

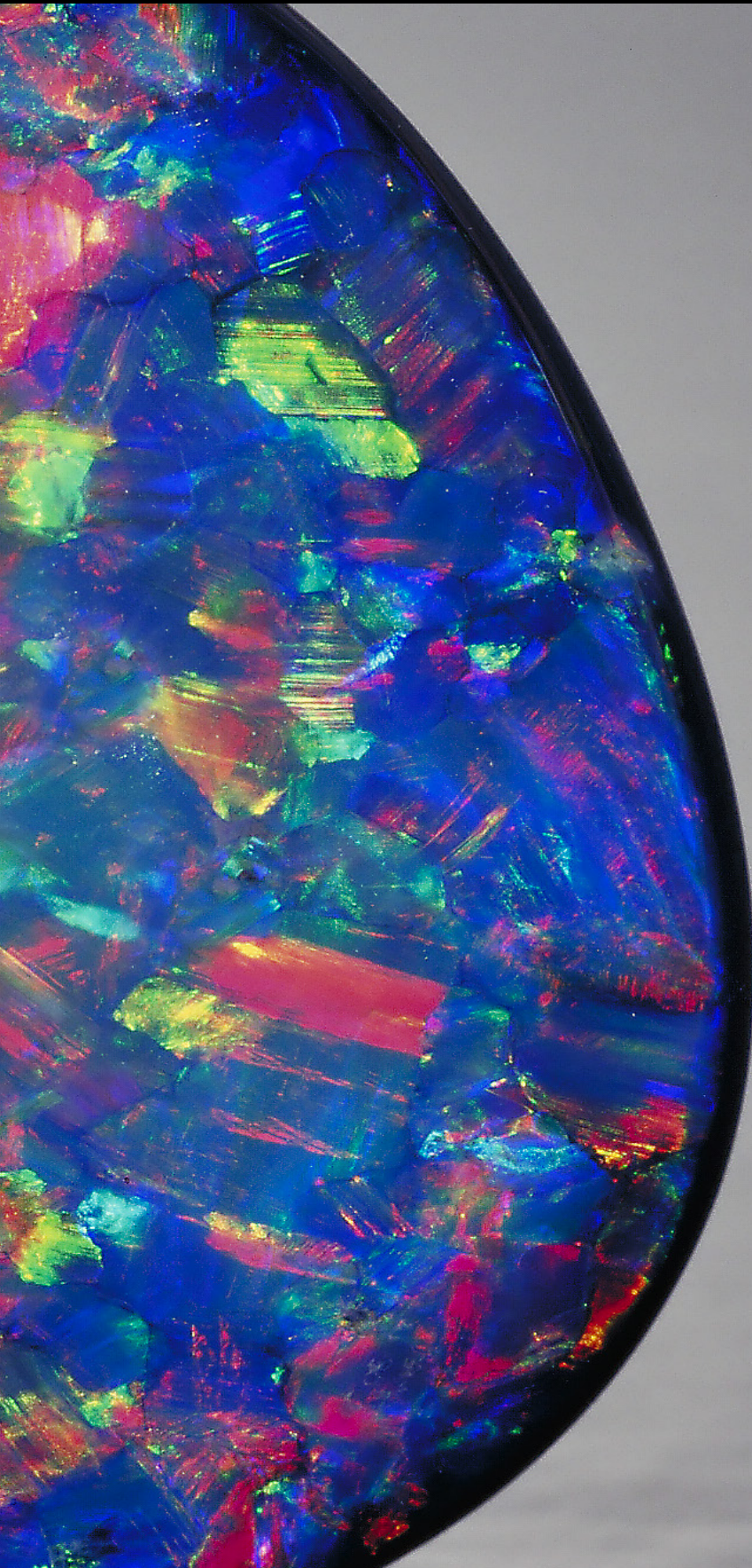


Gemmology Today

February 2017
Quarterly Publication

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A comprehensive gemmological program for tomorrow's gemmologists.

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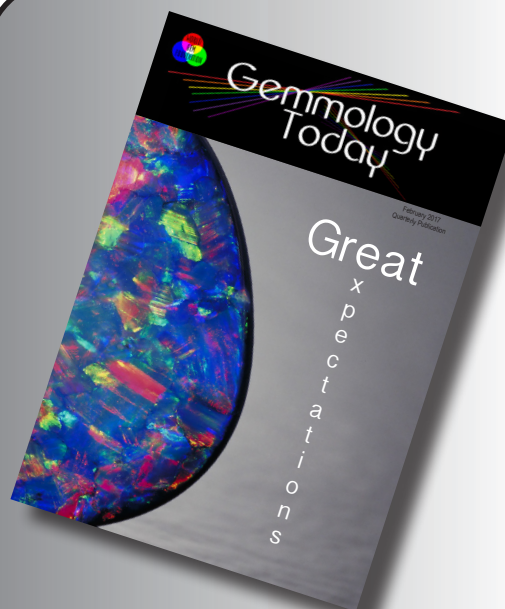
* General Interest Courses

'Sometimes it's the journey that teaches you a lot about your destination'

WORLD GEM FOUNDATION

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Cover Photograph by Tino Hammid

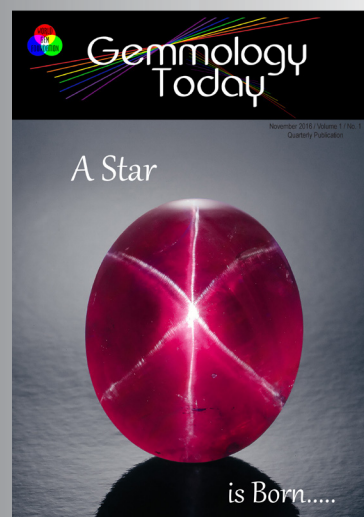
Published by The World Gem Foundation & Amazonas Gem Publications

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November 2016 Issue



Geoffrey M. Dominy is the author and creator of the digital e-book 'The Handbook of Gemmology', founder of the World Gem Foundation and editor of Gemmology Today.



World Gem Foundation Founder
Geoffrey M. Dominy

I am usually not lost for words but they say there is always a first time. In the first three days of the first issue hitting the cyber waves, it reached more than 10,000 readers and was viewed in 43 countries including the U.S.A, Australia, Canada, the U.K, Holland, Switzerland, France, Sweden, Austria, Brazil, Portugal, Thailand, Finland, Hong Kong, Israel, New Zealand, South Africa, Spain, Bolivia, China, Cuba, Czech Republic, Germany, Greece, Hungary, India, Indonesia, Ireland, Italy, Japan, Norway, Poland, Russia, Sri Lanka, Tanzania, Turkey, Ukraine, Vietnam, Greenland, Mozambique, Denmark, Belgium and Taiwan.

This is the power of social media and it is truly something to behold when you witness it first hand and just shows us how technology has changed our lives especially in the world of publishing.

The comments I have received have been incredibly uplifting. I would be lying if I said that this publication was not published with a tinge of trepidation but then again, if you talk to anyone who has stepped 'outside the box', they will tell you that it is the risk of failure that drives them forward.

We really felt there was a 'gap' in the existing publications and gauging from the reactions we have received, it would appear that we were right.

Gemmology Today also gives our contributors a new sense of freedom, freedom to explore a wide range of topics that perhaps would not be found in other publications.

Many readers have asked if Gemmology Today will be available in print and the answer is 'Yes' and 'No'. Every quarter the individual issues will be published digitally but once a year we will package the four issues and make them available as a printed publication.

In this issue we thrilled to add Antoinette Matlins, truly a legend in our industry, to our editorial team and I am sure our readers will appreciate the wealth of knowledge that she will bring to this publication. We will also be showcasing the next generation of gemmologists in our feature interview with Billie Hughes, who is confidently stepping out from the shadows of another iconic figure, her father Richard Hughes and making waves and winning awards with her inclusion photography.

If you would like to be a contributor to Gemmology Today, we would love to hear from you. The more the merrier! This is your publication and we would truly like it to represent all facets of our industry, from all over the world.



Into the Valley of the Diamonds

Diamonds and gemstones have been surrounded by myths and legends, often adding to their attractiveness, for as long as they have been known. The most widespread legend on the origin of diamonds is found in various tales of a valley of diamonds. The various versions on the story of a valley of diamonds all have the mutual ingredients of an inaccessible valley containing diamonds or other gemstones inhabited or guarded by birds or serpents, always poisonous and dangerous. Some of the stories do not mention diamonds but instead corundum, hyacinth or just gemstones in general. The diamonds (or other gems) are recovered by using meat to lure large birds to pick up the meat, to which the diamonds have stuck and then retrieving them by scaring the birds so they drop the meat, visiting their nests or simply by killing them.

The original first version of a tale about a valley of diamonds is unknown but we can recognize parts of it from early historical records and writings. Pliny the Elder tells in book seven in “*Historia Naturalis*” about how the Arimaspi people have troubles with griffins stealing gold from their mines and that they need to hunt the griffins to recover the gold (Pliny 2016). This is a description similar to an earlier legend on a valley filled with gold and guarded by griffins (Nikischer 2014). We also recognize the presence of serpents as guardians of treasure from the legends of Solomon where fire-spitting serpents guarded his magic ring (Kuehn 2011).

The oldest preserved version of the story of the Valley of Diamonds is written by Epiphanius, Bishop of Constantia on Cyprus, 315-403 C.E. His story is not about diamonds though, instead his version is explaining the origin of Hyacinth, a gemstone mentioned as one of the twelve stones on Aaron’s breast shield in the Old Testament. Epiphanius’ version bears characteristics of an older story that he manipulated to suit his focus on “hyacinth”, an obsolete name for orange-brown zircon or hessonite garnet (Nikischer 2014, Laufer 1915, Webster 1962). Epiphanius tells us that the valley is deep and surrounded by high steep mountains, the kings from the surrounding countries sends their people there to collect all kinds of gemstones by throwing meat from sheep down the valley and when eagles pick up the meat with attached gemstones the people could collect them (Maillard 1982).

A Chinese version of the legend of the Valley of Diamonds dating back to the 6th century CE places the Valley on an island in the country of Fu-Lin. Fu-Lin is described as an island inhabited by over ten thousand families and apart from a deep ravine containing diamonds that are recovered by the help of birds, there is also a forest where the trees seem to produce gemstones. Gemstones supposedly dropping from trees are recorded in earlier myths. The inhabitants of the island are also known to be very good gemstone cutters (Laufer 1915, Kunz 1913). The geographic location of Fu-Lin has been discussed at length and whether Fu-Lin is in Syria, Constantinople or Rome itself, the Valley of Diamonds is in Chinese tradition still located somewhere in the Roman empire (Hirth 1909).

There is a well spread myth about Alexander the Great discovering a valley of diamonds in India. The valley is not as in older versions of the story guarded by birds but by serpents suggesting Arabic influences. The story including Alexander the Great does not appear until sometime between the 8 and 10th centuries C.E. in attempts from Arabo-islamic writers to complete Aristotle’s *Meteorologica*. These attempts are mainly attributed to anonymous writers referred to as “pseudo-Aristotle” (Kuehn 2011). The legend is referred to repeatedly throughout the Alexander Romance: fiction and poetry with Alexander the Great as a character from before his death until modern times, and is mentioned by several Arabic writers, both with and without Alexander the Great, such as the mineralogist Al-Biruni (973-1048) in “*Comprehensive Book on Knowledge of Precious Minerals*”, by the poet Nizami (1141-1203) in *Iskandar-nama* and by mineralogist Ahmad Al-Tifashi (1184-1253), though in the case of Al-Tifashi the valley is filled with corundum that was washed down Adams Peak in Ceylon (now Sri Lanka) and during time of drought flesh was used to lure birds to pick up pieces of corundum which could later be collected (Kunz 1913, Meri 2006, Kuehn 2011).

The most well known version is the story from Arabian Nights, first written down in Arabic about 850 AD, where Sinbad the Sailor is dropped by a roc in a valley filled with diamonds but also with giant snakes. In “*The Book of Marvels*” Marco Polo describes how heavy rains bring diamonds down from

the high mountains near Murfili into deep inaccessible valleys inhabited by poisonous snakes. To recover the diamonds, meat is thrown down to entice eagles that recover the diamond-encrusted meat. The diamonds are then collected by either scaring the eagles so they drop the meat, visiting their nests or by simply killing them to see if they had swallowed any of the diamonds. An interesting detail in the story about Sinbad is that each bird nest has a different owner and that Sinbad gives diamonds as thanks to the owner of the particular nest he was brought to (*Maillard 1982, Davies 1984, Polo N/A*).

