Gems & Jewellery

July/Aug 2016 / Volume 25 / No. 4

Paua shell

Oceanview Mine

Interview with Dr Jeffrey Post

Gem-A
THE GEMMOLOGICAL ASSOCIATION OF GREAT BRITAIN

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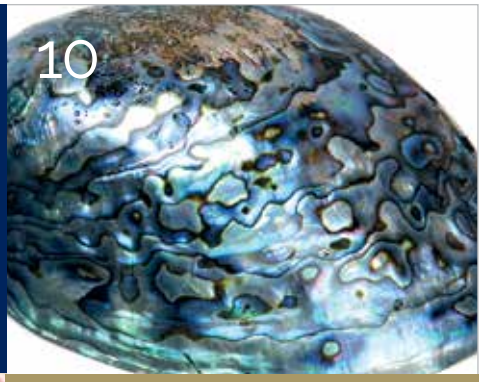
Paua shell

Maggie Campbell Pedersen FGA looks at exquisite paua shell, hailing from New Zealand.



Oceanview Mine

Claire Mitchell FGA DGA takes a hands-on look at the Oceanview Mine, in the Pala mining district in California, USA.

Thoroughly ruby

Grenville Millington FGA takes an in-depth look at an Art Deco ruby ring.

National Treasure

Claire Mitchell FGA DGA talks to Dr Jeffrey Post, chairman of the Department of Mineral Sciences and curator of the National Gem and Mineral Collection at the Smithsonian Institution.

Cover Picture

'Blue pearl', gold and diamond necklace by Catherine Best Ltd., Guernsey. Blister pearl by Eyris Blue Pearls, New Zealand. Photograph © Catherine Best.

Published by

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Registered charity no. 1109555

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Gem-A
INSTRUMENTS

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Getting an initial view of the Gem-A landscape

I have been with Gem-A for just over a month now, and in that short time I have enjoyed getting to grips with the Gem-A landscape, including familiarizing myself with policies and procedures and meeting with staff and members, whilst developing and working towards a strategic plan for the Association for the coming months. I have some exciting ideas for the progression and development of the Association in the works, and look forward to sharing these with you all at a later date.

I attended the JCK Las Vegas show at the beginning of June and the Saint-Marie-aux-Mines mineral show in mid-June. As ever, the Las Vegas show was eye opening — a heady mix of exceptional gems and jewellery, and a chance to meet the many faces in the industry. Whilst there I attended the AGA conference which had an interesting and provocative mix of speakers. The conference was excellent, as usual, and was a great event for discussing the wide range of topics presented. The Saint-Marie show saw some exceptional mineral specimens and continues to be a real focus point for mineralogical museums and organizations in Europe to talk 'shop', whilst providing a forum for various meetings of societies to get together through lectures and workshops. The show theme of 'Minerals and Wine' was well contributed to and, informative, and very well presented — congratulations to the show organizers and the town itself in managing the deluge of visitors that attended.

As I write this the citizens of the UK are still dealing with its recent vote to 'Brexit' ('British exit') from the European Union. In a trade such as ours, where travel is essential for studying, for business, for the sharing of knowledge and for trade, the prospects that lie ahead can seem daunting to some. Whilst we are uncertain of the long-term implications this will have on the economy and, indeed, the trade, I have no doubt that this outstanding field of gemmological research and collaboration will continue to flourish as it has in previous decades. Many of our close alliances and friendships include many European organizations, and we will continue to work closely with them in the future.

In other news the EGM was held at Ely Place on Thursday 30 June. Most of those who attended voted in favour of the motions set forward by the Board — see page 8 for more information. It was great to see so many turn up for this event, showing the dedication and commitment of our membership.

Looking forward, all at Ely Place are preparing for our annual Conference, which will be held on 5–6 November at the Royal Institute of British Architects (RIBA) in Marylebone. See pages 17–20 for more information. The Gem-A Conference attracts a wide range of international delegates and speakers and is a fantastic opportunity for you to expand your knowledge and network with your peers. It is also a fantastic opportunity for me to meet you all and I hope to see many of you there. If you do see me please come and introduce yourself, I'd love to meet you.

In addition to the usual Gem News, Gem-A Events and Gem-A News reports, this issue organics expert Maggie Campbell Pedersen takes a look at Paua shell; we talk museum donations and advanced instrumentation with the wonderful Dr Jeffrey Post from the Smithsonian; Kerry Gregory takes a look at the most important aspect of gemmology — gemmologists; and Grenville Millington takes an in-depth look at a ruby ring.

To return to my opening remarks, I should mention that any development strategy for Gem-A must include constructive feedback from our membership. I am more than happy to listen and take on board any issues that are voiced — I want to ensure that we have good communications and continue to enhance Gem-A together. Exciting times are ahead. ■

Best wishes,
Alan Hart
Chief Executive Officer

I have some exciting ideas for the progression and development of the Association in the works, and look forward to sharing these with you all at a later date.

Gem News

BRUCE CLEAVER IS NEW CEO OF DE BEERS

Following the departure of Philippe Mellier after five years with De Beers Group, Bruce Cleaver has been appointed CEO. The appointment took effect on 1 July 2016.

Bruce Cleaver served as De Beers' executive director responsible for strategy and commercial relationships until 2015, also serving as co-acting CEO for a year prior to Philippe Mellier's appointment in 2011. He was appointed group director of Strategy and Business Development for Anglo American in 2015.

Mark Cutifani, CEO of Anglo American and chairman of De Beers, said: "Together with our partners in De Beers, we congratulate Bruce Cleaver on his appointment as CEO of De Beers Group following Philippe Mellier's decision to step down. Bruce's leadership of De Beers' strategy and its commercial and government relationships working alongside Philippe and over much of the last decade, combined with his time working with us to shape the new Anglo American strategy, provide strong continuity at an important stage in the diamond market's recovery. The structural dynamics of the diamond market continue to improve, led by the strength of consumer demand for diamond jewellery. With the proven management team in place, De Beers is well positioned to maximize value for all its stakeholders across the diamond value chain."

Bruce Cleaver commented: "I am honoured to be asked to lead one of the world's great companies. Diamonds are as relevant to today's consumers, all over the world, as they were to their parents and their parents before them. Diamonds have also made positive contributions to a host of countries that have used their revenues wisely, to communities and to all who have been touched by their mystique and the practical benefits of responsible mining and ethical sourcing. As the world continues to evolve ever more rapidly, it is our task to ensure that we remain as relevant as we are today and to grow our position in the luxury world."

DE BEERS OPENS ROUGH SELLING PLATFORM TO TRADE

Businesses will be allowed to sell rough diamonds from De Beers' online auction platform, the company announced last month. In the pilot scheme the service will be available for single stones of more than five carats or fancy colour diamonds. The limited service will be available only to businesses that adhere to standards set by De Beers covering integrity of diamond sellers, product disclosure and provenance.

The service will represent a very small proportion of the gems sold on the auction sales platform, which in turn offers about 10 percent by value of the rough sold by De Beers.

The project "gives us the opportunity to test the strength of demand for such a service," said Neil Ventura, executive vice-president of auction sales at De Beers.

MUSEUM OF LONDON TO MOVE TO SMITHFIELD MARKET

Due to be completed by 2021, the relocation of the Museum of London to Smithfield Market has received the go-ahead after previous redevelopment plans for the market were abandoned.

The historic meat market was sold by property developer TH Real Estate to the City of London Corporation for £35m in May, after the Government threw out plans for the regeneration of the area. The Museum of London announced plans to relocate early last year. The organization said its current London Wall home has a number of problems, including a failing building, entrances that are difficult to access and a site that is hard to find.

The Museum's director Sharon Ament said: "Working together with the City of London Corporation and Greater London Authority we will help make the area a world-class cultural hub." The Museum has revealed early-stage design concepts for the Victorian market (which has lain empty for many years), which will be judged by a panel of figures from the world of the arts, media, property, architecture and business. The winning concept will be announced later this summer.

The Museum, which last year hosted the celebrated Cheapside Hoard exhibition, has permanent galleries exploring the history of London from 450,000 BC through to the twenty-first century. Its archeological archives house a collection of more than one million objects.

'EXCEPTIONAL' DIAMOND RECOVERED BY PETRA

A white, type-II diamond of 'exceptional' colour and clarity was discovered at Petra Diamond's Cullinan mine in South Africa in June. The 121.26 ct rough diamond is the latest in a string of large gems recovered from the mine, which holds the world record for producing the biggest diamond in history, the 3,106.75 ct Cullinan diamond, in 1905.

The discovery of the diamond comes after Petra recovered a 122.52 ct rough at Cullinan in 2014, selling it for $23.5 million. The largest of four polished diamonds originating from the rough fetched $25.4 million, or $1 million per carat, at a Christie's auction in New York earlier this month. ■

Events

GEM-A EVENTS

Gem-A AGM 2016
9 September
Gem-A Headquarters, 21 Ely Place, London
Gem-A's Annual General Meeting will take place at Gem-A Headquarters. Information will be available on the Gem-A website nearer the time.

Gem-A Conference 2016
5–6 November
RIBA, Marylebone, London
Gem-A return to the prestigious RIBA building for their annual gemmological conference. Featuring a host of internationally-renowned speakers, this event is not to be missed. See pages 17–20 for detailed information on speakers, events and how to book.

Gem Central
Please note: there will be no Gem Central in July 2016. Gem Central will return in August (details follow).

Fluorites with Claire Mitchell
30 August
Please check the Gem-A website for the latest information. If you are interested in attending this event please register your place with events@gem-a.com.
Price: Free for Gem-A members and students £10 for non-members

OTHER EVENTS

Midlands Branch — The Staffordshire Hoard
30 September
Fellows Auctioneers, Birmingham
Pieta Greaves will visit the Midlands Branch to discuss the Staffordshire Hoard. For more information please contact the Gem-A Midlands Branch Chairman, Georgina Kettle, at georgekettle@hotmail.com. *Students: £4 Gem-A Members: £6 Non-Members: £8*

Midlands Branch — Tourmalines
28 October
Fellows Auctioneers, Birmingham
Michael Hügi will discuss the nature and formation of pegmatites, and will include details of his recent visits to the tourmaline mines of Mount Mica (USA) and the Neuschwaben mine (Namibia). *Students: £4 Gem-A Members: £6, Non-Members: £8*

UPCOMING SHOWS

International Jewellery London (IJL) 2016
4–6 September
Stand J10
Olympia, London
Gem-A returns to the UK's biggest jewellery show. Come and visit the team at J10 to learn more about our courses and purchase equipment. Gem-A CEO, Alan Hart, has been invited on stage to participate in IJL's latest feature 'In Conversation With'. Alan will be interviewed by Sarah-Louise Jordan at 11:00 on Sunday 4 September.

IJL Seminars:
Ruby or not Ruby? That is the Question
4 September, 12:30–13:30
Lead-glass-filled rubies are a prevalent 'treatment' commonly used in today's jewellery industry. They are arguably glass-ruby composites that have hit the market in their millions and are often sold as 'natural gems'. Gem-A tutor Julia Griffith will help you to explore this 'treatment' of ruby and will discuss accurate identification techniques. Examples will be provided for hands-on practical experience.

Separating Similar Looking Stones
6 September, 10:00–11:00
How often do you glance at a gemstone or piece of jewellery and wonder what the gemstone might be? As gemmologists we all 'sight ID' from time to time but what if you have several stones similar in appearance sitting in front of you? Can you still separate them visually? Throughout this practical session, Gem-A tutor Claire Mitchell will explore several groups of similar looking stones and show which hand-held tools can be used to separate them. This is a useful exercise with lasting results.

Hong Kong Jewellery & Gem Fair
15–19 September
Stand 3M044
Hong Kong Convention & Exhibition Centre, Hong Kong
Similarly to previous years, Gem-A will join forces with ATCs across Hong Kong to promote our world-renowned education and membership packages. We will be situated at stand 3M044; visit us to browse our selection of books and instruments. We look forward to meeting our ATCs, students and members during the event.

Denver Gem & Mineral Show
16–19 September
Denver Mart Expo Hall, Denver, Colorado, USA
Gem-A join the Denver Gem & Mineral Show from 16–19 September to investigate the show's main theme for this year: African Minerals. This is the 49th show and the second that Gem-A has exhibited at. Our North American manager, Eric Fritz, looks forward to seeing you there!

IRV Loughborough Conference 2016
17–19 September
Loughborough University, Loughborough
A firm favourite with gemmologists and valuers, the IRV Conference is not to be missed. Visit www.jewelleryvaluers.org/Loughborough-Conference for more information.

Gem-A Members and Gem-A registered students receive special Gem-A Conference attendance rates.

See the pull-out Conference special on pages 17–20 for more details.

Gem-A News

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

EXTRAORDINARY GENERAL MEETING (EGM)

An EGM was held by the Gem-A Council on Thursday 30 June 2016 at Ely Place, London, to propose several amendments to the Articles of Association. The main changes follow, but full details may be viewed at www.gem-a.com/membership/egm-2016.aspx and the revised Memorandum and Articles of Association at www.gem-a.com/about-us/articles-of-association-and-by-laws.aspx.

In order to comply with the Charity Commission's stated desire that Trustees should seek to widen the skills and experience on councils, it was proposed that the maximum number of elected/co-opted Trustees be reduced from 12 to nine, and that the Council should be empowered to appoint a maximum of three Trustees, who would not be subject to election, and who were not necessarily members of the Association. Changes were also proposed to the membership requirements of nominees for the Council and nominators.

Members are currently allowed to remain in good standing for six months without renewing their subscriptions. An amendment was proposed that would allow the Council to set the period of subscription arrears (being not less than two months from the date it fell due), after which the member will have been deemed to have resigned.

