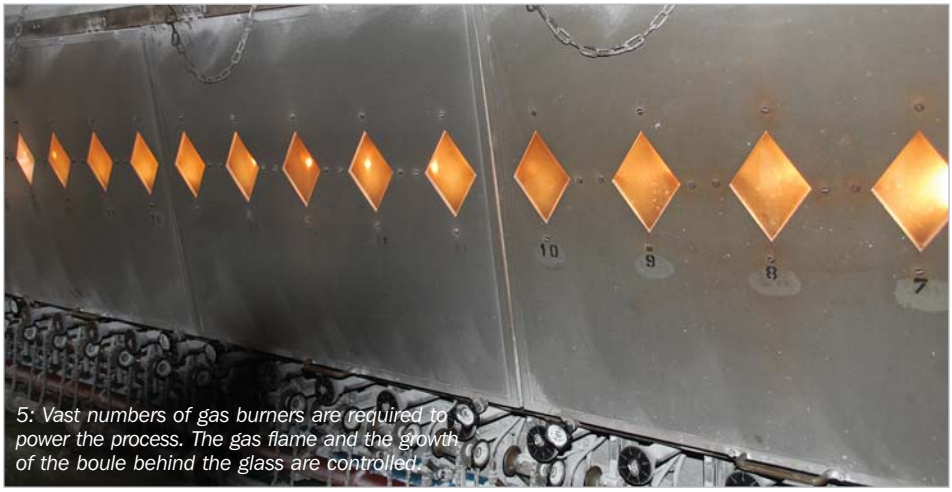


5: Vast numbers of gas burners are required to power the process. The gas flame and the growth of the boule behind the glass are controlled.

beat of the hammer (today fully automatic) melts to form a cloud of minute droplets. The fine 'rain' of these molten droplets drizzles down onto a piece of synthetic corundum of a former boule that now serves as a seed crystal and determines a given or specific crystallographic orientation. On this basis, a single pear-shaped crystal (boule) grows drop by drop, layer by layer. Like a stalagmite, the crystal slowly grows upwards towards the oxyhydrogen flame.

While this crystal grows very quickly with the Verneuil method (approx. 0.5–2 cm per hour) in contrast to other methods for the production of synthetic gemstones, the boule is slowly moved downwards with a lowering device in order to keep the growing crystal in the same temperature range, which varies from about 1,900°C to 2,400°C. The growing corundum boule and oxyhydrogen flame are surrounded by a small fireclay furnace with a cylindrical piercing. The flame, the fusion process and the growth of the boules are observed and controlled simultaneously through a window in the furnace (**5**).

The size of these artificially-grown crystals (**6**) ranges from lengths of approximately 2.0–5.0 cm, normally with diameters of 1.2–1.5 cm, and according to Nassau (1980) even up to 9 cm. They attain weights of approximately 150–400 ct. Boules of 750 ct have been produced for which only two to four hours growth time was needed.

After the boule has cooled it is taken out of the furnace. With a small stroke of a hammer, or by breaking off the tip with a pair of pliers, it is freed from internal tensions. As a result, the synthetic crystal splits along its longitudinal axis. The optical axis runs along this parting plane, which is very important for the orientation of the cut.

Until World War II, synthetic Verneuil corundum was produced only in France, Germany and Switzerland. In 1947 the American Linde Air Products Company started to produce large quantities of synthetic star rubies (Schlossmacher, 1969) and blue synthetic star sapphires, as well as various other colours (**7**). These synthetic stones were mostly opaque with 'perfect' colours and stars. The name 'Linde Stars' became a brand; typical of the stones was the 'L' engraved on the bottom of the cabochons (**8**).

6: Synthetic facetable ruby material as a typical boule.

In 1974, Linde's production of synthetic stones was suddenly stopped, citing 'overseas competitors' as the problem. This is possibly to do with competition from the producer of synthetic star corundums Wiede's Carbidwerk, based in Freyung, Germany. Production began at Wiede's Carbidwerk in the early 1950s independently of Linde, and the company produced large amounts of synthetics with the Verneuil method that differed only in minor details from its American counterparts.

7: An advertisement for a synthetic star sapphire ring, made by Linde in 1949, adopting Francis Bacon's philosophy: "They perfect nature and are perfected by experience."