The legend where birds of some kind are used to retrieve diamonds after meat is thrown into the valley is common and occurs in several varieties. This might tell us something about the knowledge of diamond properties as diamonds are attracted to grease. In the story of Sinbad the Sailor rams are used, Epiphanius mentions sheep and Marco Polo describes that only the softest meat was used indicating perhaps an early knowledge of which meats were more efficient in attracting diamonds.

Pseudo-Aristotle warns about putting diamonds in the mouth as the serpent's poison adheres to diamonds making them dangerous. The myths that diamonds are poisonous occurs on several other occasions and may have been used as a way of preventing diamond theft by swallowing them (*Kuehn 2011*).

In India there was an early Hindu tradition to sacrifice cattle when new mines were opened. Meat was left in the open and soon picked up by birds, a circumstance that may be the origin to birds used in the myths about the Valley of Diamonds (*Kunz 1913, Harlow 1998*).

The myths and legends that created stories about a valley of diamonds or other gemstones do seem to have some historical origin. Most stories place the valley in India, a few in locations that can be interpreted as trade centers or pointing out directions for trade routes and one version suggests the valley was in Ceylon (Sri Lanka). The diamonds are difficult to collect from the depth of the valley and because they are guarded by poisonous serpents. The use of meat to recover diamonds is used in most versions of the story and might give information about knowledge on diamonds adhesiveness to grease but may also originate from the early Hindu tradition to sacrifice cattle at the opening of new mines. Marco Polo tells us that soft meat is most efficient and in other stories meat from sheep is preferred. The fatter or greasier meat the better it is for collecting diamonds. A well known myth is that diamonds themselves are poisonous, a fact that may have been invented by mine owners to prevent workers from stealing diamonds by putting them in their mouth. At least one of the stories of the Valley of Diamonds tells us that diamonds might be poisonous because poison from the serpents stick to the diamonds.

The simple fact that all versions of this myth point to the difficulties and dangers of collecting diamonds strongly suggests that the people of China, India, the Middle East, Northern Africa and Europe valued diamonds.

The belief, in the Chinese version, that the diamond valley was situated in the Mediterranean area does have credence since carving tools, made by molding diamonds into iron, were exported from the Roman Empire to China and this source remained the sole diamond supplier to China for a considerable period of time. The fact that the story of a valley of diamonds is so well circulated also suggests that even though very few people had ever seen a diamond, diamonds were recognised all over the known world no later than the tenth century.

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Rough Diamonds

Photo: Tino Hammid



ANTOINETTE MATLINS, PG, FGA, is an internationally renowned gemologist and is the author of the best selling books *Jewelry & Gems: The Buying Guide*; *Gem Identification Made Easy*; *Diamonds*; *Colored Gemstones* and many other books about buying and enjoying jewelry and gems.



Treated Gems Are Acceptable - But Non-Disclosure Is NOT



Gemstone treatments have been used since prior to the Roman period, but the routine use of treatments is a relatively recent phenomenon. Most people in our industry agree that there is nothing wrong with the use of treatments themselves – without treatments today, only the world's wealthiest and most powerful would be able to afford them because they've become so rare – but failing to disclose treatment is not acceptable. Many respected dealers do provide disclosure, but all-too-often the treaters themselves have not disclosed what they are doing, so many dealers are selling them initially without disclosure, often unwittingly because they didn't know the material was treated. Or worse, were told the material was not treated!

In no small part, this is because one of the biggest problems is the lack of cooperation between treaters and gem-testing laboratories BEFORE the treatment is introduced into the marketplace. Since laboratories aren't testing for a specific treatment they don't know exists, the failure of treaters to work with laboratories prior to introducing material results in treated material, or material being treated in a new way, obtaining laboratory documentation that may not be accurate. A red-flag is raised only in cases where the "new" treatment provides characteristics that are unusual, prompting the laboratory to test further, often querying the important dealers themselves, and treaters known to be reliable and forthcoming.

This lack of communication between treaters and laboratories, and the lag-time between understanding how to distinguish

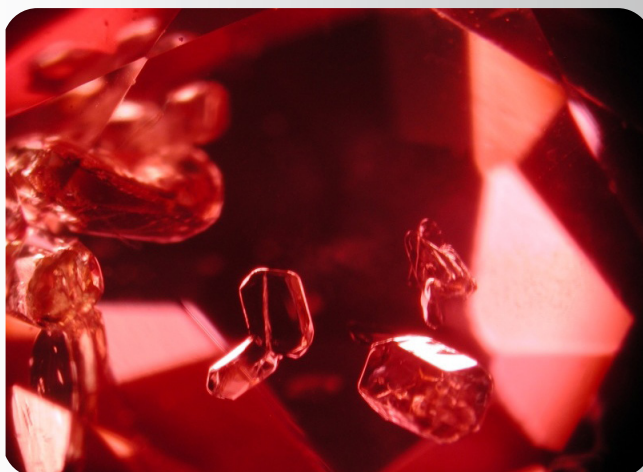
natural from treated, and one type of treatment from another, is always destructive, and the longer the lag-time, the more destructive. Sometimes, when labs begin to see too much material in the market, for example, or prices that are too low for the quality the material appears to be, they may become suspicious and figure out what's being done. But in reality, many treated gems get sold without "disclosure" because the dealers and the labs alike are unaware and detection protocols have not been established.

This is not to say that all treaters behave this way – smart treaters realize that working with labs to establish detection criteria makes the "treated" material much more acceptable in the marketplace; people are terrified of "undetectable treatments" and it always results in declining sales for both natural and treated goods, but when knowledge about the treatments is available, and detection protocols are known, then the addition of another treated gemstone simply provides a new market for that material. A close look at the current jewelry market, however, indicates that this is frequently not the case, even with treatments that have been used for decades and that are considered "acceptable" choices for consumers. Bottom line: consumers are usually not advised that any gem has been treated.

In reality, while the picture is beginning to change, disclosure has been ignored for decades because prior to the 1960s, "treated" gems were not the norm. I recall clearly that during the 1940s and 1950s the "routine" heating of sapphires and

rubies was not occurring (nor would heating of the material being mined from the known sources at that time have really yielded a significant increase in available faceted stones due to high rates of breakage); it was not until the 1960s, when a new source of lovely, clean material was discovered in Thailand, that “routine” heating became possible, and provided a much-needed method to meet the rapidly rising global demand. The new material responded very well to heating, with minimal breakage, and since then heating techniques have also changed and improved, and material that responds very well to low-heat techniques over a longer period of time –and which are more difficult to detect—is also entering the market.

In fairness to dealers and retailers in the 1960s-1970s, many stones were being sold to the trade at every level with no disclosure by the treaters/dealers. By the time it became known, dealers took the position that it was a permanent change, and they weren’t adding anything to the stones that wasn’t part of the natural material – they were just extending mother nature’s process and keeping it “in the oven” a little longer -- so it didn’t really qualify as a “treatment.” Furthermore, they were quick to point out that the “price” wasn’t affected!



Clusters of Apatite Crystals in Unheated Ruby from Mogok
(Photo by Peter Grumitt)

Initially it was true that the price of “natural, untreated” sapphires and rubies was almost the same as the treated, and the public never knew there was a difference. Since they didn’t KNOW that what they were buying might have been heated – some were and some weren’t – why bother to mention it. But no one seemed to factor in “rarity” ... and how much more special it was to have something truly “natural,” made by nature without human intervention (except fashioning the rough into sparkling cut/polished gems)! FACT: naturally beautiful gems were and continue to be rarer. For those who actually got a naturally beautiful sapphire or ruby, for example, in the days when there was no disclosure, they were very lucky indeed!

We now fast-forward to the early to mid-1990s, when the age of appraisals and insurance documents emerge on the jewelry scene, that the extent of “treated” stones became known, along with increasing dissatisfaction among consumers who had

bought “treated” gemstones or gemstone jewelry, without disclosure.

This led to another unforeseen development related with trying to stem the tide of consumer dissatisfaction. In an attempt to reassure customers that there had never been any intent to deceive or misrepresent, trade organizations began to publish pamphlets about colored gemstones, talking about treatments dating back to ancient times and creating the impression that colored gemstone treatment was common and routine, and that nothing had really “changed” except technology, enabling laboratories to detect the treatment. Thus, it was perfectly normal to get a lab report indicating heat or certain other types of treatment.

It didn’t take long before consumers were being told at the retail counter that “all colored gemstones are treated in some way.” But this was, and continues to be, misrepresentation as well, because this had not been the case throughout the first 2/3^{ds} of the 20th century (and before), nor is it the case today. There are still gemstone families that are not (yet) routinely treated; and even in those gemstone families where treatment is routine, there are also the occasional rare gems that are unearthed that need no treatment to enhance their beauty!

And let’s not forget the last of the “big three” -- ruby, sapphire and emerald. In the 1940s and 1950s, most sapphires and rubies were not treated, nor were most other gems, but there was one exception: emerald. Emerald was then, and remains, an exception.

Emerald has been oiled for centuries, but the oiling of emerald has always been considered a fair trade practice and not a treatment. This is because oiling was not altering the material nor was it concealing anything. Instead, it aided in more accurately grading the most important factor affecting value in any colored gemstone: COLOR. When light enters and travels through an unoled emerald, whenever it arrives at a fracture within the emerald, the fracture causes the light to scatter; when it scatters it creates a whitish-ness in the area, and this whitishness dilutes the true body color of the emerald. Since the most important factor affecting the value is the depth, saturation and hue of color, this had an unwanted negative impact on the true, inherent quality of the emerald, but by filling the fracture with oil, the oil provides a medium through which the light can pass, eliminating the whitishness in the area of the fracture, so its true color can be more accurately graded! And in terms of clarity, the oil does not eliminate their visibility so one can still accurately grade the stone’s clarity, along with impact of any fracture on its toughness/durability, and thus, wearability! So how could that be bad?

Oiling, however, is not “permanent” and immersing an oiled emerald in an ultrasonic cleaner, for example, can remove

the filler, resulting in the emerald's appearance returning to its pre-oiled appearance. But this is not such a dire situation because, in such cases, the stone can simply be re-oiled.

In recent years, epoxy-resin fillers have been added to the type of fillers used for emeralds, as well as tinted resins. These provide serious challenges to the trade, with respect to misrepresentation of quality to be better than it actually is, and epoxy resins are more difficult to remove or repair if necessary.

It is easy to see why the most coveted gemstones began to undergo "routine" treatment and how it has increased over the years due to increased demand. Then, as treatments of the big three became accepted in the trade, dealers of other types of gemstones—aquamarine, topaz, various colors of tourmaline, various quartzes, tanzanite, zircon, and sapphires in 'fancy colors' – saw opportunities to improve the appearance and market for many other gemstones, and various other treatments were introduced. In addition to the heating of ruby and sapphire and the oiling of emerald, we see radiation techniques becoming widely accepted, beginning with the introduction of irradiated "blue topaz" in the 1970s and later for other gemstones as well; in some cases these treatments are permanent, but in others the appearance can, and often does, change under certain circumstances. (Note: there is also naturally blue topaz, but unfortunately, the labs have never focused on distinguishing one from the other because the radiated blue topaz is so inexpensive, and the natural blue topaz market was never established before irradiated material became so popular).



Blue Topaz Before & After Treatment (Photo by Tino Hammid)

Temporary treatments have become more numerous in recent years, including dyeing; surface coatings on the pavilion and/or along the girdle and in some cases, coating of the entire stone; diffusion of a coloring agent into a stone, penetrating to a depth of only a few millimeters; fracture filling to reduce

visibility of fractures or to completely conceal them; glass-filling (especially of lead-glass into rubies, which is a serious problem and one I've already addressed separately on my website).

The list of treated gems was getting longer and longer, along with the types of treatments used. But it also didn't take long for the trade to realize that suggesting that "all" gemstones were treated was also having an unforeseen negative affect pertaining to the desirability and appreciation of natural gemstones, along with declining values, which was not merited given the desirability and rarity of truly natural gemstones. At about the same time that this realization occurred, many spectacular natural gemstones were beginning to re-surface via magnificent jewelry auctions and from private estates. How could these rare beauties command the prices they deserved unless something was done to reverse the trend of declining prices related to the abundance of treated gemstones.