It was proposed that the number of days' notice for the date of AGMs and EGMs be amended, and that the term of office of the president be clarified.

The motion proposing all amendments was passed. The Association's Annual General Meeting will be held on Friday 9 September 2016.

CHANGES IN GEM-A INSTRUMENTS

Amandine Rongy GG FGA left Gem-A at the end of June. Amandine, who had been with the Association for five years, worked as both marketing and events manager and, most recently, as Gem-A Instruments manager. She will be leaving to pursue her career in Toronto, Canada, and will be missed by all at Gem-A. We wish Amandine good luck in her career and all the best for the future. Sam Lloyd FGA will be taking over as Gem-A Instruments manager from 22 July. Sam is well known to Gem-A, and is currently an evening tutor for the Gemmology Foundation course. We look forward to welcoming Sam to the team.

NEW PREMISES FOR BCU'S GEMMOLOGY DEPARTMENT AND FIRST DEGREE-COURSE STUDENTS GRADUATE

There was a fantastic atmosphere at the launch of the Birmingham City University (BCU) gemmology department's new home at the Assay Office Birmingham in April, an event attended by over 100 students, staff, Gem-A trustees and industry representatives from all around the UK. The wine and conversation flowed all evening and everyone thoroughly enjoyed celebrating a very successful first year. The next stages of the new BCU education and research programmes for gemmology are now underway — more news to follow!

Summer 2016 saw another milestone for BCU as the first students graduated from the new BSc Honours degree in Gemmology & Jewellery Studies. Tutors and families were incredibly proud to see the students awarded their degrees at a ceremony held at Birmingham Symphony Hall. As this unique course is becoming established, the university is experiencing a sharp rise in applications and student numbers from around the world, and the team is looking forward to many more graduation ceremonies in the future.

For more information about how to study the BSc in Gemmology & Jewellery Studies visit the Gem-A website.

THE MONTREAL SCHOOL OF GEMMOLOGY (EGM) CHANGES HANDS

Odile Civitello, founder and president of The Montreal School of Gemmology (EGM) announced in April that the school has been sold to Marie-Helene Corbin. Mme Civitello has been the president and director since opening the school, Quebec's first professional gemmology institute, in 1995. Marie-Helene Corbin is a Fellow of Gem-A and an alumnus of EGM where she completed her studies leading to the Gem-A Gemmology Diploma and the EGM Diploma in Gem and Jewellery Appraisal.

Michael O'Donoghue 1934–2016: A student's view

Michael O'Donoghue passed away peacefully on Thursday 16 June 2016. For those of us who were privileged to count ourselves as students of Michael's, it is a sad time.

Michael's encyclopaedic knowledge, boundless enthusiasm and unique teaching ability combined to provide an experience that few of us will forget. He was a born teacher. Never was Michael lost for a simple analogy to explain some gemmological concept. His humour left 'hooks' in one's mind, on which he hung gemmological facts. Very few people can teach a group of students with mixed academic backgrounds but Michael did this effortlessly. To those of us throughout the many facets of gemmology, including teachers, those in the gem and jewellery trade and auction houses, and gemmology enthusiasts, Michael was not only a teacher but also a friend. May his soul rest in everlasting peace.

A private cremation and service were held for Michael on Friday 8 July in Sevenoaks, Kent. All at Gem-A offer their condolences to Michael's wife Annie, and their family.

Roy Abrahams

Gemmology is not just about gemstones

Kerry Gregory FGA DGA looks at one of the fundamental pillars of gemmology: the people.

"Gemmology is not just about gemstones." You are probably thinking that you are already aware of that fact; that gemmologists also look at crystals, rocks, organics and other gem materials. However, as Maureen Lipman, a British actress, columnist and comedian, once said: "You get an 'ology' — you're a scientist." As gemmologists, however, we are not just scientists, we are more than that — in the same way that gem materials are not just chemical compounds (or, in the case of diamond, elements) to be studied, identified, measured and documented. A gemstone is also a symbol, a thing of beauty, a moment in time, a memory… all of these things and more. I remember Richard Hughes telling delegates at the Gem-A Conference several years ago that you cannot separate gemstones from beauty and people. I totally agree; for me, gemmology is not just about my love of the materials we study, the science behind these materials and the teaching thereof, but the people involved with it. I remember studying via the old-style correspondence course 17 years ago. I felt very alone and stupid, as if I had made the wrong choice and shouldn't be studying gemmology. I came to London to do my three-day practical workshop, where I was taught by Ian Mercer, and who consequently enchanted, inspired, confused and educated me! I vividly remember Ian telling us about his favourite answers to exam questions, where one student described how they would test some natural pearls by grinding them to a powder and X-raying them. I also remember not feeling stupid anymore and feeling like I could "do this". Incidentally it was Ian who gave me my first chance to teach; a girl named Kate, about 10 years ago. Kate and I are still friends to this day.

At that propitious practical I also happened to meet Eve Symes, a very good friend of mine. Eve introduced me to Gem-A's South West Branch, where I made more friends, got more confused about gemmology and also became more educated. It was also at the South West Branch that I met Richard Slater, another member of the Gem-A Board of Trustees. I started to do business with Richard and eventually bullied him into letting me be the secretary for the South West Branch. I now sit on the Board of Trustees with Richard, and feel that I have come a long way since I first met him. Richard and I are firm friends and, not often enough, have stayed up until the small hours of the morning together at conferences putting the world (and the trade) to rights.

It was also at the South West Branch where I met Alan Hodgkinson, also on the Gem-A Board of Trustees. I was star struck — this man was in my text books! I was so surprised at how lovely he was, how quick he was to share his knowledge and how helpful he was — and still is to this day. Alan inspired me to teach and to want to give back a little of what I had been given by him and so many others. Alan is now not only an inspiration and mentor, but both he and his wife Charlotte are among the people I call friends. I have had many happy hours at the Scottish conferences enjoying a wee dram with them and reeling (dancing!) to the sound of another friend's fiddle in the bar.

I don't have the time nor space to list everyone who has inspired, helped or supported me over the years, but there are many. There is, however, a common theme, and that is that I have met an unending stream of people in this industry who are so generous with their knowledge and time, which I think is a rarity. Many of these people are now firm friends.

One of my favourite places to meet like-minded people is at one of the many gemmological conferences and symposiums around the world, with the Gem-A Conference being one of my favourites. Drawing a large crowd of international delegates, from students and key players in the industry, to veteran gemmologists and mineralogists, all who attend have at least two things in common: their love for gemstones and the study of these materials. The conference is a great place to meet the people who will be your future friends, employers, colleagues, peers and even, quite possibly, future fellow Board members! It was at the Gem-A Conference that I met Miranda Wells and Paul Greer, two Board members who constantly inspire me to be a better gemmologist, teacher and person.

Since joining the Board I have had the feeling of not being alone. I am in a group consisting of 11 members, one CEO and a number of dedicated and hardworking staff, who feel just as passionately as I do about gemmology and about the people in it. One of the things important to us as a Board is to build on and sustain this inspiring community of people who share ideas and knowledge freely, and who support one another. It is not just about studying the Gemmology Diploma and/or Diamond Diploma, gaining the knowledge, passing your exams and being elected a Fellow or Diamond member, thus being able to print those all-important three letters (FGA or DGA, or both) on your business card… it is also about knowing that you are a part of this inspiring community. You're not alone, and you too can give back as much as you gain.

The Gem-A Conference will be held from 5–6 November; check the Gem-A website for the latest news on speakers and booking information. Featuring special student rates for 2016, it's a great place to start your path in gemmology. ■

Kerry Gregory is vice-chair of the Gem-A Board of Trustees, a Gem-A ODL tutor and manager of Gemstones and Specialist Jewellery Department at H&T Pawnbrokers. An enthusiastic hands-on gemmologist, Kerry has been a member of the Association for over 14 years.

Paua

Maggie Campbell Pedersen FGA looks at exquisite paua shell, hailing from New Zealand.

1: Young, live abalone at a farm in Thailand.

Paua shells are the archetypical New Zealand gem — possibly even better known than its nephrite jade, known as 'greenstone', or Kauri copal.

Paua belong to the large family of molluscs called *Haliotidae*, of which there are well over 100 species worldwide. Six are found in New Zealand, although only three are common. The most famous, and exclusive to New Zealand, is the *Haliotis iris*, known for the beautiful, vibrant colours of the inside surface of the shells — colours which range from striking blues through aquamarines to greens, with tints of purple and gold. They are influenced by what the animal eats and which therefore vary slightly from region to region.

Haliotis are marine gastropods. They carry one shell, and have one large, very muscular foot with which they attach themselves to rocky surfaces (in the case of *H.iris* the foot has a black outer skin). They have an oval shell with two or three flat whorls, but no operculum. The name *'Haliotis'* derives from the Greek, meaning 'sea ear'. Along one side of the shells are small holes for expelling water in the aeration of the gills. The shell is made up of three layers: a very thin outer layer of conchiolin, under which is a chalky-looking rough material, and beneath that is the coloured nacre.

In common with other molluscs, the layers of calcium carbonate (in the form of calcite and aragonite) and conchiolin that form their shells, are laid down by the mollusc's soft body. *Haliotis*, however, lay down the inner layer of aragonite crystals and conchiolin in a slightly haphazard way, stopping altogether if the water temperature doesn't suit them. This results in areas where the conchiolin becomes very visible, giving an effect of wavy lines of organic material interspersed with beautifully coloured nacre. Roughly in the centre of the shell is an uneven area of dull colour, where the soft body of the mollusc was attached to the shell.

3: Modern 'hei-tiki' carved in bone, with paua shell inlay for eyes.

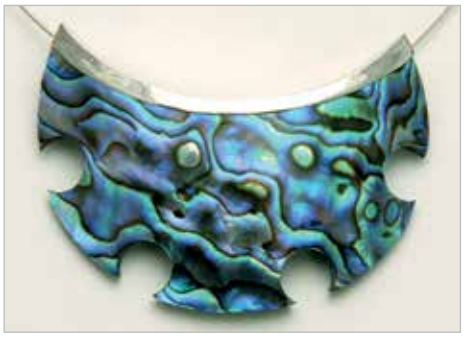
In other parts of the world the *Haliotis* shells are more commonly called 'abalones', and include species such as the small 'ormers' found around the coasts of Britain (a corruption of the French *oreille de mer*,

2: Maori carving using whole paua shells as eyes. Hamilton Gardens, Hamilton, New Zealand.

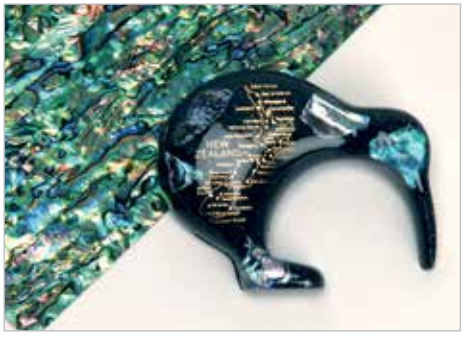
again meaning 'sea ear'). In the United States there are several species, including the Californian red abalone, which displays delicate reds, pinks and silvers. Less well known but very striking are the totally black shells of the Mexican abalones, which are now listed as endangered species.

Pauas live around the rocky coasts of New Zealand and are found at or below the level of the lowest spring tide, that is, at a depth of between one and 12 metres. They feed on seaweed. Much of the paua used for gem purposes are wild-caught, under licence and to extremely strict quota. They can only be fished by free diving — no scuba is permitted — and only a certain number may be fished at any one time, all of which helps to keep the stocks of paua healthy. Furthermore, they may not be fished unless they measure a minimum of 125 mm at the longest part of the shell, which they usually reach at the age of about six years.

Paua aquaculture started in New Zealand in the 1980s. The captive-bred molluscs can be harvested when they are smaller — at about three years old (**1**). They are largely used for food, as the shells are not of quite such a vibrant colour. The outer, chalky surface of farmed paua is also pale blue (as opposed to the pale brown of wild paua),



5: Pendant. Paua shell set in silver.



6: Laminate made from paua shell, and typical tourist souvenir of paua shell pieces embedded in plastic.

4: Laminated tiles behind a food bar.

due to their feed. The soft bodies of farmed paua are slightly paler, which is considered more attractive as food — indeed the very black surface of the wild paua's flesh is usually removed before the meat is consumed.

The flesh of the paua is very rich in protein and has been a staple diet of the Maoris, who also used some of the shells in their carvings, almost always to depict eyes. In the large, wooden carvings that adorned Maori ceremonial houses and canoes whole shells were used, and were attached so that the inner, nacreous surface was visible (**2**). On small carvings made in nephrite jade or sperm whale ivory — such as the little 'hei-tiki' figures worn as pendants — the eyes were usually depicted by round incisions in the material. These small carvings are today very popular with tourists, and the hei-tiki are often carved in a stylized design, but always with paua shell eyes (**3**). (It should be noted that ivory has now replaced bone as the material used for these carvings.)

Like other nacreous shell types, paua shell can be made into sheets of laminate, suitable for use in interior decorating. Given a stiff, self-adhesive backing it can be used to cover all manner of articles, and in fact the laminate can also be used as a coating on tiles suitable for kitchens or bathrooms (**4**). The flat part of a shell is cut on machines and sliced so thinly that several layers can be taken from each shell. Another use for thin slices of nacre is for watch faces.

The paua shell trade is unusual in that it is found at both ends of the market. It is well known in the form of pretty, colourful, whole, polished shells, or inexpensive jewellery and trinkets, which are sold as souvenirs in museum shops and other such places. In jewellers' shops can be found the expensive paua shell items, set in precious metals and with gemstones (**5**, **9**).