While the technical apparatus for the Verneuil flame fusion process has constantly been developed and refined over nearly a century, the basic principle of the method still remains the same. Today, Djeva is probably the most important producer of synthetic gemstones worldwide using this method. German companies in Idar-Oberstein who use synthetic stones obtain their raw material from Djeva.

Djeva offers synthetic corundum in 37 colours including 11 different shades of red and pink and six shades of blue (Nassau, 1980) (**9**). It is interesting to note that Djeva also produces the refractometer prisms for gemmologists.

Gems and Minerals

8: The 'L' on the back of Linde Stars.

Stars made from discs

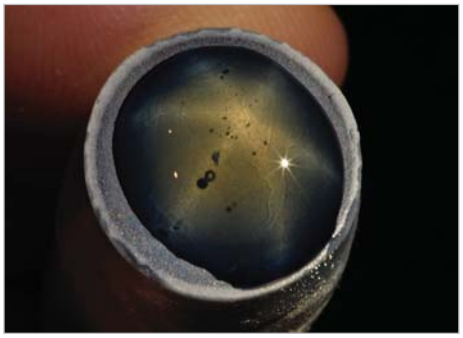
As mentioned previously, approximately 0.1–0.3% of titanium oxide is added to the starting material to produce stones with asterism. Part of the titanium oxide vaporizes during the crystallization of the corundum boule, while the remaining amount is integrated into the corundum lattice as Ti_2O_3 and forms a solid solution. After growth the raw, coloured boules are transparent.

When the boules leave the furnace they are not removed by parting like the 'normal' corundum boules; instead this is done by annealing or tempering. The rutile needles make the raw boules opaque and the rutile

9: Some of the 37 different colours of Djeva's synthetic corundum production.

network formed is the cause of the optical effect. These special 'star boules' attain diameters of up to approximately 22 mm. The opaque boules are cut into discs, which facilitates the (normally manual) polishing process. The thickness of these discs varies. Depending on the demand, these are supplied as entire boules or discs.

In **10** a star is made visible by adding a drop of acacia honey on the flat disc — a method similar to that used by experienced cutters with raw natural star stones. The 'inclusions' are not gas bubbles but honey bubbles — an absolutely new and unknown kind of inclusion in gemstones! It is possible



10: An opaque, blue star sapphire boule with a 'star' made of honey.

to cut flat stones (**11**) with very intense synthetic stars where the rays extend to the edge of the cabochon.

In Idar-Oberstein and the surrounding villages the flat corundum discs are still cut today into normal calibrated cabochons as well as interesting free-forms and fancy shapes (**12** and **13a,b**).

Acknowledgements

My thanks go to Kurt Blaser for the fascinating *tour de fabrique* in Monthey and especially to Katia Djevahirdjian.

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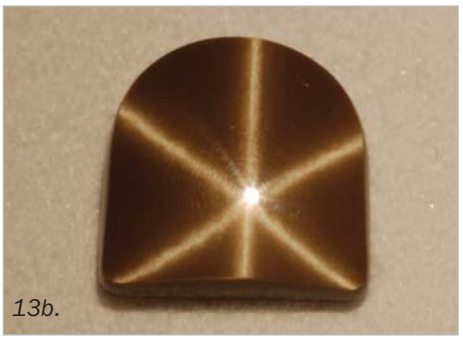
About the author

Martin Steinbach has been a Fellow of the German Gemmological Association (FGG) and an Asian Institute of Gemological Sciences Accredited Gemologist (AG) since 1982 and 1983 respectively. He is a gem merchant specializing in Burmese jadeite and asteriated gems. Email: gstargems@aol.com.



11: These discs will show a beautiful star when cut.

12: Violet synthetic star sapphire with a very sharp star, a trait characteristic of synthetic gems.

13: (a) Fancy-cut blue and (b) honey-coloured synthetic star sapphires, produced by Djeva and cut in Idar-Oberstein.