Prices for sapphires and rubies had dropped significantly when there was no disclosure between natural and treated stones. Initially, when sapphire prices began to drop, buyers were told it was because "supply had outpaced demand" when in fact, it was that treated gems had flooded the market. By the late 1990s/early 2000s it became clear that consumer confidence in gems had also dropped – they had lost their allure as something that would "hold their value" and/or as a "valuable asset" for future generations. So something had to be done to rectify this situation. NOW it made sense to actually talk about TWO different colored gemstone markets: naturally beautiful natural gems, and "treated" natural gems! Especially because as new sources opened up, so did increased supplies of naturally beautiful gemstones so that the trade could meet demand for the "natural"!

After all is said and done, there are two categories of gemstones today: treated and not treated. Let's be candid about it not only among ourselves but with our customers as well. The first thing I always ask the client is whether or not it matters to them. If so, we discuss the cost differences, and where a client initially says they want only an untreated gemstone, but then learns a natural gem of the type and quality they want is too costly, they quickly re-consider their options: they must either re-consider treated options, or decide on a more affordable gemstone variety that's not "routinely" treated (such as some of the garnets), or select a smaller size, or a less rare color or quality, or postpone the purchase until they've increased their budget. These are the only options. But the choice must be the consumer's choice, based on all the facts.

There are many people who don't care, and just want the "prettiest" stone, in the largest size they can afford; this probably represents the majority of gem and jewelry buyers. Increasingly, however, I'm finding people who want only an "untreated" gemstone, even if it means getting a less

Gemstone Treatments/Enhancements & Permanency Charts

Resultant Gemstone	H	R	SD	SSD	HP	B	D	FH	I	Other
Amber									O	C
Andalusite										
Apatite										
Benitoite										
Beryl (Aquamarine)										
Beryl (Emerald)									O	OP, EX
Beryl (Golden)										
Beryl (Green)										C
Beryl (Maxixe)										
Beryl (Pink)										
Beryl (Yellow)										
Chalcedony										C
Chrysoberyl (Alexandrite)									O	
Chrysoberyl (Cat's Eye)										
Coral (All Colours)									E, W	C
Coral (Black/Golden)										
Corundum (Black Star)										
Corundum (Blue)										F
Corundum (Blue Star)									O	
Corundum (Colour Change)										
Corundum (Green)										
Corundum (Orange)										
Corundum (Padparadscha)									O	
Corundum (Pink)									O	
Corundum (Purple)										
Corundum (Ruby)									O	F
Corundum (Star Ruby)									O	
Corundum (Yellow)										
Diamond										F, L, C
Feldspar (Red)										U
Fluorite (Purple)										
Garnet (Demantoid)										
Jadeite										Comb
Lapis Lazuli									O, E	W
Malachite									E	W
Opal									O	W, S, ST
Pearl										PC
Peridot									O	
Quartz (Amethyst)										Comb
Quartz (Ametrine)										
Quartz (Citrine)										
Quartz (Green)										
Quartz (Rose)										
Quartz (Smoky)										

Gemstone Treatments/Enhancements & Permanency Charts

Resultant Gemstone	H	R	SD	SSD	HP	B	D	FH	I	Other
Quartz (Tiger's Eye)										
Shell										
Spinel										
Spodumene (Kunzite)										
Topaz (Blue)	A									C
Topaz (Golden Yellow)										C
Topaz (Green)										C
Topaz (Imperial)										C
Topaz (Orange/Pink/Red)										C
Topaz (Yellow)										C
Tourmaline (Bi-Colour)										
Tourmaline (Blue/Green)										
Tourmaline (Cat's Eye)									E	W
Tourmaline (Cuprian)										
Tourmaline (Golden)										
Tourmaline (Paraíba)									E	F
Tourmaline (Pinkish-Brown)										
Tourmaline (Red/Pink)									O, E	W
Turquoise									O, E	W
Zircon (Brown)										
Zircon (Blue)										
Zircon (Colourless)										
Zircon (Orange)										
Zircon (Red)										
Zircon (Yellow)										
Zoisite – Tanzanite										C

AGTA KEY

Treatment/Enhancement	Code	Treatment/Enhancement	Code
Heat Treatment	H	Irradiation	R
Oil Impregnation	O	Dyed	D
Waxed	W	Coated	C
Impregnation	I	Bleached	B
Fracture Filled	F	Laser Drilled	L
High Pressure High Temperature	HP	Diffusion	U

ADDITIONAL KEY

Treatment/Enhancement	Code	Treatment/Enhancement	Code
Smoke Treated	S	Sugar Treated/Sulphuric Acid	ST
Epoxy Impregnation	E	Flux Healed	FH
Surface Diffusion	SD	Sub-surface (Lattice) Diffusion	SSD
Combination of Treatments	Comb	Annealed	A
Opticon	OP	Excel	EX
Permanent		Not Permanent	
Permanency Unknown			

fine quality or smaller size. I'm also seeing an increase in the number of people willing to consider another gemstone altogether.

I think this trend offers retailers new opportunities, and it should also cause treaters to re-think whether or not they should be treating all of the material they are currently treating. For example, let's consider an emerald in a "pastel" green (I avoid judgmental terms such as "pale") rather than a rich, deep green. Pastel green emeralds are also often very clean, and show much less to the eye. While there are ways to make this pastel green a richer color, then you change it to a "treated" gem, which might not be where consumer preferences are headed (especially the current generation of gem and jewelry buyers).

There are also certain gemstones that until recently were not treated, or only rarely so:

- Alexandrite
- Andalusite
- Chrysoberyl (all colors)
- Chrysoprase
- Garnet (all colors)
- Hematite
- Iolite
- Moonstone
- Fire opal
- Peridot
- Spinel (all colors...although we're starting to see treated "red" material)
- Tanzanite (green is often natural)
- Tourmaline (chrome green variety, and most cat's-eye tourmaline)
- Chrome tourmaline
- Zircon (brown and green varieties)

Today this is also changing. Increasingly, we see miners/dealers fall victim to wanting the material to be "even prettier" or "even brighter" and so on. We are seeing spinel with fracture filling and we're also seeing them heated to improve color. But in our rush to make the appearance more "perfect" are we making a mistake?

Natural-ness now commands a premium. A gemstone's overall "character" is becoming more important, and wanting something that doesn't look like what everyone else has – something that is not "perfect"—is what the new generation of jewelry buyers is looking for.

And we also cannot ignore the fact that whether or not we like it, the laws in the USA and in an increasing number of countries, now requires disclosure, not only whether or not it is treated, but how it is treated, the degree of treatment, whether or not the treatment is permanent, and whether it requires special care. Sellers must understand what the options are and communicate them clearly to the customer. Only by so doing can the customer make the choice that best meets their needs, which is the customer's right!

But in order to ensure that the customer gets all the facts, we must have disclosure at every step of the journey from mine to end-user, and anyone who fails to do this should be found guilty of misrepresentation and penalized to the full extent of the law. At least, to the extent that I can influence it, this would be what I'd like to see happen. I welcome your help.



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Today women are playing an integral role in the jewellery and gemstone industry from the store front to the laboratory. Here we look at the women who are making a difference.



E. Billie Hughes is a 2011 graduate of UCLA (B.A., Political Science). She has already distinguished herself with her photographic work published in *Terra Spinel*, the *Wall Street Journal*, and *Ruby & Sapphire: A Collector's Guide*. Daughter of Wimon Manerotkul and Richard W. Hughes (both widely respected gemmologists), she became a Fellow of the Gemmological Association of Great Britain in 2013. Her first gemological article (on Myanmar's Mogok mines) was published in the 2013 Fall/Winter issue of *InColor* magazine.

This year she won first place in the categories of "Internal" and "Humanity," in Gem-A's annual photographic competition and in 2014, she won second and third place in their single-category competition.

GT: A famous gemmologist as a father and a talented and renowned photographer as a mother. A blessing or a curse?

BH: Overall, a blessing. It's given me great opportunities to travel and learn. I have tools at hand that not everyone has had, from advice to equipment to samples, so I'm lucky. Sometimes there is some pressure to be able to "do it all," but that's not necessarily a bad thing.

It's always challenging to work with family, especially one like ours where we are all opinionated perfectionists! But I think that's also an advantage, because you have people pushing you to improve.

GT: Did your interest in gems and photo microscopy develop naturally or did you feel compelled to follow in your parent's footsteps?

BH: Gemology and photomicrography are such a niche that I don't know if I would have discovered them otherwise. I didn't feel like I had to do them, though.

In fact, I got interested in photography just from traveling with family and taking photos along the way. When I started the FGA course, that's when I got hooked on inclusions and photomicrography. Looking at inclusions is like entering a different world. It's incredible because even though it's all so tiny, when you look through the microscope you get this real sense of space, like you're looking into the night sky.

GT: Today the photography of inclusions has taken a whole new direction with talented photographers such as Danny Sanchez bridging the gap between science and art. What direction interests you the most?

BH: I love how gemology is this mixture where art and science meet. To me, gemology inherently has both, and inclusion photography should reflect that. I hope that even my more educational shots still put a spotlight on the beauty in the stones. What's cool about inclusions is showing people that stones are beautiful both on the outside and inside.

GT: Photographing gemstones and inclusions are extremely challenging. What are some of the obstacles you have faced and what advice would you give to up and coming photographers?

BH: I am in the opposite situation of a lot of new photomicrographers. A lot of people struggle to get enough specimens.

In my case, I get to work with a lot of great material in the lab. My biggest obstacle is time. When I work, I'm usually under a lot of pressure to quickly return specimens to their owners. The best advice I can say for that is to practice a lot. The more comfortable you get with your microscope and lighting, the faster you will be able to adapt to the needs of different specimens.

In general, light is of utmost importance. You need to use enough light, and make sure you're using it to carry out your vision for the shot. Often, the light from the microscope is not enough. I use fiber optic lights instead of or as supplements to the microscope light, and sometimes I use more than one on the same specimen. Also, don't be afraid to use makeshift tools to help you get the shot. Bits of paper (like business cards), foil, plastic film containers can all be used creatively as filters and reflectors.

I think there is also a tendency to want to fix photos with Photoshop and other types of post-processing. It will always be better to get a great shot first, and then make a few minor adjustments where needed. Don't go overboard with post-processing.

GT: Where do you see the future of gemmology ten years from now?

BH: In the market, lab reports have already started to become more important, even for smaller stones. I expect that trend to continue in the future.

In the lab, gemology is headed towards more advanced equipment as we go forward. There are so many new origins and treatments that there is always more work to do to keep up. That said, I think that is no substitute for experience and knowing the basics.

One thing I hope will happen is that clients will take the time to learn more about stones, rather than just relying on color types or origin as signifiers of quality. However, it's often difficult to educate clients, I think because most people buy colored stones so rarely that it's something really foreign to them. People are looking for quantitative data, but buying a colored stone is more like buying fine art, it's a matter of taste.

GT: Do you feel there is equality for women in the jewellery and gem industry?

BH: I think there are a lot of opportunities out there, but women are under represented in certain parts of the industry. In labs, for example, I think you see a lot more men.

I don't think it's always like that, though. If you go to say, a market in Mogok, most of the traders are women, and women are also involved in parts of the mining. In mines I've been to in East Africa, you also see women involved in mining.

What I see a real lack of, is women in high-level positions. If you look at a lot of the most well known gemologists, most are men. The same goes for the biggest gem dealers. I would like to see more representation for women at higher levels in the future.

GT: What advice would you offer to a woman thinking of studying gemmology and entering our industry?