At the inexpensive end of the market a little paua shell can go a long way when embedded in moulded clear plastic with a black backing, and is sold in great quantities to the tourist trade. It is made up into various designs, often depicting something specific to New Zealand such as a kiwi bird (**6**).

7: Two polished paua shells (13 and 14 cm long).

8: Natural paua pearl (3 cm long).

Although the pieces of shell must be inserted into the mould by hand, it is not necessary first to carefully polish the backs — they can be merely tumbled before use. When paua shells are sold whole, the outer, chalky-looking surface is removed to reveal the colourful, nacreous surface beneath, and it takes an expert only about 10 minutes to polish a raw shell on a diamond wheel (**7**).

The typical pattern of the nacre with its dark, wavy lines of conchiolin is very attractive, and this is revealed when the outer layers of shell are removed. However the inside surface of the nacre has a much smoother, almost liquid transition of colours, far fewer lines of conchiolin, and is subsequently considered the better material. It is from there that the best pieces are taken to make jewellery, and is of course the area in which hemispheres of material are placed to produce blister pearls.

'Blue pearls' as they are called — although they can have more of a greenish tint than blue — first came onto the market around the turn of the millennium. They are round blister pearls, usually referred to as mabés. They are mostly produced from wild-caught paua, which are nucleated and treated in much the same way as the oysters in the culture of marine pearls, that is, by suspending them in baskets from lines in areas of clean water and tending them regularly. They can also be cultured in shells reared from spat in captivity, and nucleated when they are large enough. Nevertheless farmed paua are produced mostly for food, and very little is used for decorative purposes, although some whole shells are sold as they are a very attractive blue.

The process of inserting the nucleus must be undertaken with utmost care as the smallest incision in the mantle can result in the death of the mollusc — they have no blood-clotting agent and therefore would bleed to death. (It is for this reason that it is impossible to produce spherical cultured abalone pearls, where the nucleus would have to be inserted into the mantle by cutting it.) Natural paua pearls do exist, but they are always concretions produced by the animal outside the mantle, and are inevitably very oddly shaped (**8**).

The success rate of the pearl production is not high. Only 10% will produce a marketable blister pearl covered with nacre, and only 2% will produce a smooth one of top quality and colour. Not only must the animals not be injured during the nucleation process, when the mantle is carefully lifted to insert the hemispherical bead underneath, they must then be kept in a stress-free environment for the two to three years it takes to cover the nucleus with nacre and produce a 'blue pearl'.
As with all organics, science alone cannot ensure success. We also have to rely on the assistance and co-operation of a living creature.

Paua blister pearls are harvested in the same way as those of other species, by cutting the blister out of the shell. From the remainder of the shell discs are cut, polished on both sides, and used as backs on the blister pearls. The soft body of the mollusc is sold for food and is considered a delicacy.

Paua shell is very unusual as a gem material, as it spans such a broad price range. It is used for trinkets costing a few dollars, and also for exquisite jewellery, where a pair of blister pearls set in gold with diamonds can cost thousands (**9**). ■

Paua shell is very unusual as a gem material, as it spans such a broad price range. It is used for trinkets costing a few dollars, and also for exquisite jewellery, where a pair of blister pearls set in gold with diamonds can cost thousands.

9: 'Blue pearl', gold and diamond pendant by Catherine Best Ltd., Guernsey. Blister pearl by Eyris Blue Pearls, New Zealand. Photograph © Catherine Best.

All photos by Maggie Campbell Pedersen, except where otherwise stated.

The author would like to thank William Sommerville of ASIL Group NZ, Matt Carter of NZ Dimensionz and Sharlene Wiseman of Eyris Blue Pearls for their patience and help with the preparation of this article.

Gem-A
THE GEMMOLOGICAL ASSOCIATION OF GREAT BRITAIN

PRESENTING

GEMSTONE PHOTOGRAPHER OF THE YEAR 2016

Have you got what it takes to be Gem-A's gemstone photographer of the year? Enter Gem-A's NEW photo competition and you could win a year's free Membership and a *Photoatlas of Inclusions in Gemstones*.

THERE ARE THREE CATEGORIES FOR ENTRY:

THE INTERNAL
Including photomicrography, gemscapes and unusual inclusions.

THE EXTERNAL
The external world of gemstones, e.g. shots of unusually cut or faceted gemstones, carvings and *objets d'art*.

THE HUMANITY IN GEMS
This category covers the life around gemstones, including mining, dealing, gemmologists at work or studying.

SUBMISSIONS
Members and current students of Gem-A only. Please submit a maximum of three entries to editor@gem-a.com, specifying your membership or student number, captions for each photo and each category of entry. Photos should be a minimum of 300 ppi. Please send files larger than 10 MB via Dropbox. Closing date for entries is Friday 2 September 2016.

WINNERS
A Member Award and a Student Award will be given. Honourable mentions will also be given for each category. Winners will be announced at the 2016 Gem-A Conference. For full terms and conditions please see our website.

Oceanview Mine

Claire Mitchell FGA DGA takes a hands-on look at the Oceanview Mine, in the Pala mining district in California, USA.

1: Black tourmaline (left) and coloured tourmaline (right), both sorted by Claire Mitchell from Oceanview Mine and donated to Gem-A. Photo Gem-A.

Oceanview Mine is situated 2.5 miles northeast of Pala, on the northeastern slope of Chief Mountain, a short, scenic drive from Pala, California. Visitors to the area pass through landscapes bedecked with nurseries growing a multitude of produce and plants, whilst turning off the main highway you pass through beautiful orange groves, finally reaching the dirt track which takes you up to the mine.

Famous mines in this area also include the Tourmaline Queen, famous for its 'blue cap pocket' tourmaline, and Pala Chief Mine, known for its kunzite. The area has been a source of gem materials since the 1870s, with its most active period being between 1900–1922. Claim was first made to the Oceanview deposit in 1907 by Frank A. Salmons. Since then, ownership has passed through several hands, and the mine is now owned by Jeff Swanger, who acts as CEO, owner and operator of Oceanview Gem Mine LLC. In its lifetime the mine has produced some of the best morganite specimens ever recovered in North America, as well as exceptional tourmaline (**1**) and kunzite, with additional minerals of lepidolite, mica, apatite, quartz and feldspars.

Today the Oceanview Mine is currently the only actively working underground mine in this district. The mine is also open to the public for a fee-for-dig, dump screening — which I gladly attended in April 2016.

Two things struck me when I arrived: firstly, the amazing view from the top of the site (**2**), as well as the beautiful, perfumed smell of wildflowers in the air.

The set-up for the mining experience was simple: there was a large dump pile of material which had been taken out of the mine by excavator, around which is the screening equipment is situated (**3**, **4**). When I first arrived I was allocated a position and screening equipment and, after a safety briefing, was instructed on the most efficient technique for screening the material. We were given four

2: View from Chief Mountain.

3: (Left) Dump pile and sorting trays.

4: (Right) Claire sifting and sorting the material.

hours to work the pile; so using a bucket and small shovel I collected a full load and returned to my workstation. Two large wooden heavy wire screens allow you to 'sift' the material — the first screen (with the larger mesh) sits atop the second screen with a smaller mesh. Material collected from the pile is placed in the top mesh, the smaller material of which then passes through to the second mesh. Any larger pieces in the top mesh are then washed and checked for gem-quality material and discarded or kept as required (**5**). The material in the second screen is then washed and checked for gem-quality material. It is thrilling seeing glimmers of colour or good crystal form.

After four hours of happy and productive sifting, it was time to assess the fruits of the day's labours. These included tourmaline (pink, green and black, or 'schorl'), mica, quartz, garnet and beryl. Sadly I had to leave behind some of the larger pieces such as the tourmalines in matrix (**6**) due to weight restrictions on my baggage, which, whilst not 'gemmy', were still very interesting pieces.

Visitors can also experience a jeep tour of Chief Mountain, which not only offers some breath-taking views but also allows you to catch a glimpse of the active mine entrance and prospects, as well as views of other famous mines in the area. At the edge of the ridge you can see the Tourmaline Queen Mountain, and in the distance you can just about see other former mine workings.

There is truly nothing better than digging for gem materials — it's a great visit, for both the experience and for the introduction into the techniques in sorting by this method. I thoroughly recommend this to anyone visiting the area — a bonus is the opportunity to also experience the fantastic weather and beautiful countryside whilst there. ■

All photos Claire Mitchell, except where otherwise stated.

5: (Left) Scrubbing away dirt on a rough crystal of quartz.

6: (Right) Tourmalines in matrix.

The Journal of Gemmology

Guy Lalous ACAM EG summarizes two articles from Volume 35 Number 2 of *The Journal of Gemmology*.

Additional summaries from this issue will be included in the September/October issue of *Gems&Jewellery*.

Sekaninaite, a New Collector's Gemstone*

Summary of 'Gem-quality Sekaninaite from the Czech Republic' by Radek Hanus, Ivana Kusá and Jana Kasíková.

Sekaninaite from Dolní Bory in the Czech Republic was approved as a new mineral by the International Mineralogical Association in 1968. Sekaninaite is the Fe-rich end member of the cordierite-sekaninaite group. The chemical formula of the cordierite-sekaninaite series is $(Mg,Fe^{2+})_2Al_3(AlSi_5O_{18})$–$(Fe^{2+}Mg)_2Al_3(AlSi_5O_{18})$; both minerals are complex cyclosilicates of Mg, Fe and Al crystallizing in the orthorhombic system. Fe is present as an essential element in sekaninaite, Mg in cordierite. Other localities for sekaninaite include Germany, Italy, Russia and the USA.

The sekaninaite from Dolní Bory is typically enclosed in orthoclase (and albite), the main resource of the mining operations at the former Moravské keramické závody feldspar mine. The veins from this locality are classified as peraluminous granite pegmatites, of an orthoclase type with weak albitization and secondary rare-element mineralization. In total, more than 81 mineral species are known from this Czech locality, which is popular among local mineral collectors.

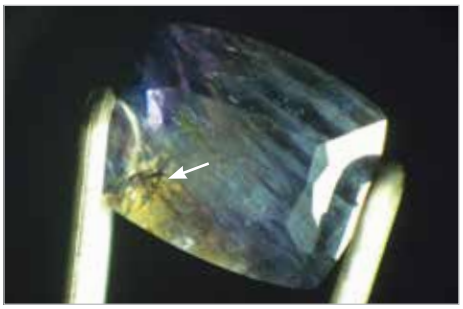
The RI values of sekaninaite mostly overlap those of cordierite. However, the lowest RI value for sekaninaite (n_α = 1.561) is slightly higher than the n_α range (1.527–1.560) for cordierite, and is therefore diagnostic for separating the two minerals. The SG measurements of sekaninaite (2.53–2.78) have a wider range than those reported for cordierite (2.53–2.66), and higher values also may be diagnostic in some cases.

Inclusions in the sekaninaite most commonly consisted of fractures and wispy linear aggregates of microcrystalline chloritoid/chlorite. Chloritoid was previously documented, and chlorite inclusions were identified in the current study.

The Raman spectra of cordierite and sekaninaite generally have overlapping features, with differences in peak intensities that are probably due to orientation effects. The UV-Vis-NIR spectra show similar absorption features as well.

Sekaninaite and cordierite have similar or identical properties. The use of X-ray diffraction or quantitative chemical analysis may be necessary to separate the two minerals. To the best of the authors' knowledge, sekaninaite was previously unknown as a gemstone and has not yet been set into jewellery.

These rough (~0.5–2 g) and cut (0.22–0.30 ct) samples of sekaninaite are from the Czech Republic. Photo by R. Hanus.



Fractures and wispy linear aggregates of microcrystalline chloritoid and/or chlorite form conspicuous inclusions in these sekaninaite gemstones (left magnified 5× and right 3×). The stone on the left also contains ferrogedrite (see arrow). Photomicrographs by R. Hanus.

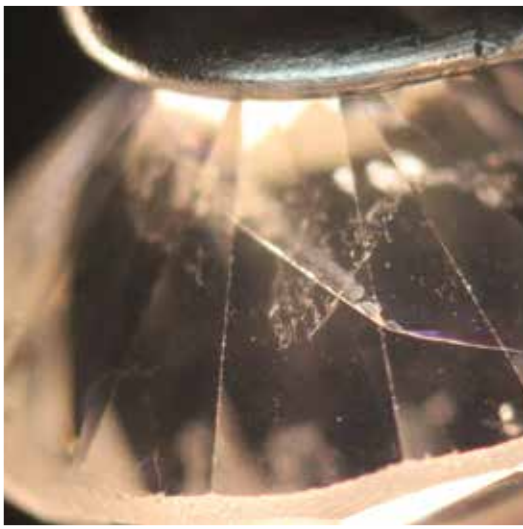
* A summary of an article published in *The Journal of Gemmology*, **35**(2), 2016, 148–154.

Gem-A

THE GEMMOLOGICAL ASSOCIATION OF GREAT BRITAIN

Gem-A Conference 2016

Saturday 5 and
Sunday 6 November



SPEAKER PROGRAMME

Following on from the success of last year, Gem-A will return to the Royal Institute of British Architects (RIBA), Marylebone, on 5–6 November, to host its internationally acclaimed annual conference. Welcoming speakers from around the globe, the Gem-A Conference has a reputation for tackling the most innovative and contemporary gem-related topics, whilst bringing together leaders in the field for a weekend of networking and special events.

SATURDAY 5 AND SUNDAY 6 NOVEMBER

Gem-A Conference

Jarvis Auditorium, Royal Institute of British Architects (RIBA), Marylebone, London

Located in the heart of Marylebone, near to Regent's Park and Oxford Street, this architecturally significant venue was opened in 1934 as the headquarters of RIBA.