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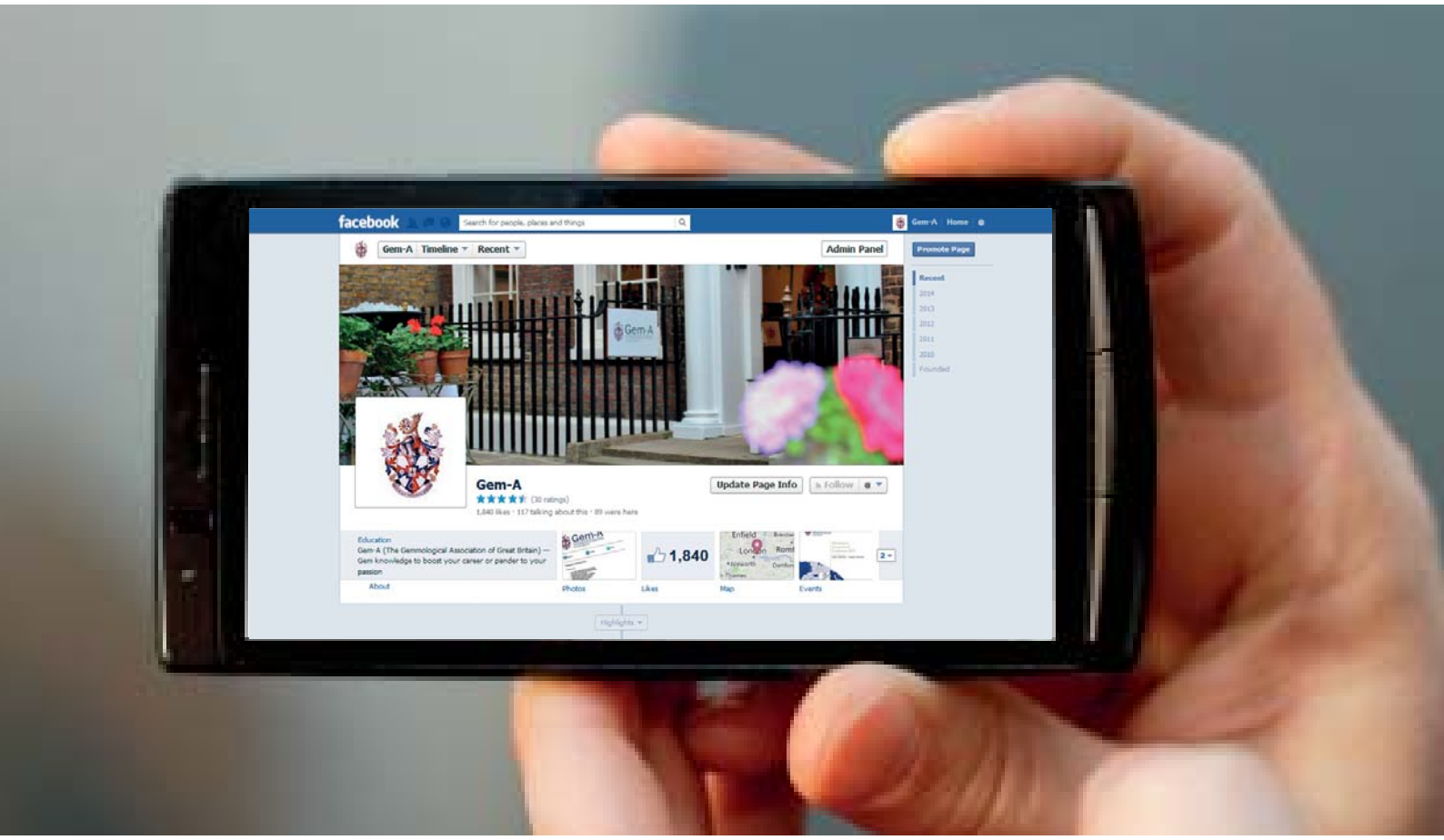

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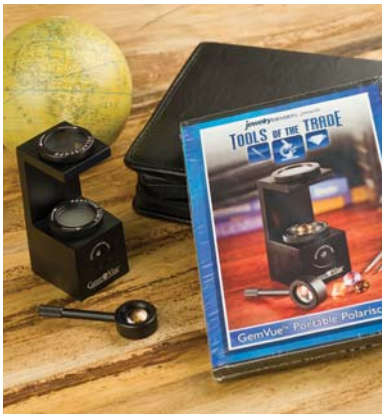

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