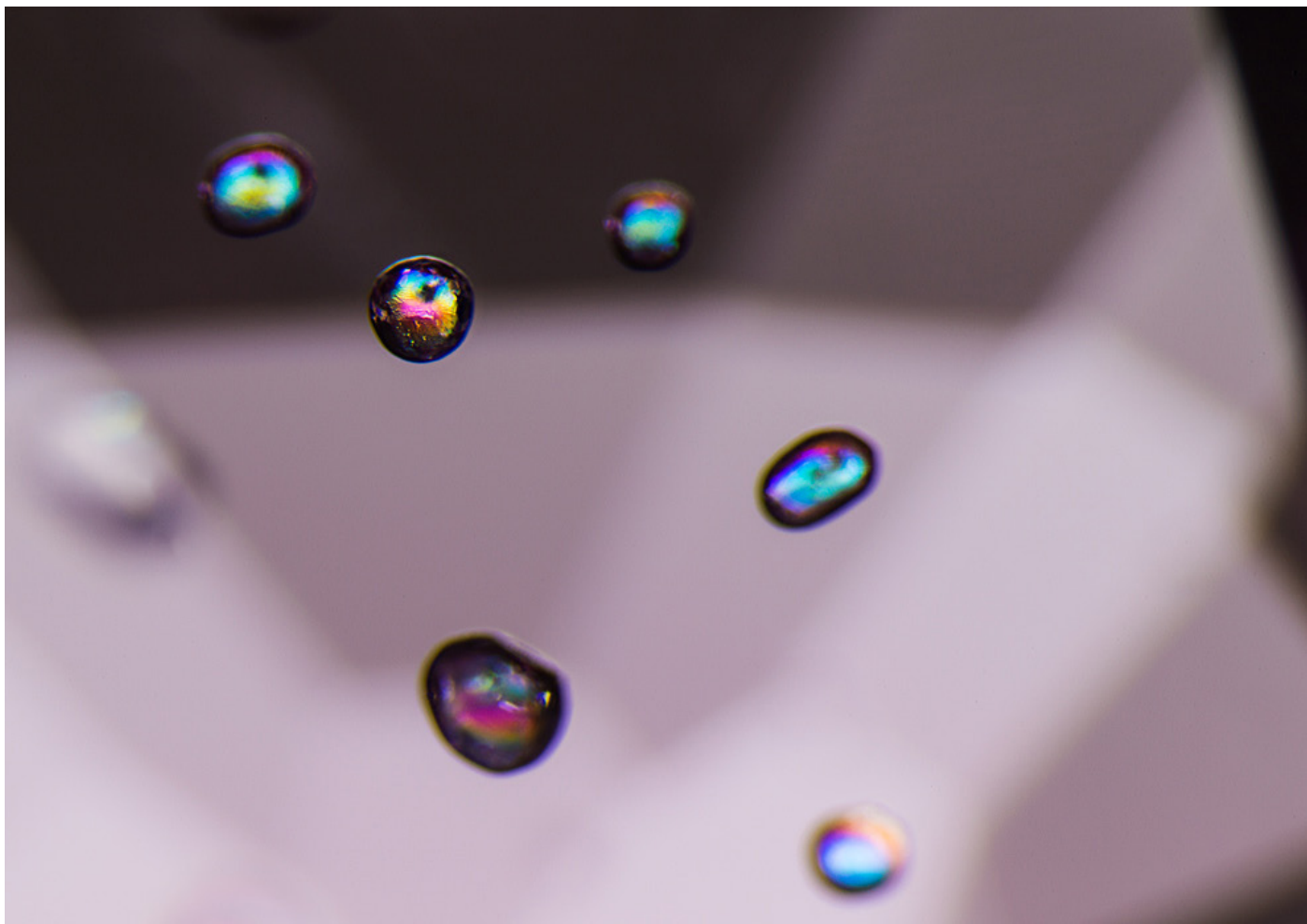
BH: Do it! There are so many fascinating things about this field, and there is so much work that needs to be done. I think anyone with an interest in the field should pursue that passion.

GT: If we were sitting here a year from now celebrating what a great year it's been for Billie Hughes professionally, what would you say was the reason?

BH: Next year I of course hope to spend more time on photomicrography and improve my skills. We are continually adding to our Hyperion inclusion database, and I hope by the end of next year I'll have continued to make a significant contribution to it.

I would also like to spend more time doing research. We spent so much of our time last year focusing on getting the book ready, and now that it's finished it's a great opportunity to work on other projects.

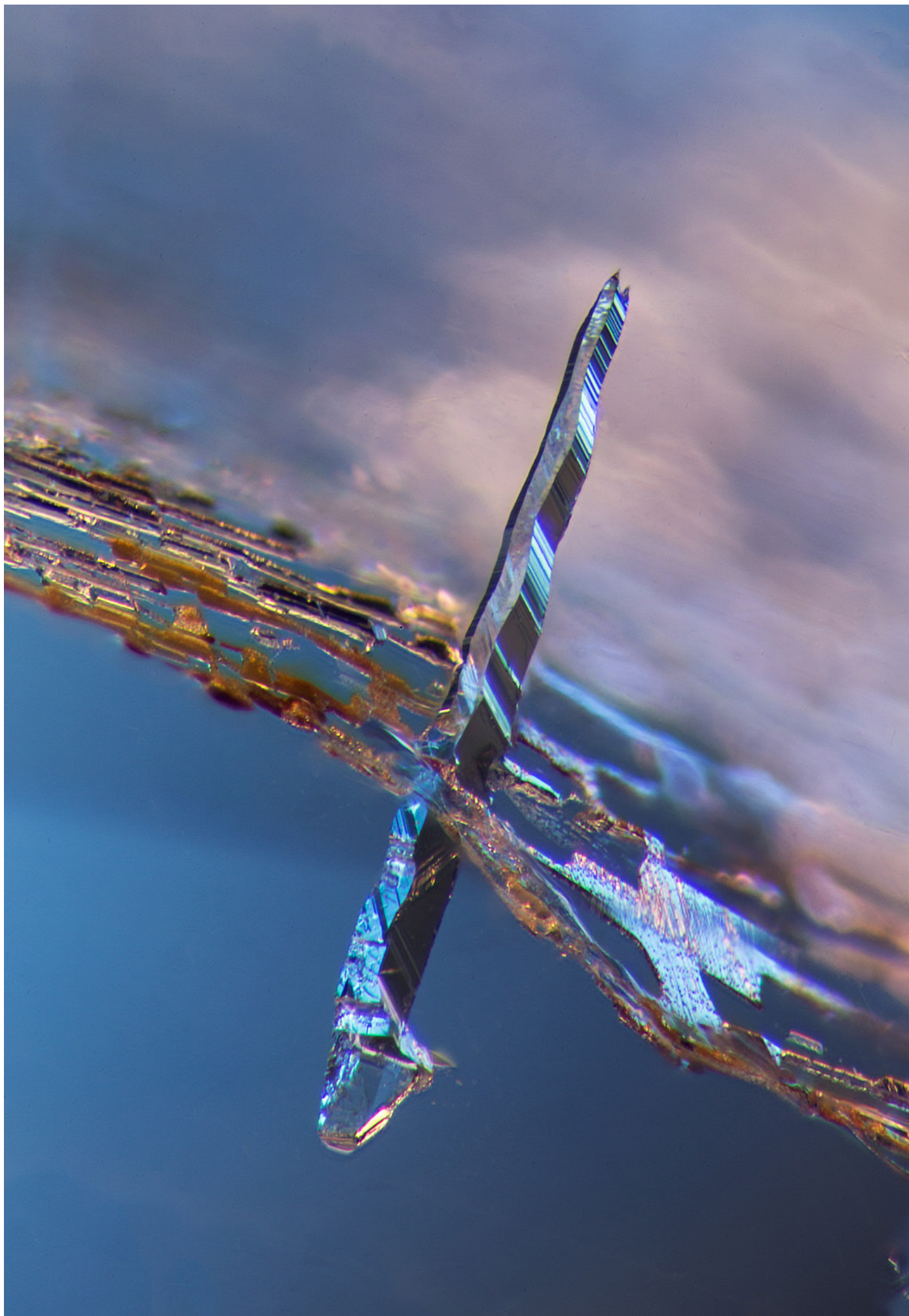




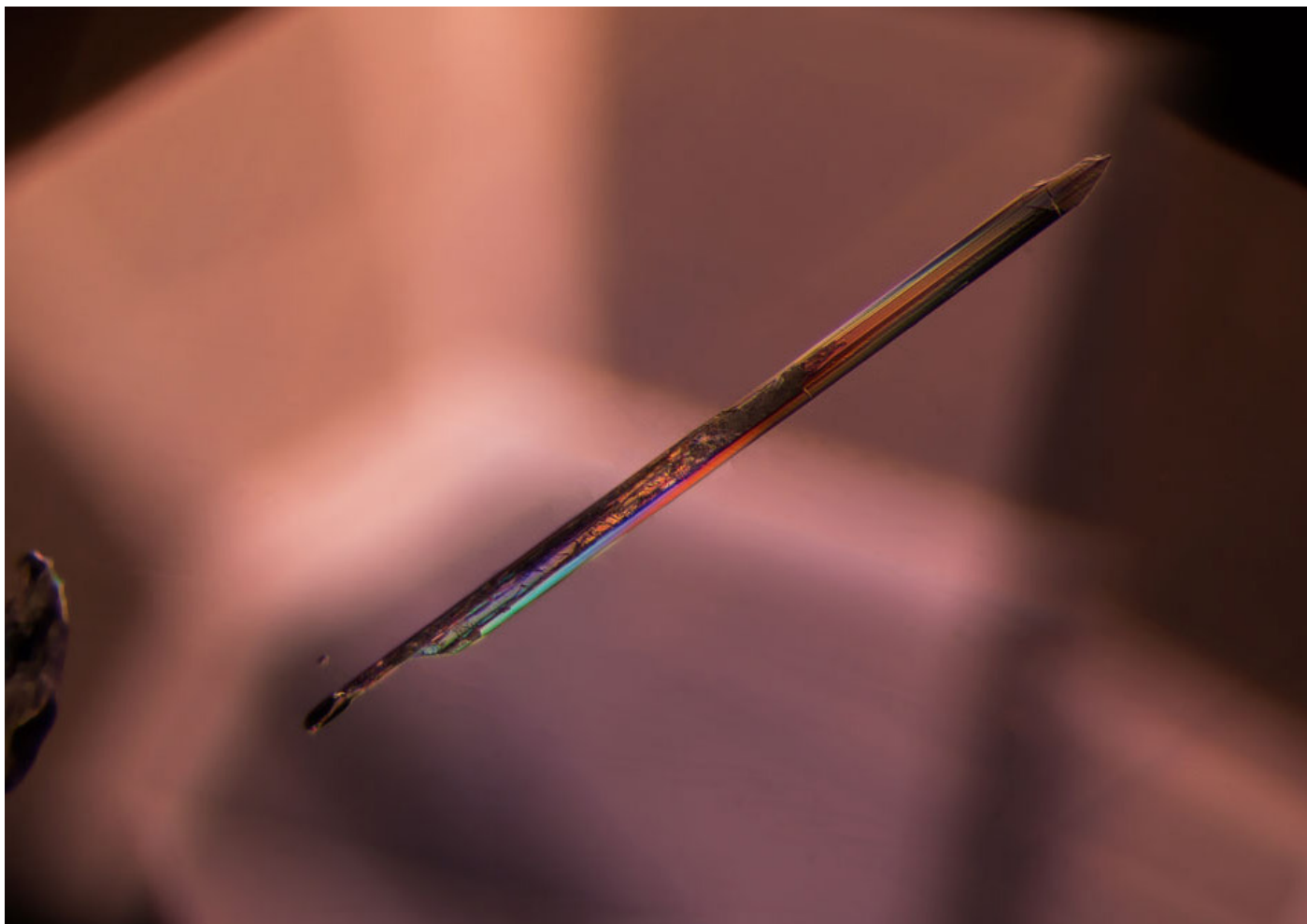
"Belly Button" apatite crystals in spinel. Illuminated under crossed polars, creating the rainbow of interference colors