SATURDAY PROGRAMME

Ian Harebottle
The critical role of colour and design in ensuring the future of the jewellery sector

Jim Clanin
The fundamentals of mining for coloured gemstones and mineral specimens

David Fisher
Progress in the detection of diamond treatments

John Dyer
The science and the art of gem cutting

Robert Weldon
In Peter Ranier's footsteps: journey to the Chivor emerald mine

SUNDAY PROGRAMME

Helen Molesworth
The history of gemstones

Dr Michael Wise
Hiddenite emerald deposits of North Carolina

Danny Sanchez
Photomicrography of inclusions

Pat Daly
TBC

Bill Larson
TBC

WORKSHOPS AND TRIPS PROGRAMME

SATURDAY 5 NOVEMBER (EVENING)

Gem-A Conference Dinner

Florence Hall, RIBA, Marylebone, London

Drinks reception for 18:30, dinner for 19:15

Saturday's programme will be followed by a drinks reception and a three-course dinner where you can relax and enjoy the company of friends old and new. Dress code is smart/casual.

MONDAY 7 NOVEMBER

Workshops

Gem-A Headquarters, Ely Place, London

Two practical workshops will take place at Gem-A Headquarters in London.

Guest workshop hosts:

- **Richard Drucker FGA GG, President of GemWorld International Inc.**
  'Coloured stone grading and pricing workshop'
- **Alan Hodgkinson FGA DGA**
  'Visual optics'

MONDAY 7 NOVEMBER (EVENING)

Graduation Ceremony and Presentation of Awards

The Royal College of Surgeons, Lincoln's Inn Fields, London

Graduates of the Gemmology Diploma and Diamond Diploma and their families are invited to attend the 2016 Graduation Ceremony and Presentation of Awards. The ceremony will be followed by a drinks reception in the Hunterian Museum and Surgeon's Library for graduates and guests.

TUESDAY 8 NOVEMBER

Private viewing of the Natural History Museum's mineral collection

Natural History Museum, London
09:45–12:00

Explore this breathtaking collection with a private viewing, hosted by Alan Hart FGA DGA, Gem-A CEO and former Head of Earth Sciences Collections at the Natural History Museum.

Book soon; places are limited at this popular event and always sell out quickly.

Private viewing of the Crown Jewels

Tower of London, Tower Hill, London
18:00–19:00

You will be taken on a tour of the Tower of London, one of London's finest landmarks and steeped in history, finishing with a private viewing of the Crown Jewels. You will be able to stop and admire each piece on this fascinating tour.

Book soon; places are limited at this popular event and always sell out quickly.

Check the Gem-A website for further information on workshops and trips.

BOOKING

Event	Date	Price
MEMBER RATE		
Price for two-day Conference attendance (not including Saturday evening Conference dinner)	Sat 5 and Sun 6 November	£250.00
Price for one-day Conference attendance (not including Saturday evening Conference dinner)	Sat 5 OR Sun 6 November	£135.00
STUDENT RATE		
Price for two-day Conference attendance (not including Saturday evening Conference dinner)	Sat 5 and Sun 6 November	£100.00
Price for one-day Conference attendance (not including Saturday evening Conference dinner)	Sat 5 OR Sun 6 November	£50.00
NON-MEMBER RATE		
Price for two-day Conference attendance (not including Saturday evening Conference dinner)	Sat 5 and Sun 6 November	£295.00
Price for one-day Conference attendance (not including Saturday evening Conference dinner)	Sat 5 OR Sun 6 November	£150.00
SATURDAY EVENING DINNER		
3-course evening dinner at RIBA with drinks reception	Sat 5 November	£75.00
WORKSHOPS		
Half-day session with Richard Drucker	Mon 7 November (Morning OR afternoon)	£25.00
Half-day session Alan Hodgkinson *(Max. 8 people per session)*	Mon 7 November (Morning OR afternoon)	£25.00
EVENTS		
Mineral Collection at the Natural History Museum	Tues 8 November (09:45)	£25.00
Crown Jewels at the Tower of London	Tues 8 November (18:00)	£45.00

This year all bookings will be processed via Eventbrite. For more information please visit the Gem-A website.

Booking will close on Friday 21 October 2016 and no bookings will be accepted after this date. Priority for workshop and trip bookings will be given to conference attendees. Please select a maximum of one trip and one workshop per booking.

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Identification of Low-Temperature Heat Treatment in Mozambique Ruby*

Summary of 'Phase Transformation of Epigenetic Iron Staining: Indication of Low-Temperature Heat Treatment in Mozambique Ruby' by Tasnara Sripoonjan, Bhuwadol Wanthanachaisaeng and Thanong Leelawatanasuk.

Mozambique has emerged as an important ruby source, as shown by these untreated stones (1.02–5.93 ct). Photo by T. Sripoonjan.

Mozambique has become an important source of gem-quality ruby since 2009 when rubies were found in Montepuez in the northern part of the country. The red colour of the corundum is sometimes inhomogeneous, with bluish zoning.

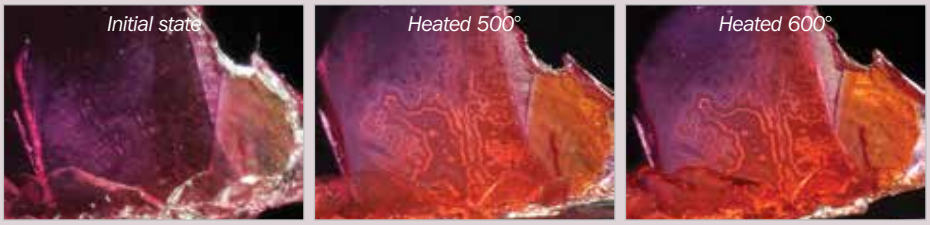
Low-temperature heat treatment aims to remove the blue colour component from red-to-pink corundum and enhance the resulting colour. Heat treatment of corundum at relatively low temperatures has been performed for centuries using firewood or charcoal as a heat source, sometimes with a blowpipe. Such conditions have now been applied to Mozambique ruby using modern electric furnaces. The microscopic identification of such treatments is problematic as the appearance of mineral inclusions after low-temperature heating remains unchanged.

The present study investigates changes that occur in iron-stained fractures within Mozambique rubies and provides criteria for detecting their low-temperature treatment. Iron-oxide staining, seen as yellow-to-orange epigenetic residues along surface-reaching fractures, is one of the most prominent internal features in rubies from Mozambique. The colour saturation of the iron-staining tends to be intensified by heating, providing visual evidence of treatment.

Raman spectroscopy of unheated ruby samples identified the epigenetic iron-stained residues as goethite, α-Fe^{3}+O(OH). Raman spectra of the iron-stained residues after heating to 500°C and 600°C revealed characteristic peaks of hematite (Fe_2O_3) at approximately 227, 245, 295 and 410 cm^{-1}. FTIR spectra of Mozambique ruby before treatment showed goethite-related absorptions in the 3600–3000 cm^{-1} region. These absorptions, however, nearly disappeared after heating to 500°C and 600°C due to dehydroxylation and recrystallization of goethite into hematite.

It is important when one determines the value of a high-end ruby to find out whether the stone has been heated, especially as many unethical traders have sold heated stones as untreated. Raman and FTIR spectroscopy provide proof of the presence of hematite residues in iron-stained fractures. This feature is a key criterion to indicate heat treatment at relatively low temperature in Mozambique ruby. ■

The iron-stained fractures in this representative sample of Mozambique ruby display a noticeable increase in orangey red coloration in the heated half (right side) compared to the untreated portion (left side). Photos by Y. Lhongsomboon.



Heating of this Mozambique ruby produced a distinct change in the appearance of epigenetic iron staining within a fracture. Photomicrographs by Y. Lhongsomboon; image width 4.65mm.

* A summary of an article published in *The Journal of Gemmology*, **35**(2), 2016, 156–161.

Thoroughly ruby

Grenville Millington FGA takes a hands-on, in-depth look at an Art Deco ruby ring.

1: Red and colourless stone cluster, the red stone about 6.5 × 6 mm and 4.1 mm deep.

The telephone call was standard: a jeweller wanted to send me a ruby and diamond Art Deco ring, to check whether the ruby was synthetic or natural. I related to the jeweller how it was quite fashionable in the 1920s and 1930s to have platinum jewellery set with white diamonds and synthetic ruby/synthetic sapphire (they were still novel at that time). The jeweller confirmed that the ring was indeed platinum, which seemed to imply confirmation that the gem was synthetic. The ring was posted to me that day.

Before I continue I would like to pause here and draw up a list of what the item could possibly consist of:

1. An Art Deco ring (i.e. manufactured in the 1920s/1930s) and set with its original ruby centre with diamond-set surround.
2. As in 1, but with a replacement ruby from a later date.
3. As in 1, but set with its original synthetic ruby (Verneuil-type).
4. As in 1, but with a replacement synthetic ruby from a later date.
5. A modern copy, made in the last 20 years, set with a ruby and diamonds.
6. As in 5, but set with a synthetic ruby and diamonds or maybe cubic zirconias.
7. A rhodium-plated white base metal mount set with paste stones.

I was not expecting option 7 due to the nature of the client, but if the item was being sent by a member of the public then it would be as valid a possibility as the others.

When I received the parcel and looked at the ring I realized I had missed out other possibilities from the list:

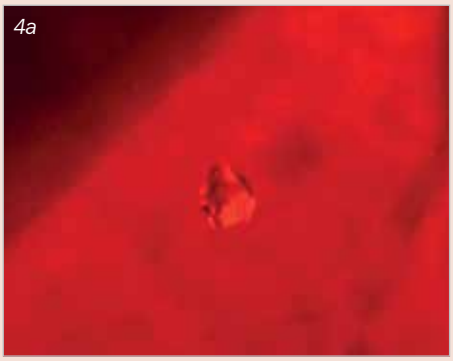
8. An Art Deco ring set with a red gem (not ruby) centre with diamond-set surround.
9. An Art Deco ring, that had an original ruby centre, but now replaced with another red gem.

In other words, the red centre stone, which was an intense, slightly darkish red, did not look like the general ruby red or the general synthetic ruby red (**1**).

It was certainly a strong colour but it suggested, from an arm's distance away, red spinel. I didn't mind that because,

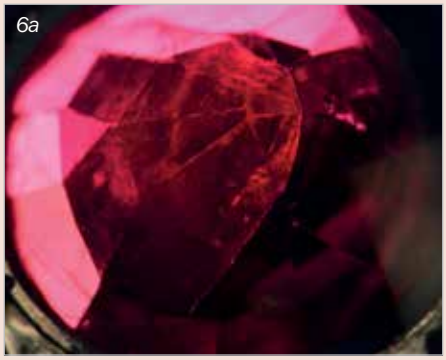
2: Bubble-like inclusion. Magnification approx. 60×.

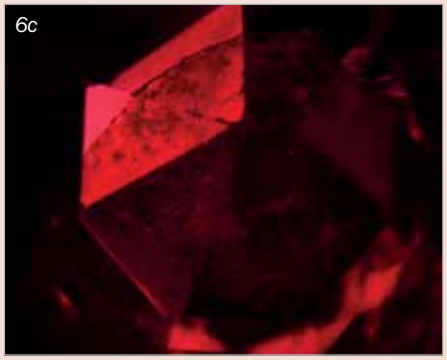
3: Isolated crystals (the one on the right with double image under two facets) and colour swirls. Magnification approx. 40×.



4: A seemingly isolated crystal (a) but associated with much smaller ones along a line (b, c). Magnification approx. (a) 100×, (b and c) 60×.

5: Centre stone (a) displaying fracture plane, top lighting (the white spot is a cavity in the table) and (b) seen from below, displaying fracture plane and surface cavity. Magnification approx. (a) 12× and (b) 8×.





6: Dried infilling material within the fracture. (a) The line off-centre towards the right is the edge of the fracture at facet surfaces. (b) The line towards the right is the edge of the fracture at facet surfaces. (c) The line towards the top left is the edge of the fracture at facet surfaces. Magnification approx. (a) 15×, (b) 45× and (c) 30× (the last one was taken through a blue filter).

personally, I prefer the full-bloodied red spinel colour to a fine ruby colour, but this was 'business' and I guessed the jeweller would be happier to find out it was ruby, although red spinel would certainly be preferable to synthetic ruby.

THE STONE

A first look with a 10× lens showed why the jeweller was uncertain. There was part of the stone that showed a strong ruby red (i.e. a crimson red) and another large section that displayed a scarlet red (orangey red), and that's without mentioning what looked like a single, small 'bubble' just in from the girdle. Greater magnification was required (**2**).

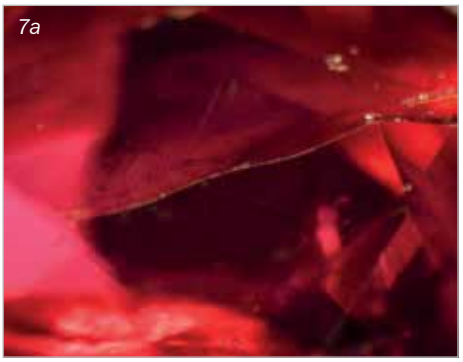
Under the microscope it was still bubble-like, but less so. It seemed to have an angular outline, albeit rounded, but no bright centre within a thick dark border. Now that the ring could be examined in ultra close-up, other isolated, rounded crystals could be seen (**3**). One of the rounded larger crystals had some associated smaller ones in a trail that seemed to have an association with some growth irregularities within the gem (**4a**,**b**,**c**). These small crystals were enough to rule out synthetic ruby, but what about the colour differences? A view of the ring from top and bottom highlighted the cause (**5a**,**b**).

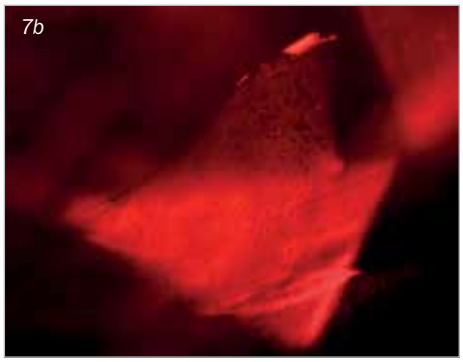
In **5b**, the light reflected off the one back facet shows a cavity due to a missing part of the gem to one side of the fracture. The pattern of the dried infilling material within the fracture can be seen in **6a** and **b**. Such was the intensity of the red colours in this stone under the microscope lighting that I tried using a blue filter in some shots (**6c**). Other, smaller surface-reaching fractures had a similar, but finer appearance, as shown in **7a** and **b**.

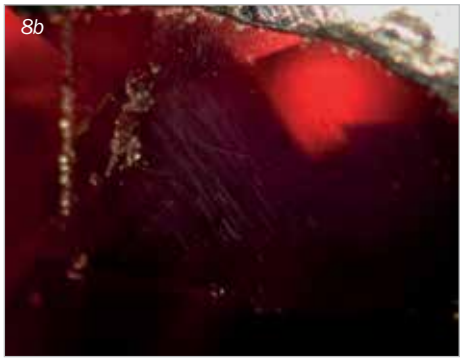
One factor I haven't mentioned is the infilling material. It had a brownish ochre colour which was responsible for giving half the stone a scarlet tinge, the true stone colour being the crimson red. This colouring, plus the fineness of the dried pattern and the fact that this same pattern continued to the very surface edge of the fracture, suggests it is all natural — not a modern addition or 'enhancement'. Such fracture filling by a natural iron-rich liquid is quite common with gems and might be seen, for example, in rubies, sapphires (to a lesser extent), the beryls and the quartzes.

You might assume at this point that I had made up my mind that the stone was ruby. Is any more proof needed? Naturally!

The RI was 1.765–1.773 (the extraordinary ray gave a shadow edge on the refractometer scale that moved entirely between the two figures just mentioned). The spectrum was a powerful ruby example, with black-as-ink lines in the red and blue, all the orange-yellow-green totally absorbed,

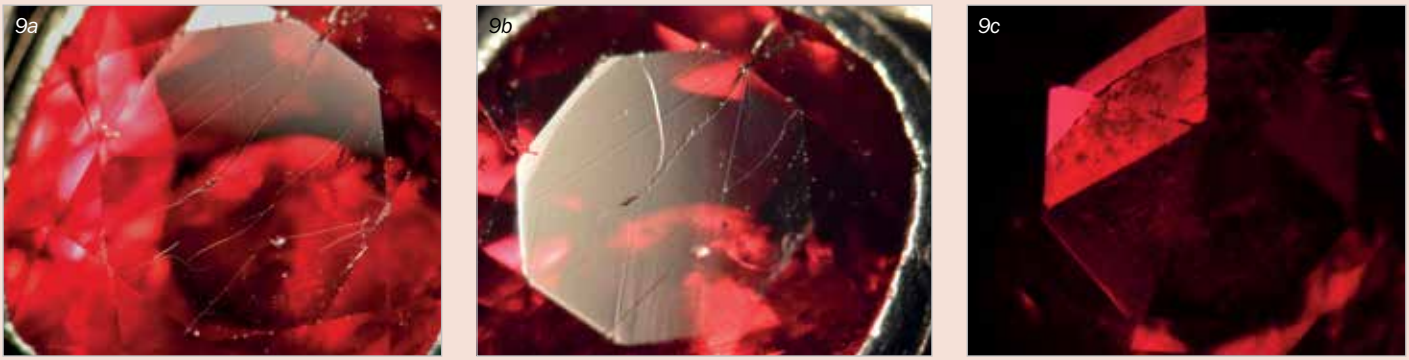






7: (a, b) Smaller surface-reaching fracture with very fine lace-work of dried infilling material. Magnification approx. 75×.

8: A straight-zoned cloud seemingly composed of silk inclusions. (a) The three strange linear effects to the right are all open surface features. (b) The cloud clearly shows its fine rutile silk make-up when the lighting angle is changed. The top white part is the stone setting edge. Magnification approx. 80×.



9: (a) Reflected light traces the edges of fine fractures and the parallel lines of lamellar twinning. (b) The near-vertical parallel lines are due to polishing, the thicker off-centre white curved line is a surface scratch. (c) Polishing drag marks showing the fracture was present before the stone was cut. The two lines top left represent a single twinning 'line'. Magnification approx. (a and b) 30×, (c) 120×.

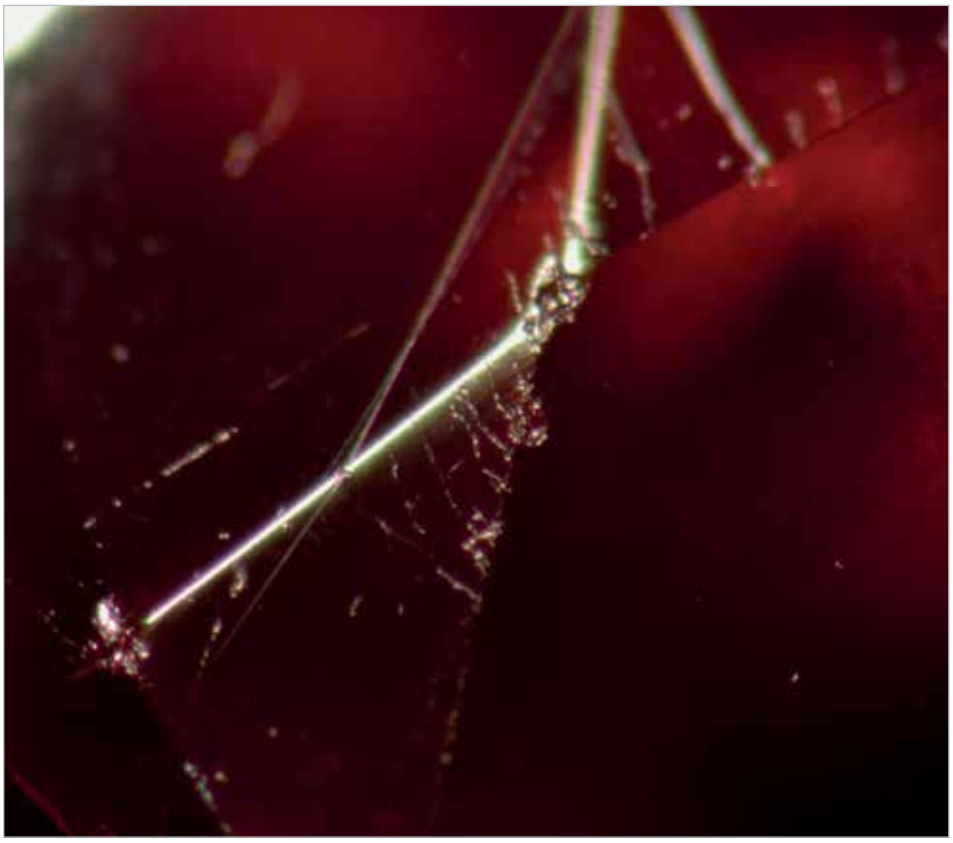
and with the chromium doublet fluorescent (all strong enough to be produced by a synthetic stone, of course).

Another session under the microscope with careful, slow turning of the ring under varying light conditions proved edifying. Photo **8a** shows a cloud displaying a straight zoned appearance, possibly formed from very fine silk. Turning the ring around to change the angle of incident light resolved the cloud into extremely fine rutile needles (**8b**).

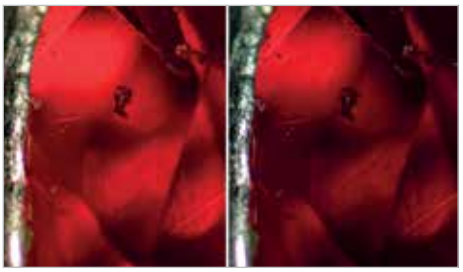
Views across the table also brought to light some other facts. The light reflection angle traced the edge of some other fractures and the unmistakeable parallel line formation of lamellar twinning (**9a**). As always with twinning lines, we need to make sure they continue across an adjoining facet or two, and these obliged. I did try to locate actual polishing striations so that I knew which direction they took; the table facet is as shown in **9b**.

A closer look at the path of these polishing lines shows very clearly that they cut across the surface-reaching edge of the centre fractures, leaving drag evidence, shown in **9c**. An interesting aside: the twinning 'lines' displayed in this photo have a thickness and appear to be narrow troughs, which possibly signifies a fractional difference in hardness from the material on either side.

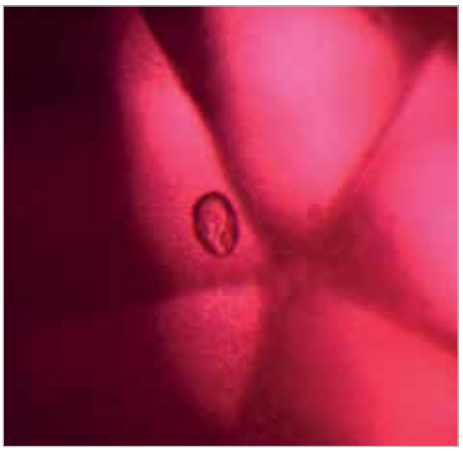
When I looked at photo **9b**, however, I noticed an anomaly. Just to the right of the



10: On a star facet 'fire' marks were visible and a twinning line can be seen across two facets. The broader, white, angled line is light from facet edges. Magnification approx. 80×.



11: An inclusion with stress fractures. Under the blue filter colour swirl irregularities are more distinct (right). Magnification approx. 80×.



12: Included crystal showing surface features within a feather of extremely small droplets. Magnification approx. 100×.

13: Strong dichroism displayed.

centre is a near vertical straight line. It is parallel neither to the polishing lines nor twinning planes, which meant that the ring had to be returned to the microscope for an explanation. There was nothing immediately below the line within the stone and it did not extend to the neighbouring facets. A close examination showed a couple of smaller, parallel, almost dotted lines (not visible in the printed image). My conclusion was that these were the remains of the original grinding of the facets that had not been removed at final polishing. The edge of the table also proved that the crystal inclusions were solid rather than 'negative', as one of them was cut through.

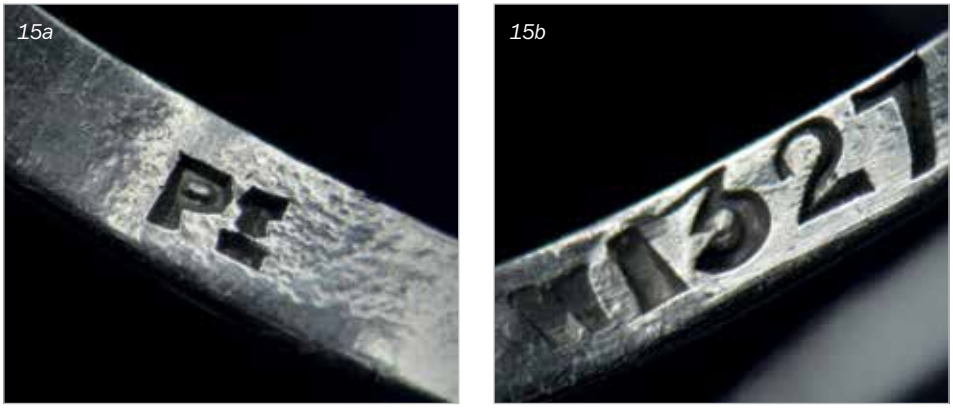
On the edge of a star facet, 'fire' marks were just visible (**10**). Other features which became apparent with a more patient examination were an inclusion with stress fractures, possibly signifying zircon (**11**), and a crystal with an irregular surface, sitting in an associated feather of very fine droplets (**12**).

Although the fractures prevented much examination of major parts of this stone

14: Very little wear to the facet edges; the main cavity is natural. Magnification approx. 15×.

it didn't prevent me from noticing colour irregularities or swirls, as can be seen in **3** and **11**. The strong dichroism was displayed with the ring lying on the polarizing plate of the polariscope (**13**).

Just to wrap up the ruby examination, it was clear from the view of the table facet that there was very little damage or wear

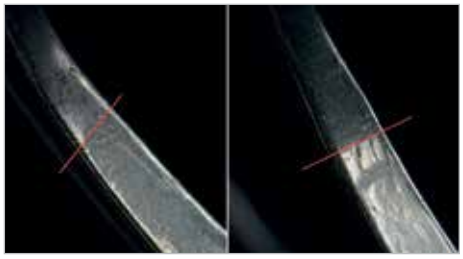


15: (a) Punch mark and (b) stock-reference punch mark inside shank.

considering the ring dates back to about 1930 (**14**).

Finally, "The classical diagnostic guide to the internal world of Burma rubies", according to page 325 of the *Photoatlas of Inclusions in Gemstones Vol. 1* (1986) by Gübelin and Koivula, is: "...small nest-like concentrations of tiny rutile needles... accompanied by loosely strewn calcite and dolomite crystallites and a swirly haziness."

So the original job was complete — natural Burma ruby with original fractures that had been subject to iron staining/deposits.



16: Inside the ring shank can be seen a polished finish above the red line with a dimpled surface below, due to being hammered on a triblet.

THE MOUNT AND COLOURLESS STONES

However, my list of possibilities, drawn up at the outset, included queries about the mount as well as the main gem. It was time for an examination of the whole thing! Is the mount a genuine Art Deco ring? Can we apply the same meticulous scrutiny to determining that?