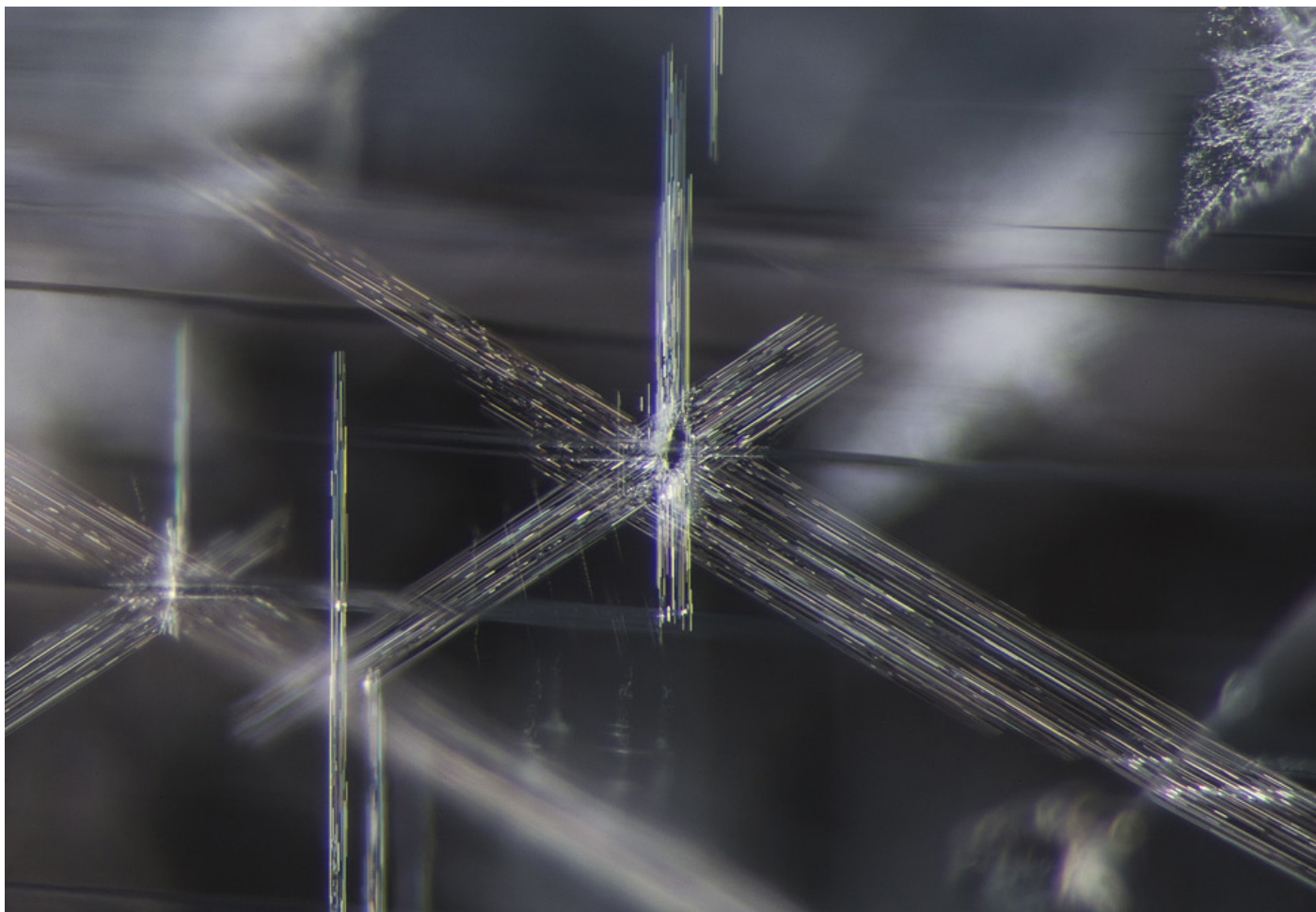
A large, polysynthetically twinned calcite crystal lies trapped in this ruby (Myanmar's Mogok Stone Tract)



A negative crystal cuts through a fingerprint against a sky blue backdrop in this unheated sapphire (Sri Lanka)



A birefringent lance pierces the heart of this untreated blue sapphire (Madagascar)



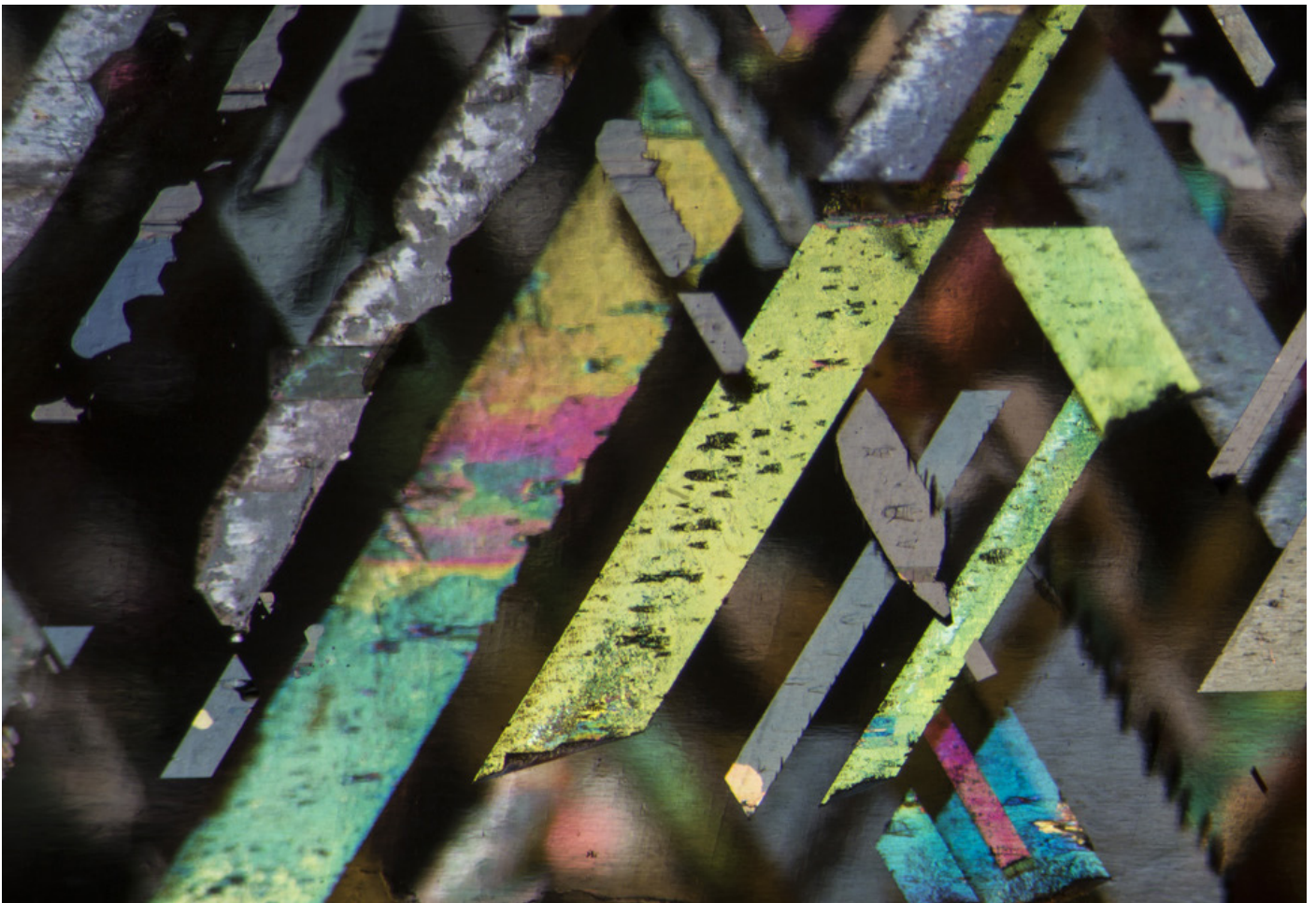
Stellate (star-like) dislocations decorate the interior of a spinel (Vietnam's Luc Yen District)



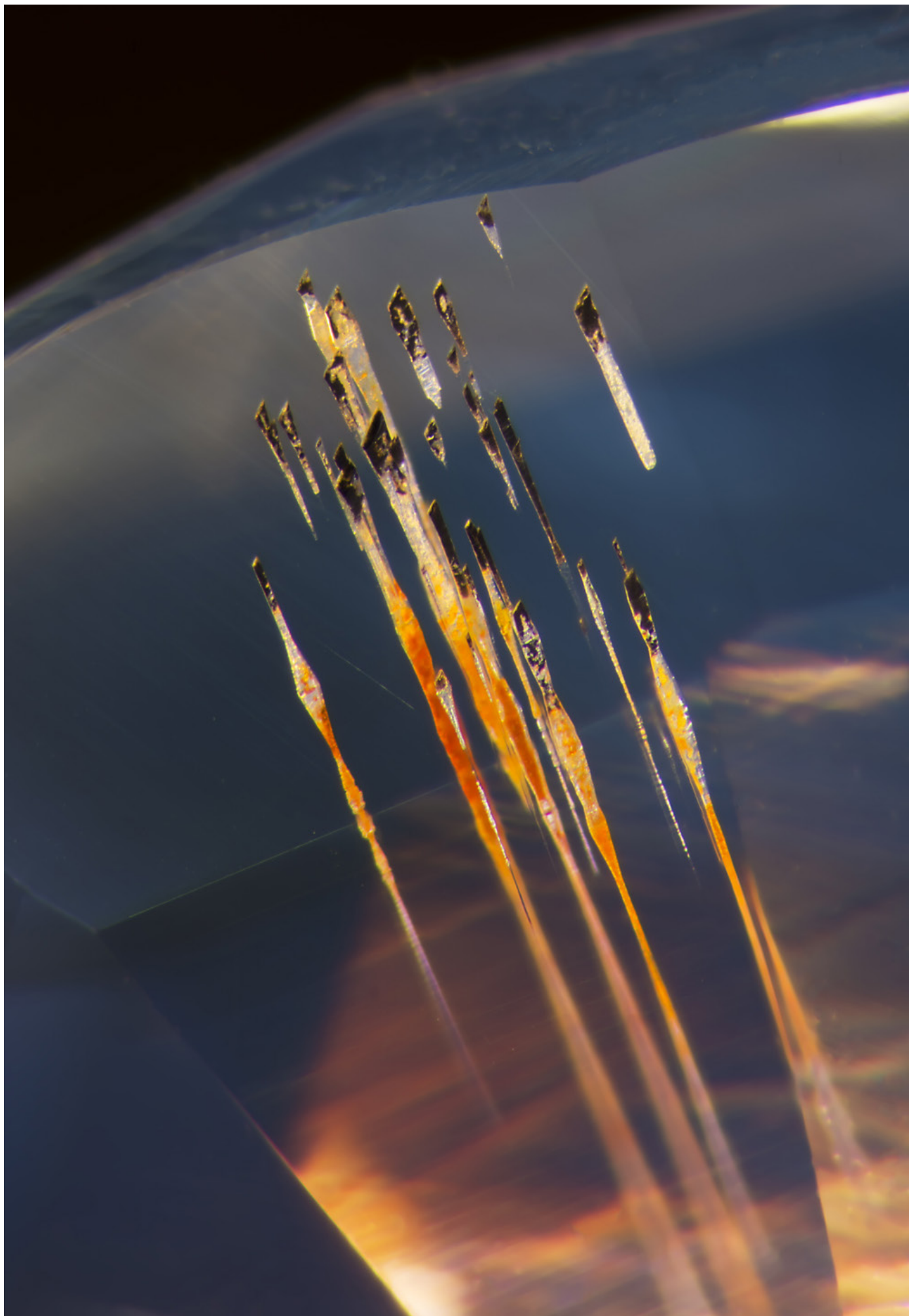
The clear, undamaged, euhedral form of this crystal, suspended in its sapphire host, provides evidence that the stone is unheated (Sri Lanka)



A fixed, six-rayed star can be seen in this trapiche ruby (Myanmar)



Rainbow lattice sunstone (Australia)



Orange-stained growth tubes blast off in this unheated sapphire (Madagascar)

The Spice of Life

Coloured Gemstones



LEONE LANGESLAG is the CEO of the Dutch Gem Academy and owner of SoleLeone. She received her European Gemmologist (E.G.) diploma from the Federation for European Education in Gemmology (FEEG) in 2006.



Scapolite - Going the extra mile.....

Although scapolite is a lesser known and unusual gemstone for jewellers and consumers, it has many virtues that make it an ideal choice; rarity, good brilliance, a vitreous lustre and depending on how it is worn, durability.

While gem quality scapolite usually exhibits excellent transparency, stones with less transparency often exhibit chatoyancy (cat's eye effect) when cut en cabochon. These are more sought after by collectors due to their relative rarity and exceptionally sharp eyes.

Unfortunately scapolite isn't a particularly hard stone, with a rating of 5.5 to 6 on the Mohs scale, therefore it is better suited for pendants, earrings and brooches.

Scapolite is quite a young gemstone as it was first discovered in 1913 in the Mogok Stone Tract in upper Burma. In the last decade it has been mined in a number of locations around the world, but major sources of this unique gem were found in the Mogok region of Myanmar, Madagascar, Espirito Santos in Brazil, Siberia Russia, the Badakhshan of Afghanistan, Darra-i-Pech, Afghanistan, and Merelani, Tanzania.

Gem scapolite usually forms in metamorphic rocks, particularly metamorphosed limestones, and in near contact with igneous intrusions. Associated minerals of scapolite are apatite, garnet, zircon, and sphene.

Scapolite forms in the tetragonal crystal structure and usually occurs in an elongated prismatic shape with flat pyramidal terminations.

Actually scapolite is a name used for a group of minerals consisting of sodium calcium aluminium silicate. This group includes three minerals meionite, marialite, and silvialite, who all have very similar compositions, crystal structures, and physical properties. They cannot be easily distinguished from one another, which is why name "scapolite" is a term used for convenient communication.

The name scapolite comes from the Greek word meaning "rod", possibility in reference to the shape of the scapolite crystals.

Gem scapolite can be found in an interesting array of colours, including white, colourless, yellow, grey, green, purple and pink. The most common colours for scapolite are bright honey-yellow and purple. All scapolite colours occur naturally from Mother Nature and this is big plus point for gem scapolite compared to some more famous gemstones that are being treated more and more.

There is however mention of some treatment by X-rays, electrons, or by exposure to radium that will produce light a purple lavender variety of scapolite but this colour does not seem to be stable and is therefore not commercially viable.

Chemical Formula	$\text{Na}_4\text{Al}_6\text{Si}_6\text{O}_{24}(\text{CO}_3\text{SO}_4)$
Refractive Index	Purple to violet stones commonly 1.536 to 1.541, yellow gems 1.55 -1.56, overall 1.54 -1.57
Birefringence	0.006 - 0.039 (higher as RI increases)
Optic Character	Uniaxial
Optic Nature	Negative
Pleochroism	Moderate to strong blue and bluish purple in pink, purple, and violet stones; distinct in yellow stones, colourless-yellowish
Spectrum	Not diagnostic, except in pink stones, which might show lines at 663 nm and 652 nm
Fluorescence	Variable responses, not diagnostic
Specific Gravity	2.58 - 2.74 (often 2.60 in purple to violet stones)
Inclusions	Mica, Hematite, Apatite and Diopside

For gemmologists, scapolite is a tricky one, as it has similar refractive indices to quartz, feldspar and iolite. However if certain key tests are correctly executed (birefringence, optic character and nature) it can't be mistaken by amethyst quartz, citrine quartz, orthoclase or even iolite. So don't be too quick to jump to conclusions by measuring the refractive index in only one position on the refractometer! By taking numerous readings, the true optical character (uniaxial) and nature (negative) of scapolite will be evident.

Scapolite's R.I. can be as high as beryl and labradorite, but it has a much higher birefringence than either of them.

In conclusion, I believe that scapolite is a great gemstone, which has often been overlooked by the industry, as an attractive gemstone that is not only available in fairly large sizes but is also inexpensive!

References:

Gemselect.com
Gemdat.org
Geology.com
Handbook of Gemmology



Yellow Scapolite 45.35 carats (Kenya)

Photo: Tino Hammid



The Ruptured Rupee



In the last issue we looked at 'Brexit' and the effect the June 23rd referendum had had on the British pound and how leaving the single market would impact on the economy and more importantly the jewellery and gem industry. One reader questioned the validity of this article in a gemmological publication but surely when a decision is made that affects every level of a society, how can it not be relevant?

In the lead up to Theresa May's key speech regarding Brexit on January 17th, which many investors believe will signal an end to Britain's participation in European Union's single market in order to regain control of immigration, the British pound has again fallen sharply against the dollar (1.6% to \$1.199). This was in addition to the 1% drop the pound incurred in early January after May repeated that she would be pushing for a 'Hard Brexit'. While the British economy has performed better than expected, the fact that the sterling exchange rate moves every time May questions the continued access to the single market is worrying and the weaker the pound becomes, the less buying and earning power it generates.

Equally worrying were the events that unfolded in India in early November. On the evening of November 8, after most businesses had closed and the ATMs had been locked up, the Indian Government led by Prime Minister Narendra Modi threw the entire country into chaos by rendering 86% of the country's currency or some twenty-three billion banknotes worthless.

This sudden 'demonetization' of 500 and 1000 rupee bank notes, described by former Indian Prime Minister, Manmohan Singh, a well-known economist as an "organised loot and legalised plunder" was defended by Modi who stated that the unprecedented move was aimed at cracking down on tax evasion, black money, corruption and terrorism funding.

In a country where most business is conducted on a 'cash basis', this surgical strike not only sent shockwaves through the Indian economy but also created a 'nightmare' scenario. With an insufficient quantity of replacement notes printed, the government placed strict regulations on the quantity of new banknotes that people could withdraw at any given moment with daily limits of 10,000 rupees (roughly \$ 145 USD) and weekly limits of 20,000 through the banks and 2,000 rupees (later rising to 4,000 rupees) daily through the ATMs.

The problem was further compounded by the government's decision to make the new banknotes a different size, which rendered the ATMs incapable of dispensing them.

While the government had imposed a December 30th deadline for old notes to be exchanged for new ones or deposited into a bank account, the very fact that more than half of Indians do not have a bank account, and millions do not have any government identification simply exacerbates the problem.





With most average Indians short of cash to buy daily essentials this has had a catastrophic effect on small businesses including of course the jewellery sector. Foreign tourists were also caught off guard with many struggling to change their defunct banknotes and being forced to appeal to their government embassies for financial assistance.

While some say this surprise move will boost the economy by bringing billions of rupees of 'unaccounted cash' into the economy, the short-term effects have left many wondering how a country that has been described by many as an 'economic powerhouse' could have adopted a monetary strategy that was so clearly ill conceived.

Simply put, governments do not create resources, people do and since money represents what people produce in the real

world, what the Indian government has perpetrated is nothing less than a massive theft of people's property. With a onetime windfall of perhaps tens of billions of dollars, it is hardly surprising.

In a recent survey by the World Bank, India was ranked among the worst in the world for operating a business. Plagued by excessive rules and taxes, governmental red tape, lethargy and corruption, it is hardly surprising that 'Cash is King' in India. Will this move solve the problem? Hardly. Will it have a devastating effect on the hundreds of millions of India's poor who are least equipped to deal with the financial fallout, undoubtedly. 'Cash' may have been 'King' but for now the King would appear to be dead.



Smart Thinking

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Hanneman Direct-Reading Specific Gravity Balance

Specific gravity refers to the ratio of a substance's weight in air to an equal volume of water at 4 degrees Celsius; that is the temperature at which water is the densest and at standard atmospheric pressure.

Unlike density, which is referred to in units of weight and volume, such as the kilogram and the cubic metre, specific gravity does not use any unit of measure; it is simply a ratio. Consequently, when we say that a ruby has a specific gravity of 4.00, we mean that a ruby weighs 4 times heavier than an equal volume of water at 4 degrees Celsius.

This can be expressed as:

$$\text{S.G.} = \frac{\text{Weight of the Gemstone in Grams}}{\text{Volume of Water Displaced in Cubic Centimetres}}$$

Since one cubic centimetre of water weighs exactly 1 gram at 4 degrees Celsius, we can also express it as:

$$\text{S.G.} = \frac{\text{Weight of the Gemstone in Grams}}{\text{Volume of Water Displaced in Grams}}$$

We can also calculate the specific gravity of a gemstone by dividing the weight of a gemstone in air by the difference in the weight of the gemstone in air and the weight of the gemstone in water. This difference is referred to as the apparent weight loss and is due to buoyancy.

$$\text{S.G.} = \frac{\text{Weight of the Gemstone in Air}}{\text{Apparent Weight Loss}}$$

The problem with determining specific gravity is two-fold; firstly many gemstones are set in jewellery which makes the determination of their specific gravity impossible and secondly, even for loose gemstones, mineral specimens or carvings, it is very time consuming.

Until recently, many gemmologists used 'Heavy Liquids' to determine the specific gravity of a loose gemstone. While these had numerous advantages, namely speed, they were highly toxic, could not be used on porous or organic gemstones and due to their prohibitive costs and availability, restricted the user to the testing of smaller gemstones.



Heavy Liquids

Solution	S.G.
Saturated Salt Water Solution	1.13
Diiodomethane diluted with I-bromonaphthalene or toluol	2.65
Bromoform	2.85
Diiodomethane diluted with I-bromonaphthalene or toluol	3.05
Undiluted Diiodomethane	3.33
Clerici's Solution diluted with Water	4.00

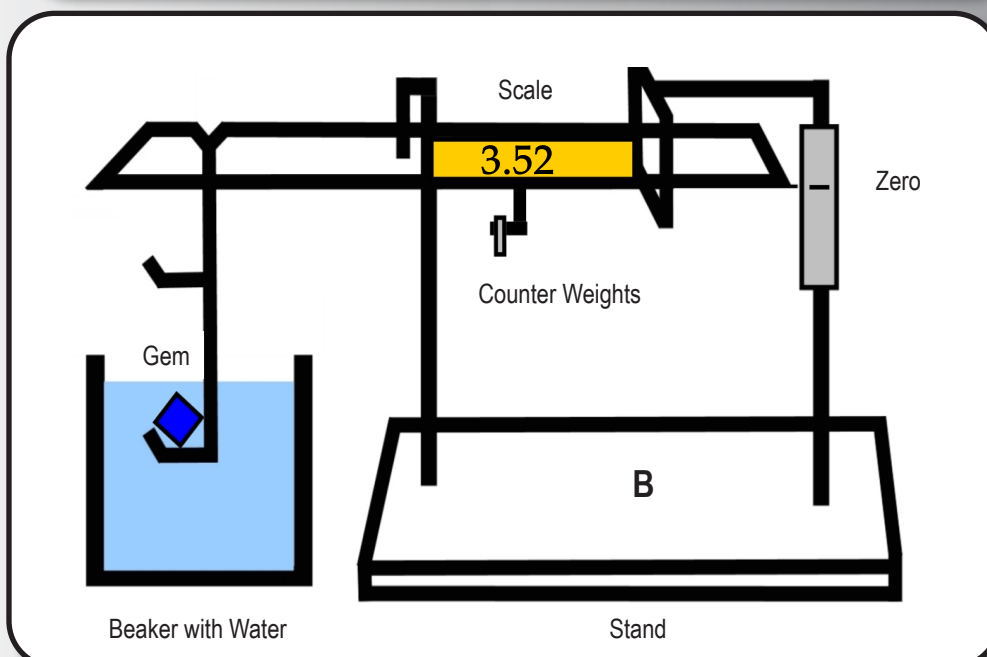
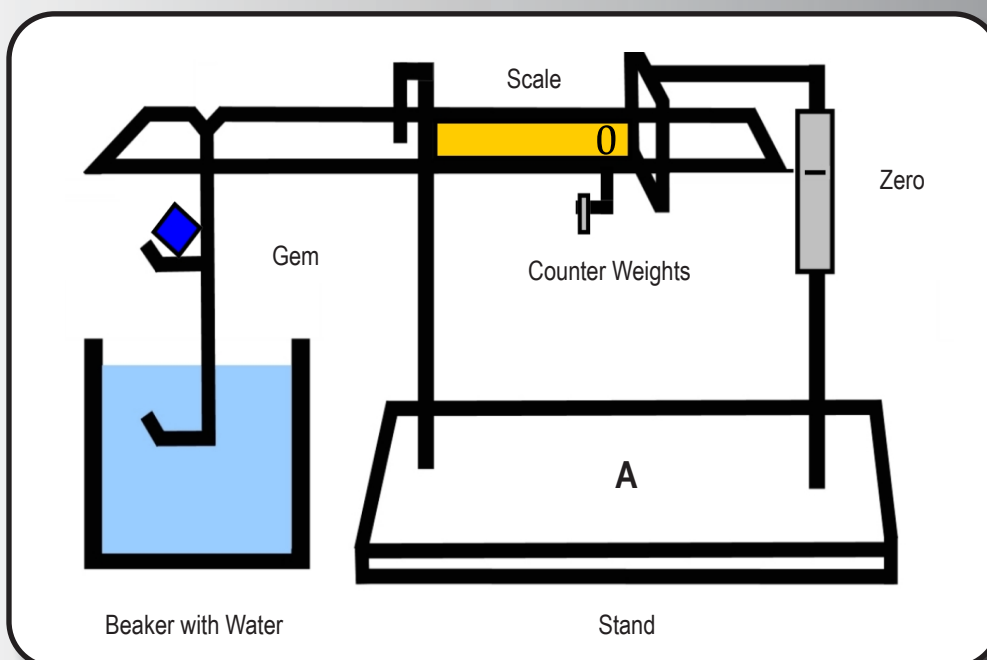
Interestingly, these very same liquids could also be used to approximate the refractive index of a gemstone (through immersion) and had the added advantage of being able to test both loose and mounted stones.

The Hanneman specific gravity balance permits the determination of specific gravities from 0 to 22 by giving a direct specific gravity readout on a calibrated scale and can be used for specimens ranging from 1 carat to 150 carats.

The balance consists of a modified beam balance with the beam suspended from a centre pivot point. The right side of the beam has a fine pointer that is adjusted to a 'zero' position. Suspended from the left side of the balance is a weighing pan including an upper pan for weighing the stone in air and a lower pan for weighing the stone in water. Hanging from the right end of the beam is a counterweight holder to which counterweights are added as necessary to move the pointer to zero. Finally, the right half of the beam incorporates a graduated scale showing specific gravity values from 0 to 20.