Of course, the shape and design of the ring were typical Art Deco style. Inside the shank there were two punch marks, a 'Pt' representing 'platinum', and a reference mark, 'W1327' (**15**, **16**).

Platinum articles over 0.5 g have required hallmarking for the last 40 years (this ring weighed 3.5 g). A genuine ring, of Art Deco style, made within this period, would require a hallmark for it to be sold over the counter. But a fake replica would also have just a 'Pt' punch mark, so that doesn't help. What about the reference number? It was made up of individual punched numbers (the old method) and not machine engraved (the modern way). It contained a '3'. The modern '3' is generally represented with a curved top, as shown in the '375' millessimal mark for 9 ct gold stamped by the British Assay Offices since 2 January 1975 (the 1973 Act actually took effect on 1 January 1975, but the offices were closed on Wednesday the 1st!).

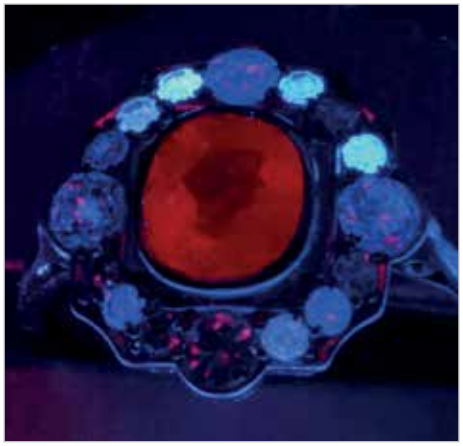
17: The chenier tube in the shoulder had the same width wall all round, was clean around the inner shoulder 'V' gap and showed its solder joints. Magnification approx. 12×.

18: The holes for the small diamonds are shaped and the whole back is polished. Magnification approx. 12×.

Prior to this the '3' had a straight top, as in **16**. Whilst looking at the shank I noticed that there was no solder join mark at the back, so it had not been altered radically in finger size from its original size, but the dimpled effect (shown in **15**, **16**) showed marks typically inflicted by the steel triblet (tapering steel bar used for forming rings) that had not been smoothed. This effect was seen all round until just below the shoulders, as indicated in **17**, which was evidence of the ring shank having been 'tapped up', maybe a couple of finger sizes by hammering only.

This, of course, is no evidence of age, just an observation. To eliminate the possibility of lost-wax casting, which became prevalent immediately after 1945, I needed to examine surfaces and look for solder joints (**18**).

20: The diamonds were brilliant- and eight-cut, with a plain-edge finish. Magnification approx. 25×.



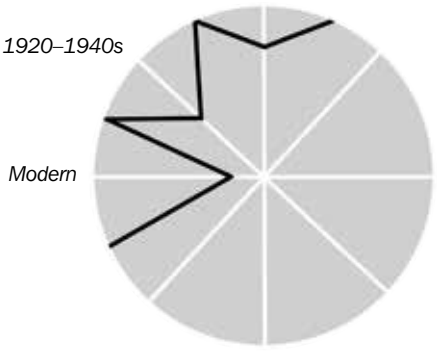
19: The ring under LWUV.

Older pieces are generally well made, by hand, with great skill (much of the trade today relies on 'mounters' cleaning up cast components). The underside of the top plate from which the settings are cut out displayed the characteristic shaping of the round drill holes and a polished finish typically found in pieces from the nineteenth century up to the 1950s. This extra effort is rarely expended today at current hourly rates of pay!

All the surfaces, even the hidden ones, showed no evidence of the stippled or 'orange peel' effect of the casting process. It is possible to 'clean up' castings to look like handmade items, but every surface, nook and cranny has to be filed or scraped and buffed or burnished. It is extremely difficult to make a cast ring look handmade to someone who knows what to look for under a 10× lens; less difficult for someone who only looks at the parts on general view. This ring was handmade.

How about the settings and colourless stones? The stones looked like diamonds (adamantine lustre, very flat facets, sharp facet edges, an occasional small inclusion, the right look to the internal reflections and the right apparent depth of the culet from the table), but to show willing I switched the LWUV lamp on to see if there was a difference in their responses (**19**).

The ruby, as expected, showed bright red, and the diamonds displayed fluorescence



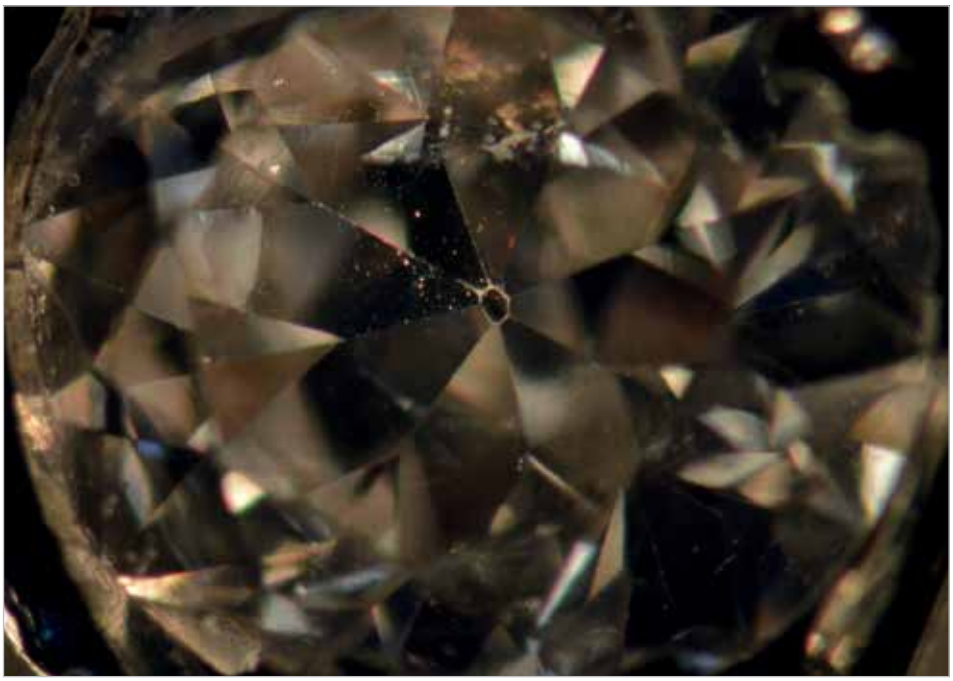
21: The lower pavilion facet was very small at first, hence it was termed a half-facet, reaching further towards the culet as time went on.

varying from inert through to slight, moderate, strong and very strong. The very bright ones obliged me with a yellow ochre phosphorescence for a while after the lamp was switched off. SWUV showed very dull red for the centre and much reduced fluorescence for the border stones.

The diamonds were four round brilliant-cut and eight single-cuts (or eight-cuts), and the settings were 'plain-edge' (**20**).

The brilliants I estimated at around 0.12 ct each and the single-cuts at around 0.025 ct each, giving a total diamond weight of around 0.78 ct. Single-cut, or eight-cut, diamonds were universally used during the Art Deco period and up to the 1980s, when automatic diamond polishing meant the full brilliant-cut could be applied to the very small stones. Gradually, even stones as small as 0.01 ct (1.3 mm) were offered by all the merchants. In terms of appearance, diamonds under about 0.05 ct (2.4 mm) look better with the single-cut, as the brilliant cut's very tiny facets at this size give very tiny pin-pricks of light! However, it was the four brilliant-cut diamonds that helped with a date. A give-away on a brilliant's general age can be ascertained by looking at the lower pavilion facets and how far their point is along the main pavilion edge (**21**).

The brilliant-cut diamonds in this ring had the lower pavilion facet reach about half-way along towards the culet (**22**), in addition there was a small culet on two of the brilliants. The culet went from being very large in the nineteenth century to small in the twentieth century, getting smaller to virtually non-existent as a facet by the Second World War.



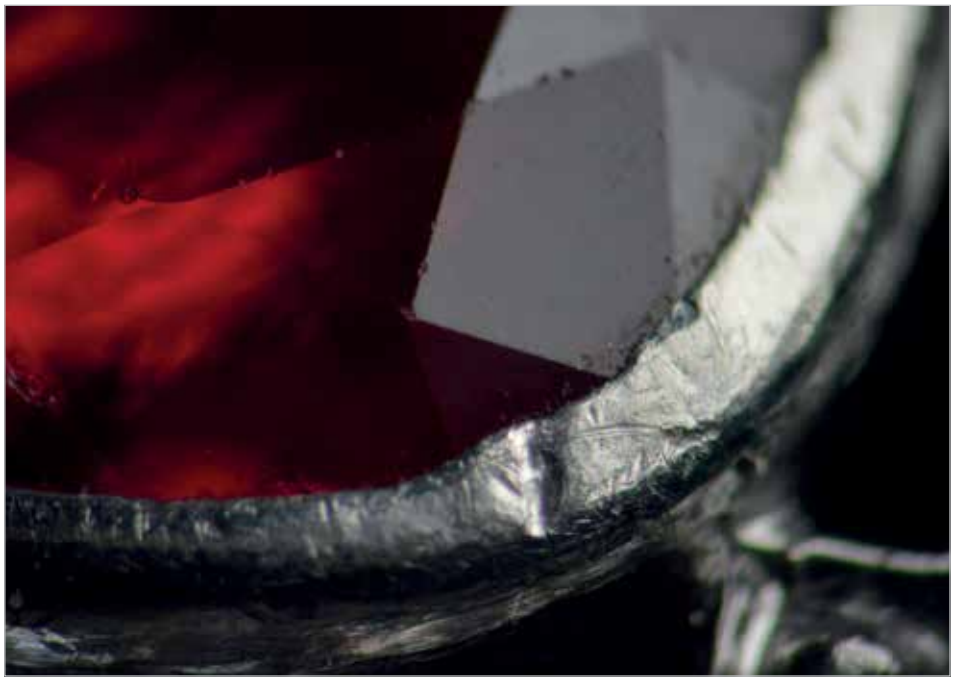
22: The lower pavilion facets reach about halfway to the small culet. Magnification approx. 40×.

It is extremely difficult to make a cast ring look handmade to someone who knows what to look for under a 10× lens...

The edges of the settings and the rubbed-over centre setting were 'plain-edge' (**20**), as was the custom from around 1925, as opposed to the millegraining of the edges before the First World War.

I did not test the platinum (apply a drop of aqua regia acid to a prepared surface — no effect on platinum) as there was no sign anywhere of either tarnish or worn-through rhodium plating. In other words, it looked exactly as I would expect a platinum ring to appear.

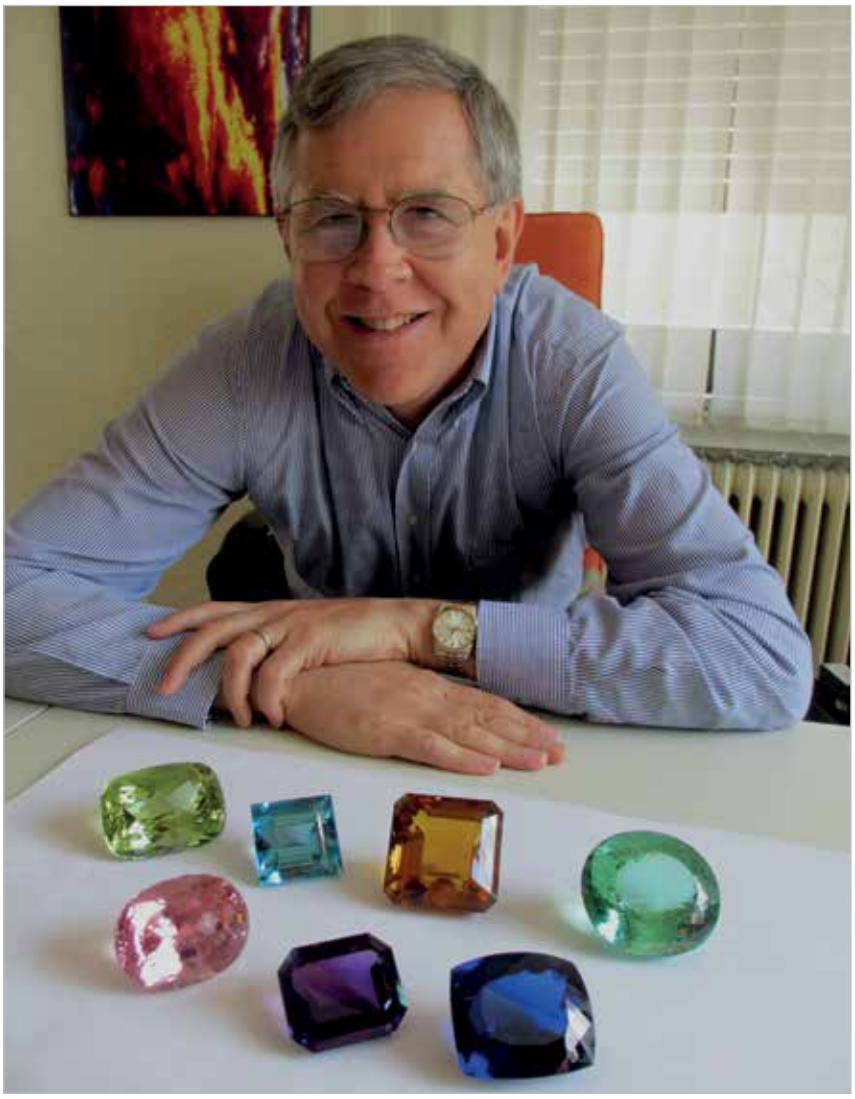
So was this natural ruby the original or a replacement? The shape was slightly unusual in that if the original stone had been lost a replacement would probably be cut-down from an existing faceted gem, which would be oval. The table facet would then be out of keeping (only minimum work is done usually) rather than as it was (**14**). The marks on the ruby rubbed-over setting edge were as expected for a stone that has been set for a long time — minor nicks and scratches, which appear different from the file marks of a more recently set stone (**23**). Going back to my original list therefore, I concluded that the ring was as suggested in item **1**, i.e. an Art Deco platinum ring set with the original natural ruby in a natural diamond surround. ■



23: Nicks and scratches worn onto the setting edge. Magnification approx. 40×.