Procedure:

- Place the specimen in the upper weighing pan and add counterweights until the beam pointer returns to the zero position.
- Place the specimen in the underwater weighing pan and move the counterweight holder and counterweights along the beam until the beam pointer comes to rest at the zero position.
- The specific gravity is determined by reading the position of the counterweights on the graduated scale.



Tools of the TRADE

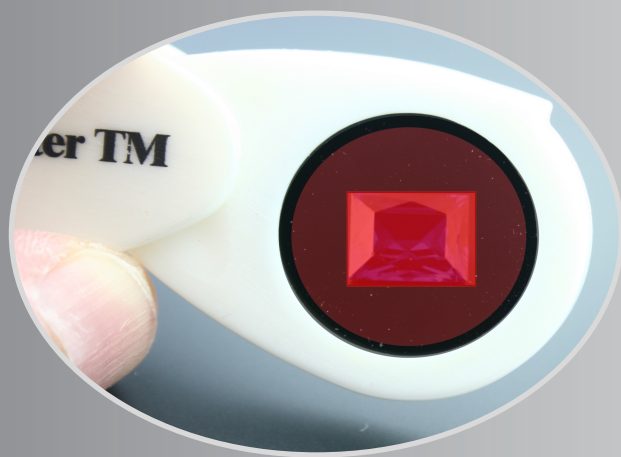
In this issue we look at the Chelsea Filter, it's capabilities, limitations and why you should always have one at your disposal.

The Chelsea Filter

The first colour filter was developed in 1934 by Basil Anderson and C.J Payne of the Gem Testing Laboratory of the London Chamber of Commerce in collaboration with students studying gemmology at the Chelsea College of Science and Technology, where Basil Anderson was an instructor. It was aptly called the Chelsea filter.

Originally, it was developed to help distinguish natural emeralds from their many simulants; however, today, in conjunction with other colour filters developed specifically for certain gemstones, it has a wide range of uses.

The Chelsea filter consists of a combination of two gelatin filters, one that only allows free transmission of deep red wavelengths around 690 nanometres, and the other, allowing only yellow-green wavelengths around 570 nanometres. These were chosen to coincide with the emissions and absorption of emeralds.



Since emeralds transmit in the deep red but absorb the yellow-green portion of the spectrum, they will appear reddish to pinkish in colour, depending on how much chromium is present, when viewed under a strong electric light (not fluorescent light). This was particularly helpful since most stones used at that time to simulate emeralds, appeared green.

Once laboratory grown emeralds also containing chromium were introduced in the early 1940's, the usefulness of the Chelsea filter diminished somewhat although it still provided

a rapid means of separating parcels of green stones into those that were natural or lab-created emeralds and those that were not.

Of all the gem testing instruments, colour filters are perhaps the easiest to master requiring the user to simply hold the filter close to their eye and then observe the gemstone in a strong non-fluorescent light.

Green Stones

While the filter may not be definitive with a majority of green stones, it is highly effective when trying to separate natural green jadeite from colour-enhanced jadeite. If the stone appears red under the filter, it is positive proof that the stone has been treated. If however, the stone appears green, further tests should be carried out since some colour-enhanced jadeite will also remain inert under the filter.

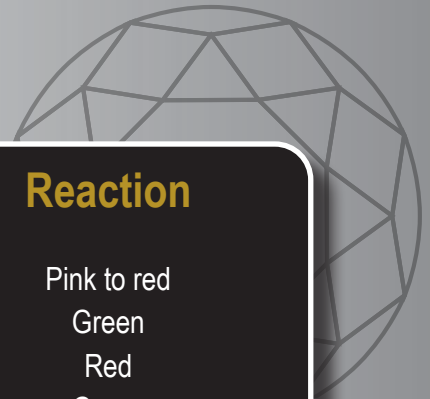
Blue Stones

Interestingly the Chelsea filter is more definitive when it comes to testing blue stones. Lab-created light blue spinels can be easily separated from parcels containing aquamarine, blue topaz and zircons. Furthermore, lab-created dark blue spinels can be rapidly separated from parcels containing blue sapphires by their distinctive red to orange reaction (See Photo).

Although the filter will not distinguish between lab-created and natural cobalt coloured blue spinel, unlike other lab-created gemstones, slight variances do exist in the physical properties of natural and laboratory-grown spinel making their identification relatively straightforward.

Red and Purple Stones

As we can see from the chart below, the Chelsea filter cannot be considered an effective tool to separate red stones.



Gemstone	Reaction
Natural Emeralds	Pink to red
Natural Emeralds (South Africa/India)	Green
Lab-created Emeralds	Red
Emerald Simulants	Green
Demantoid Garnet	Red
Green Zircon	Red
Green Tourmaline	Green
Chrome Green Tourmaline	Red/Pink
Lab-created Green Spinel (older types)	Green
Peridot	Green
Green Sapphire	Green
Alexandrite	Red
Stained Jadeite	Red
Lab-created Corundum (Alexandrite Colour Change)	Red
Lab-created Green Sapphire	Red
Lab-created Green Spinel	Red
Chrome Chalcedony	Red
Lab-created Dark Blue Spinel	Red
Natural Cobalt Blue Spinel	Red
Lab-created Light Blue Spinel	Orange
Blue Zircon	Green
Blue Cobalt Glass	Deep Red
Light Blue Glass	Green
Aquamarine	Green
Blue Topaz	Olive green to flesh colour
Blue Sapphire	Dark green
Lapis Lazuli	Weak brownish-red
Swiss Lapis	Green to blue
Sodalite	Slightly brownish
Garnet-Topped Doublets	Greenish-blue
Red Garnets	Red
Garnet-Topped Doublets	Red
Natural Ruby	Strong red
Lab-created Ruby	Strong red
Red Spinel	Strong red
Lab-created Red Spinel	Strong red
Amethyst	Strong red
Violet Sapphire	Bright red

Meet the Team

Meet our team of dedicated professionals who all share a common philosophy, a common goal and a passion and commitment to gemmology and education.



Geoffrey M. Dominy
WGF Founder

Geoffrey Dominy is an author, independent gemmologist and former jewellery appraiser who appeared on the Canadian Antiques Roadshow for four seasons. He received his F.G.A through the Gemmological Association of Great Britain (Gem-A) in 1987 passing the diploma examinations with distinction.

Throughout the 1990's, Geoff developed and taught the 'Gemmology' program at Red River Community College and The University of Manitoba in Winnipeg, Canada, worked for the Canadian Institute of Gemmology, was President and Founder of the Jewellery Appraisers Association of Canada and was a contributing author for the 5th & 6th Editions of Robert Webster's 'Gems' which even today is considered one of the most authoritative textbooks in Gemmology.

In 2013, he released the first digital gemmological textbook entitled 'The Handbook of Gemmology' in collaboration with world famous gem photographer Tino Hammid. Now in its third edition, the handbook has been sold or downloaded in forty-seven countries, is used by fourteen schools, colleges, universities and gemmological organizations as their recommended textbook and now features photographic contributions by another award winning photographer Jeff Scovil.

Geoff currently lives in Palma de Mallorca, Spain and in addition to lecturing and promoting his book, is the founder of the World Gem Foundation and Mi Isla También.



Leone Langeslag
Dutch Gem Academy

Leone Langeslag is a graduate of the Federation for European Education in Gemmology (FEEG) (2006), an independent gemmological consultant and is actively involved with the Gemma Association in Holland offering lectures and workshops. Her desire to provide accessible gemmological training in the Netherlands has led to the formation of the Dutch Gem Academy.

Leone is a frequent visitor to international symposiums, exhibitions and trade shows where she continues her own gemmological education and passion for collecting gemstones and minerals.



James Riley
British Gem Academy

James Riley is a sixth-generation jeweller who studied modern history at university, was the former manager of Backes and Strauss in the U.K and the former Chief Executive Officer of Gem-A.

During his time at Gem-A, James along with other Board members, was instrumental in revitalizing the association, securing Ely Place as their London headquarters and implementing several key initiatives.

He is a well-respected figure in the gemmological community, is passionate about education, gems and jewellery and brings a wealth of experience to the British Gem Academy and the World Gem Foundation.



Conny Forsberg
Scandinavian Gem Academy

Conny Forsberg has over thirty years experience as a gemmologist and precision gem cutter. He received his FGA in 1986 through Gem-A, his diamond grading diploma through Hoge Raad voor Diamant (HRD) in 1994 and is an Accredited Senior Gemologist with the Accredited Gemologist Association (AGA).

He is currently the owner of the Swedish Gem AB, a modern and accomplished gem lab as well as a precision cutting facility. He has twice received 'Honourable' mention in the Gem-A photo competition for his photomicrography (2011 & 2013) and is a valued contributor to the Handbook of Gemmology, with a large collection of his photomicrographies planned for the upcoming 4th Edition. Conny is also an Accredited PRINCE2 Practitioner (Project Management), experienced in public procurement and contracting (EU law) and the initiator and organizer of the Scandinavian Gem Symposium. He is currently the auditor for the Swedish Gemmological Association.



Jan Asplund
Scandinavian Gem Academy

Jan Asplund is a gemmological consultant specializing primarily in the identification and valuation of diamonds, both cut and rough, as well as coloured gemstones and jewellery.

He received his FGA & DGA (Gem Diamond Diploma) through Gem-A in 2011, his BA in History from the Mälardalens University in 2000 and studied geology and gemmology at Luleå Technical University (2005 – 2007), cultural and industrial history at the Uppsala University (1998 – 2000), and archival science at Karlstads University (1998 – 1999). Jan also took his Accredited Jewelry Professional – AJP (Gemmological Institute of America 2011), Introduction to Watches (International School of Gemology 2012), Jewellers Education Foundation – Graduate Sales Associate (American Gem Society 2011), Blacksmithing (Sätergläntan 2002) and Silversmithing (Tärna Folkhögskola 1996).

He is a board member of the Swedish Gemmological Association, fellow and diamond member of Gem-A and initiator and organizer of the Scandinavian Gem Symposium.



Leroy Bakelmun
Pacific Northwest Gem Academy

Leroy Bakelmun started his gemmological career after receiving his certificate in gem cutting and polishing at the Lapidary Training Centre Sri Lanka in 1995. In the same year he also received his certificate in Gem Identification, through the A.K. Institute of Gemmology in Sri Lanka.

In 2006 he received his 'Gemmologist' certificate through the Canadian Institute of Gemmology (C.I.G.)

Leroy has extensive experience buying and selling gemstones. From 1997 to 2014, he owned and operated GeoGem Jewellers in Langley, British Columbia, Canada and from 2012 to 2014, he also owned the 925 House of Silver in Fort Langley, British Columbia, Canada.

He currently lives in Grass Valley, California with his wife Sally and family.



Majala Mlagui
Kenyan Gem Academy

Ms Majala Mlagui is a mining entrepreneur and African gemstone lover.

Majala founded her social enterprise Thamani Gems, to empower such miners in East Africa by helping them create sustainable livelihoods through responsible mining, ethical sourcing and access to fair-trade markets.

Majala also provides professional-development resources to miners and helps them navigate complex regulatory and legal systems in their country. Her work raises the profile of local miners in Africa and improves their economic conditions.

Majala received her BEng in Software Engineering from University of Sheffield in England and is a certified PRINCE 2 Project Manager. She has taken the Exploring Gemstones Certificate from Holts Academy, London (UK) and is a Gemmological Institute of America (GIA) Accredited Jewellery Professional (AJP).

Majala is working towards the GIA Coloured Gemstones Programme certification.



Rahul Desai
SRDC WorldGem

Rahul Desai began his career taking forward his father's creation Shreeji Rajendra Diamond Classes (SRDC-INDIA), a pioneer in diamonds, gems and jewellery education throughout India that has graduated more than 50,000 jewellers, gemmologists, diamond traders and jewellery designers through their educational programs.

One of the first and foremost private institutions in gems and jewellery education, SRDC – INDIA received world recognition through its corporate education program in various countries including Turkey, Hong Kong, Bangkok, Myanmar (Burma), Dubai and Bostwana.



Renuka Punjani
SRDC WorldGem

Renuka Punjani has worked within the jewellery industry for nearly 25 years with a tremendous inclination towards designing and fine jewellery and has worked closely with some of the industry leaders, designing personal family fine jewellery.



Cristina Rzepka de Lombas
Spanish, South American,
Central American and Caribbean
Gem Academies

Cristina Rzepka de Lombas is a geologist, gemmologist, appraiser of gemstones and jewellery and an expert in diamond and coloured gemstone grading.