National Treasure

Claire Mitchell FGA DGA talks to Dr Jeffrey Post, chairman of the Department of Mineral Sciences and curator of the National Gem and Mineral Collection at the Smithsonian Institution, about advanced gem testing, the Hope diamond and the importance of donations to a museum.



Jeffrey Post with an assortment of beryls, a tanzanite and an amethyst. The amethyst (402 ct, Brazilian) is now in the Smithsonian Institution's collection.

How important do you feel advanced testing is in moving forward?

I think it's getting there — a lot has changed in the last 10–15 years, particularly when you look at the kinds of sophisticated research instruments that the various gem labs have now. These days you've got pretty smart scientists out there trying to figure out ways to treat and enhance stones, so it takes pretty smart scientists and good instrumentation to be able to detect these treatments and enhancements. Nowadays there are labs all around the world that are treating stones — sometimes you don't find out about certain treatments until quite a bit later — so we are in an 'arms race' of sorts. It's getting to be fairly sophisticated material science — the kinds of techniques that are being applied are ones that are not always easy to detect, and ones that we would never have imagined that could be done.

I, and many others, have made the argument for a long time that we need well-trained scientists working in some of these labs, because the nature and sophistication of what is being done is dealing in the scientific. A lot of people trained as gemmologists were never trained as scientists and, while I don't mean to demean or to minimize the credentials or experience of gemmologists, you need scientists in order to assist with these detections. Unfortunately there are not a lot of opportunities for scientists in university laboratories to work on materials that are of interest to the gem industry. Funding is an issue too. There is a sense that if it's a gem material it's not 'serious' science — I know good scientists that, for years, have tried to get funding to work on legitimately interesting projects that I think would be of great interest and benefit to the gem world, but they can't get the funding.

Smithsonian's National Museum of Natural History on the National Mall in Washington, D.C.
© Smithsonian Institution.

I think it's a shame that there isn't a really clear path for someone to pursue research in science that will be directly relevant to gems.

However, GIA — along with a couple of other groups — have tried to get together some funding to hire post-doctorates to work on gem-related projects, and have provided hands-on training to people that have good backgrounds in chemistry, physics and material science. It's clearly a step in the right direction — in the end you get someone who has that scientific background, but who also has some experience working on gem materials and who has been introduced to the gem world.

I think that the gem industry has some responsibility to try to help fund more of the kinds of research that need to be done; research which will ultimately benefit the industry. If they are the ones that are going to be benefiting then really they should be the ones to pay for it. So if you have people who are depending on the next new bit of research to have some way of identifying a particular treatment, then there has to be some investment in that research to do that sort of thing. Look at beryllium diffusion treatment, for example. That was something that no one ever expected — who would of thought of diffusing beryllium into corundum to change its colour — it's a pretty sophisticated treatment that took some research to figure out and understand, and then to develop a way to identify it. The trade were actually behind on that process by several years before it was finally cracked.

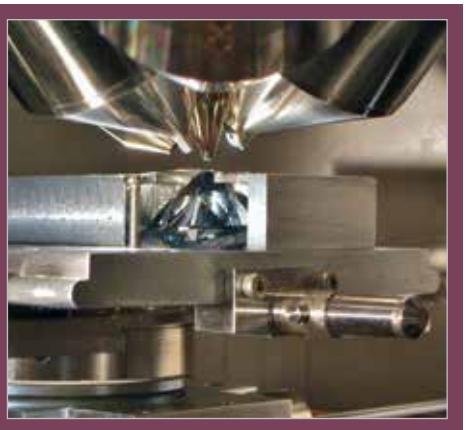
The bottom line is that the gem industry should be investing a little more money into supporting research scientists by providing funding and grants. If all the various gem organizations got together and put up some money, you could actually fund a grant for a student to conduct research into a specific area, approved by a committee within the industry. However, nobody wants to spend the money — everyone wants to spend the money on something that will, understandably, give an immediate return. It needs to be thought of as a much longer-term investment — people need to think about the health of the industry. For the good of all of us we need to figure out ways to be sure that we are staying up to date with technology, research and developments in related scientific fields.

The Smithsonian carried out advanced testing on the Hope diamond. It was reported that the type of instrumentation that was used created a very, very tiny hole in the diamond — did it? Was it hard to make the decision to test it in that way?

I hate to say it but it did. The key words here are that the hole was very, very, very tiny — if you look at it under a microscope you still can't see it. However, the decision to test in that way wasn't hard, not once I knew what the technique entailed. We had worked on other materials before we worked on the Hope diamond, and we worked on other diamonds before we worked on the Hope diamond, so we had a pretty good understanding of what we were doing, what the test would involve and how the diamond would respond to it.

We have a saying at the Smithsonian that every specimen in the collection is available for research because ultimately, why are we keeping these things if we are not learning from them? The Hope diamond is a very rare, blue diamond that is a piece of the earth. We use minerals and crystals to learn something about the earth — the Hope diamond has its own story to tell us about how it was formed, where it came from and how it is different from other diamonds, so I think that the fact that we have it in the collection means that it is available for us to study. If it was owned privately it would probably never be loaned to us to do the kind of study that we wanted to do. We do have some responsibility towards the stone — we are not going to do something that is going to damage it. We have a responsibility to protect and preserve this really valuable and unique object, but the great thing about being there as a scientist is that you get to study the object, and you can therefore make good judgements.

The instrument we use is the ToF-SIMS machine — 10–15 years ago we would never have imagined being able to use such an instrument or for somebody to have one in their department...



The Hope diamond in the Time-of-Flight-SIMS instrument. Photo Jeffrey Post.

It wasn't just me, it was a measured and thoroughly assessed decision. All the way through the tests we kept a close eye on things and made sure that it was working the way we thought it would, and so yes, we knocked a few billion atoms out of there, but no one is going to miss those few billion atoms. In the end we learned a fair bit of information about the diamond. We got a lot of publicity after we did that experiment and I think part of the reason for that was that people never thought about the Hope diamond as anything other than a 'cursed' gemstone worth a lot of money, so I think for many it was an eye-opener to think of it as something that is worth studying. The fact that it stays in the collection means that we can continue studying it. The instrument we use is the Time-of-Flight-SIMS (ToF-SIMS) machine — 10–15 years ago we would never have imagined being able to use such an instrument or for somebody to have one in their department, so who knows, 10–15 years from now, what other instrumentation will come along? What other options for testing will we have access to that are equally non-destructive? It's therefore nice to know that we can go back and continue to try and pull a few little pieces of information from the item and continue to learn its secrets.

How important is the private sector to the purchase of acquisitions?

It's absolutely critical as the Smithsonian is a public-private partnership. The Smithsonian started as an institution from a gift given to the United States by an Englishman, James Smithson, so it was set up as what they call a 'trust instrumentality of the federal government', therefore it was founded entirely with private money. As the institution grew federal money was added to the funds — this is partly because in the 1800s the federal government sent out global exploration expeditions and were accumulating objects that were being brought back. A lot of these objects started coming to the Smithsonian, and so federal money started coming in to help support the care of those objects. More and more it became a combination of a federal and a trust partnership, and that's what we are today. Activities such as research, outreach programmes and building collections and exhibits are all done with money from the original trust fund. We end up depending very heavily on private donations, particularly endowments, that people have set up.

The Maharaja of Indore Necklace, featuring 374 diamonds and 15 emeralds. The emeralds are from Colombia, while the diamonds are from India. The necklace was purchased by the Maharaja of Indore in the early twentieth century, and was subsequently purchased from the Maharaja's son in 1948 by Harry Winston. The necklace then became part of Winston's 'Court of Jewels' travelling exhibition. Gift of Mrs Cora H. Williams in 1972. Photo Chip Clark. © Smithsonian Institution.

Some of these go back 100 years, whilst some of them are more recent, so one of our goals is that we are always trying to build up our endowments to continue to support the work that we do.

Typically the collection has grown not from what we have purchased but from what people have given, so the big private partnerships are the donations that people have given us to help build the collection. Sometimes they come in as a large collection of minerals, sometimes as a single piece of jewellery or a single gemstone. The Smithsonian has been around for a long time (by USA standards, anyway) and so if we continue to accumulate at a steady rate the collection will grow to an even bigger collection.

Luckily we have time on our side; we don't need to get everything right away. One of the great parts of my job is the feeling that you are part of something that has had a long history and will have a long future — it's a cool feeling to be a part of something that has longevity associated with it. It gives you context for the work that you are doing and allows you to relax a little bit and say: "I don't need to get that thing this year", or "I don't need to sell everything to get that one thing", because that one thing, even if it goes into another collection now, will still be out there. If you plant the seed and tell people: "this is something that we would like to have", you just keep an eye on it or make a record and, over time, some come to you. For example, I have received calls from people that I have never met, saying things like: "In 1965 I visited the Smithsonian and one of the curators back then said this is something they would really like to have for the collection. In 1965 I didn't want to give it away, but now I'm 90 years old and I've always remembered that the Smithsonian said that they would like to have this, if you still want it now I am ready to give it to you." It's a nice feeling knowing you're benefitting from the work other people have done in the past and hopefully what you are doing now will be a benefit to those that come after you.

It helps me to realize that my job never

The Chalk Emerald, a stunning 37.80 ct Colombian emerald. It is reported that the Chalk Emerald was once the centrepiece of an emerald and diamond neckace belonging to the Maharani of the former state of Baroda, India. It originally weighed 38.40 ct, but was recut and set into a platinum and gold ring designed by Harry Winston. The emerald is surrounded by 60 pear-shaped diamonds totalling 15 ct. Donated by Mr and Mrs O. Roy Chalk in 1972. Photo Chip Clark. © Smithsonian Institution.

The Dom Pedro Aquamarine, cut from a large (35 cm high) crystal mined in Minas Gerais, Brazil. Cut by Bernd Munsteiner and donated by Jane Mitchell and Jeffery Bland to the Smithsonian in 2011. Photo Don Hurlbert. © Smithsonian Institution.

really had a beginning and doesn't really have an end; you are just stepping in as a caretaker of sorts, you keep things going and hopefully you will do some good things that will result in the collection growing.

We are so fortunate that the Smithsonian has such a positive name recognition — one of the things I will really miss when I leave is the feeling that I can pick up the phone or send an email to somebody I've never met saying: "Hi, I'm with the Smithsonian Institution and I would love to talk to you about xyz…" — invariably you get a positive response, a positive recognition of them knowing the place or having visited once, and it opens up so many doors. I don't ever feel like I am going out raising money for charity, all I have to say is: "I would like to tell you about what we are doing, here are some things we are working on…" and before you have finished talking they are already asking how they can help out. As the national museum of the USA we don't charge, and so there really is a sense that people feel like the museum belongs to them — there is no better situation than one where you're saying: "it's your museum, it's your collection, here's what we would like to do."

I have seen all the different types of donations in the showcase at the Tucson show, and there are some amazing pieces.

We are fortunate that people feel that they can trust the Smithsonian — they trust the fact that we will take care of the piece. I also think that at some point in people's lives they like the idea of giving something that will go on in perpetuity — in their mind at least. We all want a bit of immortality, right? And we all want to know that something we did, some part of us, is going to live on. I've really been impressed at how generous people are in the gem and jewellery industry — these are people who work hard to make a living, and for a lot of people the cash flow isn't always that great, but so many of the people that you meet in the industry love what they do and they love the stones. For example, at the Tucson shows people just love to pull things out and show you something special, or maybe their favourite thing, and so you always have this one connection in common: the love of stones. You get to know these people, and at some point they're saying: "I would love to have something of mine in the Smithsonian." Your grandchildren could one day come to the Smithsonian and say: "I'd love to see grandpa/grandma's piece" — and the great thing is that even if it's not on exhibit they will be able to find it, it will always be here and will always be in our database. I don't think you can get that sense of immortality anywhere else — you might put your name on a building or on a brick in a stadium, but that building is going to be knocked down or change someday. If your name is on a gemstone that's sitting in our collection it's always going to be there, it's always going to be the Logan sapphire, it's always going to be 'Rosser Reeves' star ruby — it's not going to change.

In the end my goal has always been to make every gift feel good for everybody. I want them to wait until it is the right time for them — you want them to feel really good about giving it, not like I've quickly 'sweet talked' them into something. You want them to feel so good about it that in the end they are saying: "thank you for giving me this opportunity" to you.

The Victoria-Transvaal Diamond Necklace, cut from a 240 ct rough stone found at the Premier Mine in Transvaal, South Africa, in 1951. Originally known as the Transvaal Diamond, the fancy 'champagne-coloured' diamond was originally cut to 75 ct but then later recut to 67.89 ct for better proportions. The Victoria-Transvaal Diamond is a pear-shaped brilliant cut and has 116 facets. The necklace consists of 66 round brilliant-cut diamonds, fringed with 10 drop motifs, each set with two marquise-cut diamonds, a pear-shaped diamond and a small round brilliant-cut diamond. Gift of Leonard and Victoria Wilkinson in 1977. Photo Chip Clark. © Smithsonian Institution.

The Logan Sapphire, a 423 ct sapphire cut from a crystal mined in Sri Lanka, framed by 20 round brilliant-cut diamonds totalling 16 ct. Gifted to the Smithsonian by Mrs John A. Logan (Rebecca Pollard Guggenheim) in 1960. Photo Chip Clark. © Smithsonian Institution.

If you are considering buying pieces and had two mineral specimens, one from a North American locality and the other from another location, but you had a tight budget, would your priority be the one from North America?

We are in this situation all the time — we are always seeing more things that we want to buy, so we are always having to make choices. One consideration for us is that we are a US national museum and so we always have a special interest in minerals or gems that come from the United States as we know that a big proportion of our audience coming in into the museum is from the United States, and we know it's the kind of thing that they relate to and get excited about — they like to see something from their state/part of the country.

So yes, we certainly consider that, but for any of those kind of decisions there are many factors that need to be taken into consideration, for example, we might see something that is the best example of something that we've even seen, and whilst we would like to have it we might know of a dozen or so others out there that are similar, so the chances are if we don't get that one now we will have another opportunity to get another one someday. However, there might be something else that is the best one and if we don't get it immediately then we're probably never going to get another chance, so we always need to assess what is the collection's greatest need. Price does matter as well — for example, one important stone could be 10 times as much as another, and if we didn't buy it we could buy five other things for the collection… so every time we make a decision it is a balancing act. The good thing is that those kinds of decisions are almost always made (especially if it's something of any higher value) by an acquisition committee, which I sit on along with two of my colleagues. We have always worked by consensus, that is, if we can't convince each other that something is the right decision then we move on. We figure that if it is something that is important enough for the collection then we should all be able to agree on acquiring it.

With such an extensive collection, is there a 'holy grail' still out there for you?

Yep there certainly is! Every once in a while we review our aspirational pieces; what are the things that we don't have, or that we would like to have a better version of? You know, a 20 ct Kashmir sapphire would be really nice. We have seen a few here and there but of course the prices are astronomical. It would have to be someone, someday, deciding that they would like to give us something like that. Also on that list would be a 25–40 ct Paraíba tourmaline — we have a 5 ct one, but there are a few people out there that have some really nice ones. When I see them they say: "Someday we are going to give that to the museum". So we will see if that happens. We are always keeping our eye on things like that — there are some Tanzanian spinels that came out a few years ago, the Mahenge material, beautiful stones. Again, we have a smaller one, but we'd like a really nice big one — they were just out of our price range, but they are beautiful. There are enough of them around that I am hoping one of these days one will land in our collection. There are also a couple of big diamonds out there that people have that we would love to have eventually.

If you were able to show anyone famous your collection whether living or dead, and they could be from any field, who would it be and why?

Being in Washington we have been fortunate enough to have had a lot of interesting people stop by to see the collection. There's different ways of thinking about it, e.g. who would you like to meet first of all, and then who would actually appreciate seeing the collection? It's most fun to show the collection to people that go: "Wow, you know, I know what that is, that's a really cool thing." It would be cool to take someone like President Obama around the collection and have a chance to chat about world politics at the same time — I think that he has enough interest in science and technology that he would appreciate the stones and why we have them in the collection.

If you were allowed to take one piece from the museum with you when you retired which would you take?

It depends how much prison time I would like to do! You know, honestly, I would not want to take any of the major pieces off exhibit, they belong there for the public to see, and I would feel really badly about taking something away.

Now, if there was a fire, it wouldn't be too hard to choose which piece to save, it would have to be the Hope diamond, right? Just because it has meant so much to the collection and has been such a big part of my career in terms of the connections and the attention that it has brought the Smithsonian and the collection. One could argue that it would be the hardest thing to replace, so that certainly would be a hard thing to leave behind. Also the Carmen Lúcia Ruby that we have would be hard to replace, it's one that came in whilst I have been working at the Smithsonian, so I have a special personal connection with it and so to me it is a beautiful stone that I wouldn't mind looking at every day, it would bring back good memories.

Calcite from Balmat, New York, weighing 1,865 ct. Cut by Art Grant and a gift of Harold and Doris Dibble in 1994. Photo Minor. © Smithsonian Institution.

Vietnamese spinels in a range of colours, from a suite consisting of 32 round brilliant-cut spinels that range from 0.60 ct to 4.60 ct, having a total weight of 57.71 ct. Gift of Smithsonian Gemstone Collectors in 2013. Photo Ken Larsen.
© Smithsonian Institution.

What is your favourite gemstone variety?
It's funny, I always used to say I really like spinels, but then suddenly they got really hot and popular, so now they are expensive. But I do like spinels, and the reason that I like them is that they are often still a little surprise to people who haven't been aware of what's been going on in the jewellery world. I like the fact that until recently they were almost always not heated or treated in any way, so when you looked at a spinel it was what it was. Vietnamese spinels also come in so many beautiful colours and from so many different places, so I think that for most people, if you could put out a really beautiful display of spinels, all 10-15 ct stones from different places around the world, and show them all the different colours, I think that they would be astonished. I also think that there is almost no other gem that would rival the variety of colours that would you would see in sapphires or rubies — I don't think even sapphires necessarily show the range of colours that you see in spinels — and when they are well-cut they are beautiful stones and to me are just absolutely mesmerising.

I also like the fact that they were hidden in history a little bit, people didn't know what they were for a long time, and it's only as people and science and technology caught up a little bit and people started looking a little more carefully, that it was a little bit more of a surprise. However, you could ask me the same question again, and I could give you different answers every different time. It's like asking who your favourite kid is.

Do you collect from source and if so do you have the opportunity to visit the mine areas yourself? How far have you travelled to do so?
We do a little bit of that, although we do less than they probably did in the past and probably less than I would like to, but part of it is: do you really have an opportunity to collect at source? Mines that I have gone to, in many cases they are happy to show you what they are finding and to show you what they are doing, but they don't really want you just to take the good stuff back — it is their product, they are selling it. Sometimes we will buy things from a mine, perhaps an interesting piece of rough that tells a story, or which is an off mineral. The nice thing I find about going to the mines is that you see a better cross-section of what's being found than what you see in the market. Often the only things that you see in the market are not the best things, but the things which they consider to be the most marketable or the most beautiful. From a scientific point of view it's all the other stuff that's in the mine that never comes out because they don't consider it as valuable that's good to see, so going to the mines sometimes gives you the opportunity to see it.

The last couple of summers we have been visiting and working with the miners at the sapphire mines in Montana — not so exotic, but it's a beautiful part of the country. We have contacts out there that we have gotten to know, so we have been visiting some of the mines and mining areas there. We realized that, for the US locality and for the importance of it, we really didn't have a very good representative collection of that material, so the miners have promised us to get a really good collection of Montana sapphires for the Smithsonian. In fact we have recently just spent time with a miner from Montana who actually donated to the collection a small ruby, which they almost never find in Montana.

In short, I have been to some of the mines in Brazil and some of the mines in Mexico and South America, but not a lot beyond. Part of it was that for much of my career I was raising a family and so I would say to my wife: "I am thinking about going to Afghanistan" and she would say: "Over my dead body!" One of the nice things about getting towards the end of my career is that I can start justifying taking the time to go to some of those places. This time next year I am hoping to be in Sri Lanka visiting some of the mines there — we have gotten to know a lot of people around the world and many have been very generous about offering us to come and visit, so hopefully one of these days I might be able to take them up on it. ■

If you would like to contact Jeffrey please email postj@si.edu.

[With spinels] I think that there is almost no other gem that would rival the variety of colours that would you would see in sapphires or rubies — I don't think even sapphires necessarily show the range of colours that you see in spinels...

The Carmen Lúcia Ruby, weighing 23.10 ct, was mined from Mogok in Burma. It is one of the finest large, faceted Burmese rubies known. Aside from its large size, this extraordinary gemstone displays a richly saturated homogeneous red colour, combined with an exceptional degree of transparency. The Carmen Lúcia Ruby is mounted in a platinum ring with two triangular-cut diamonds totalling 2.38 ct. A gift to the Smithsonian and the people of the United States in 2004 from Dr Peter Buck, in memory of his wife, Carmen Lúcia Buck. Photo NMNH Photo Services.
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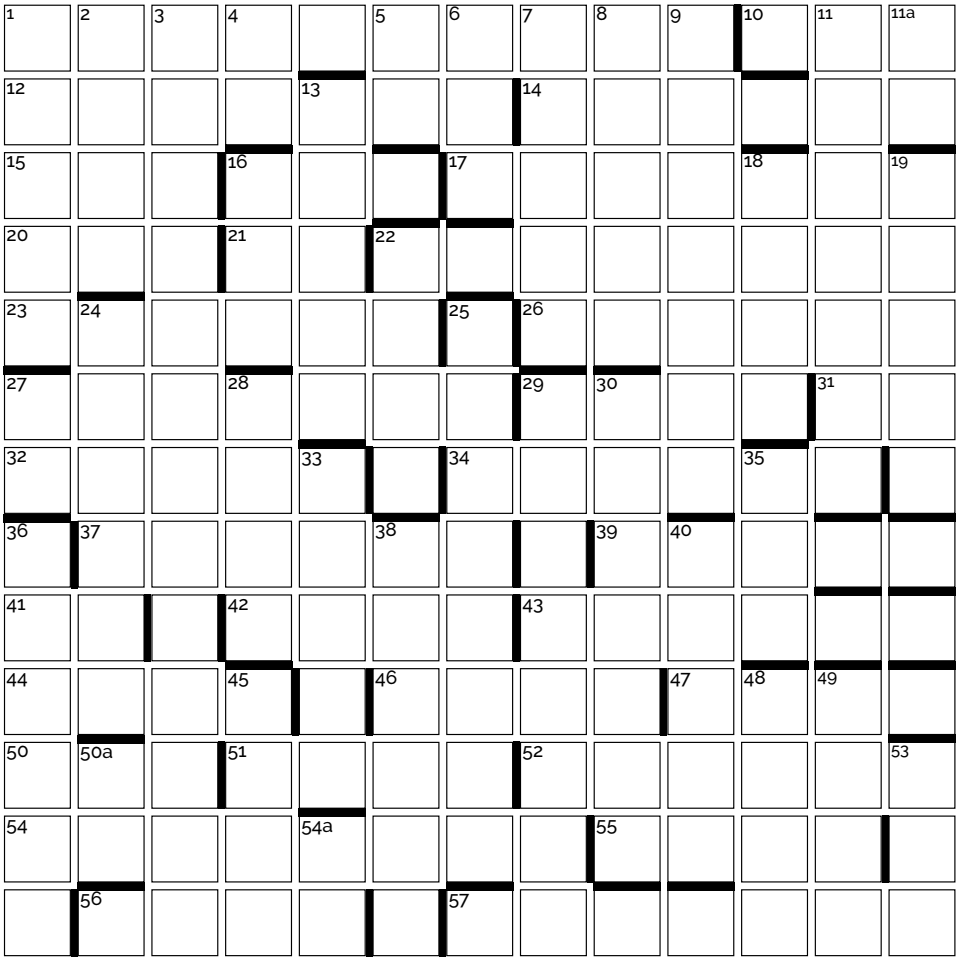
A gemmological crossword

This month we reproduce a crossword featured in *The Gemmologist*, Vol. IV, No. 43, Feb. 1935. Answers to appear in the next issue of *Gems&Jewellery*.



Across

1. A *very* complex borosilicate of aluminium.
10. A Gemmological Fellow.
12. Important properties, from IO's point of view.
14. Played the piano thumping well.
15. Portion of butter.
16. Coal product.
17. Gambler's perquisite made from a damned refrigerator.
20. Small beer.
21. "—, Stanley, —!"
22. How to draw a straight line.
23. This gemstone acts as host to hafnium and uranium.
26. A pillar, *not* of the Minister of Transport, but of the Church.
27. In a crystal necklace these are usually glass.
29. Find this, and the ruby is genuine!
31. 50% gold.
32. A cow calls backwards at the flower's end.
34. Seems much connected with laundry.
37. I go to India at 4400A.
39. Endo- for pearls, micro- for synthetics, peri- for Royal Weddings.
41. Cockney tile.
42. 26 lacks company.
43. Higher dispersion than diamond.
44. Judge.
46. Ceremony that sounds right.
47. Throw-back.
50. Scots Christian name.
51. Is not contracted.
52. Even half this cat is quite enough!
54. In the midst of invisible surroundings a Roman Catholic seems quite put about.
55. Proceeds on definite lines.
56. Right and just.
57. Can a green stone come from a Red Sea?

Down

1. This yellow stone starts like an infinitive, and, like an infinitive, is easily split.
2. Shows colours, but is not a "coloured" stone.
3. Speak foolishly, is quite absurd (2 words).
4. Refractive index.
5. Motorist's friend.
6. Doctor of Laws.
7. In a green embrace.
8. Secreted by a mantle.
9. Shows red under the "Chelsea" filter.
11. Grandparent to Gemmology.
11a. These days.
13. Paddle boat.
16. In Talbot House, this stands for Talbot.
18. To hurry this up!
19. Rare gas of the atmosphere.
22. Sole.
24. Named after one of its three colours; its SG and RI are near those of quartz.
25. Jeweller's jacinth.
27. Rule Britannia, but be quick writing this down!
28. President of the N.A.G.
29. Spangled feldspar.
30. Mixed pins, etc.
33. President of the G.A.
35. Hard or soft? A herring may have it either way.
36. Turns diamonds green.
38. Family name of an isomorphous group.
40. Often goes in threes.
45. Cat's eyes needed!
48. Hundred-headed youth.
49. Roman man.
50a. Not an egg.
53. Rum unit.
54a. Follow up Q & S.

A&Z Pearls' award-winning
"Prima Ballerina" 18K gold
and freshwater pearl
with diamonds

Coming Soon:

The Sisk Gemology Reference

by Jerry Sisk

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