Currently Cristine serves on the Board of Directors of the Instituto Gemológico Español (IGE) in Madrid, Spain where she also teaches their 'Gems of Organic Origin' course.

She is also the Director of Education for the Spanish, South American, Central American and Caribbean Gem Academies.

World Gem Foundation Gem Academies

To contact the individual gem academies,
please click here



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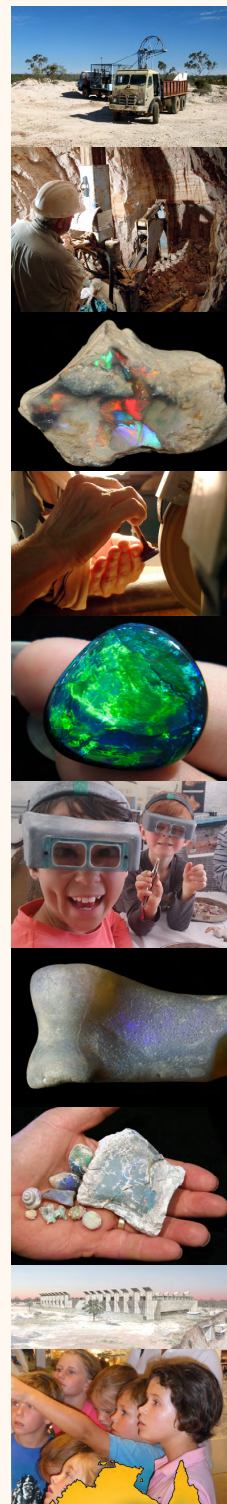
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Photomicroscopy

Inclusions and Other Cool Stuff

EGOR GAVRILENKO is the current Director of the Gem Testing and Certification Laboratory of the Spanish Gemological Institute, holds a PhD in Geology and is a qualified and highly respected gemmologist. He is also an avid gem cutter and photomicrography enthusiast.



Rock with a Little Heavy Metal

The first of a three part series that looks at the identification of HPHT and CVD synthetic diamonds. In this issue we look at the unique characteristics of these stones and how they differ from natural diamonds microscopically.

HPHT Synthetic Diamonds

The first step in determining whether a diamond is natural or synthetic is to examine it carefully under magnification. Since the ability to increase the magnification and the correct lighting is essential, this is best achieved using a gemological microscope.

A careful observation of the inclusions often reveals the true nature of a diamond. Transparent mineral crystals such as garnet, olivine or enstatite will immediately confirm that a diamond is natural, whereas in HPHT synthetic diamonds, the typical inclusions invariably correspond to their forming medium - the molten metal. The shape of these inclusions can also be very characteristic, often appearing drop-like, or as somewhat rounded crystals that are sometimes connected to each other (Figures 1 to 6).

If opaque inclusions are observed, they should be studied with great care using different lighting techniques, such as fiber optic, to determine whether they are reflective and have a metallic luster. Some metallic inclusions are surface reaching and will often exhibit an oxidized patina. These are best observed using reflected light. If metallic inclusions are suspected, a magnet can be used to confirm their nature.

In cases where a diamond has good purity and no inclusions are found, a detailed examination of the growth characteristics may aid in their identification. The graining or hourglass color zonality, generally visible through the pavilion, is related to the internal octahedral and cubic growth sectors of synthetic diamonds (Figure 7). However, in natural diamonds, it is very common to observe irregular external graining (Figures 9 and 10) or internal graining corresponding to the planes parallel to the octahedron faces (Figure 11), which would rule out synthetic origin.

The presence of trigons is very typical for natural diamonds (Figure 12). Synthetics almost never present trigons on their

crystalline faces with the rough crystal faces presenting another type of morphology, very different, to an experienced observer, from the natural ones (Figure 13).

In a colored diamond, the zonality present may be useful for identification and are best observed using diffused transmitted light. Natural diamonds may show flat bands of color or a cloudy effect, but only synthetic diamonds may show zonal patterns that are related to marked cube and octahedron growth sectors (Figure 15).

Finally, it should be mentioned that the laser inscription on the girdle of a diamond with the corresponding number of report, issued by a recognized laboratory cannot be considered a sufficient guarantee of the nature of the diamond. Laser inscriptions are easy reproducible on synthetic or treated diamonds by searching online databases for a natural diamond that has similar characteristics or even recutting a treated or synthetic stone to the measurements and weight of another certified natural diamond.

CVD Synthetic Diamonds

As with HPHT synthetic diamonds, a careful microscopic observation of the diamond is very important as it could reveal typical natural diamond characteristics such as mineral inclusions, characteristic internal and external graining or naturals with trigons.

While some companies engrave 'LAB GROWN' or similar inscriptions on the CVD synthetic diamond girdle (Figure 16), this is not typical of all manufacturers and can be removed without any appreciable weight loss.

In general, CVD synthetic diamonds can be very clean without any characteristic inclusions present.

Typical inclusions described in CVD synthetic diamonds are planes or clouds of pinpoints, inclusions of graphite, of different sizes, polycrystalline areas or small reflective cracks, reaching the surface of the diamond (Figure 17 & 18).



Figure 1: Large metallic inclusions with iridescent patina on a colorless HPHT synthetic diamond.

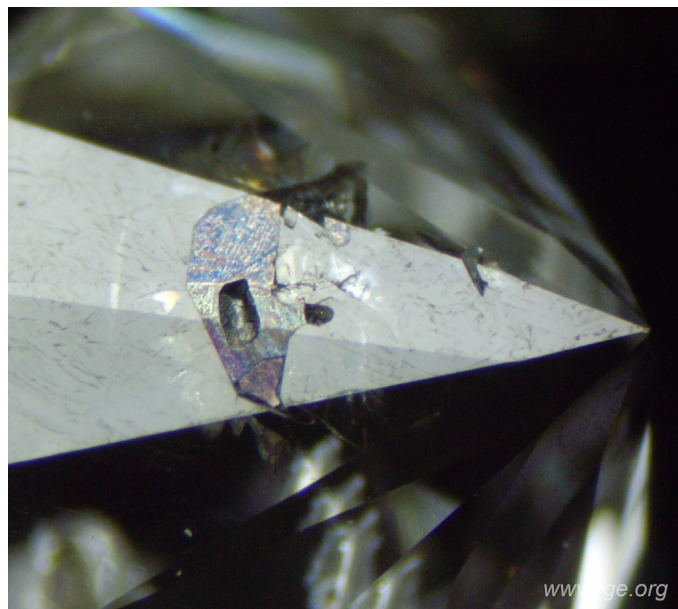


Figure 2: Large surface reaching metallic inclusions in an HPHT synthetic diamond with oxidation patina.

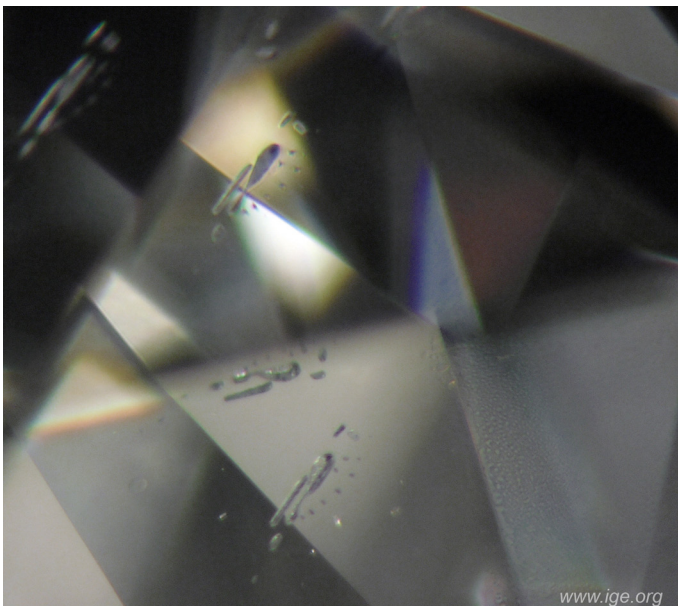


Figure 3: Metal inclusions in the form of drops, totally uncharacteristic for a natural diamond, on a synthetic diamond HPHT of almost 3 carats.

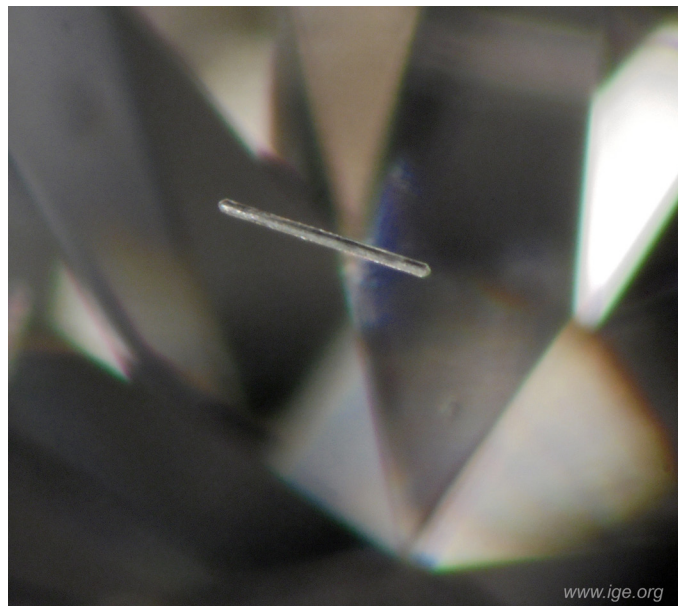


Figure 4: Metallic inclusion in the shape of a stick, typical for HPHT synthetic diamonds.

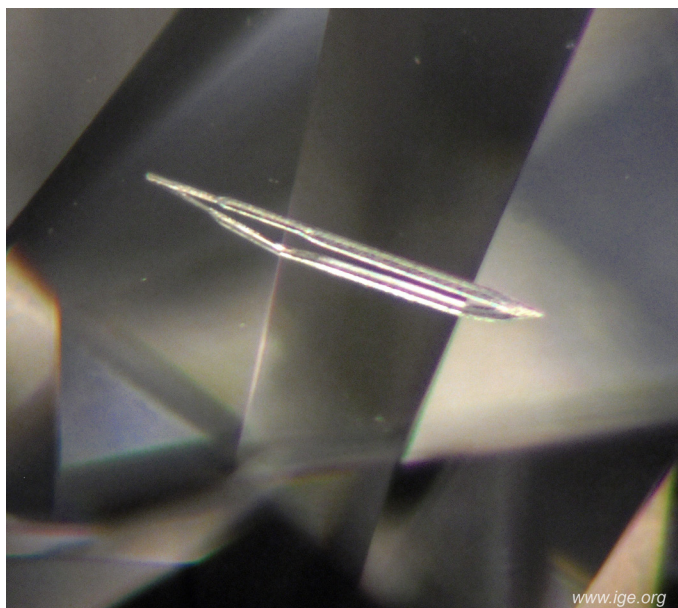


Figure 5: Another inclusion of similar form, in the same diamond that is reflected in the pavilion facets.



Figure 6: A fissure, observed in the same synthetic diamond that is similar to those found in a natural diamond.

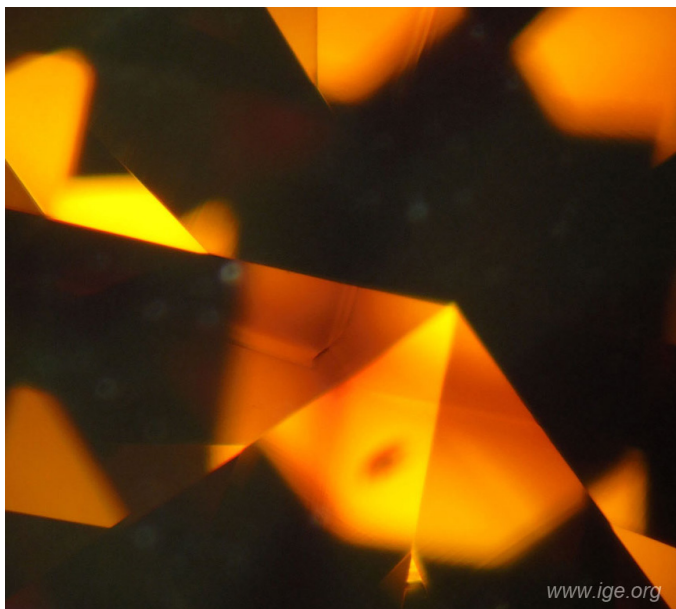


Figure 7: Hourglass-shaped growth lines in an orange-brown HPHT synthetic diamond.

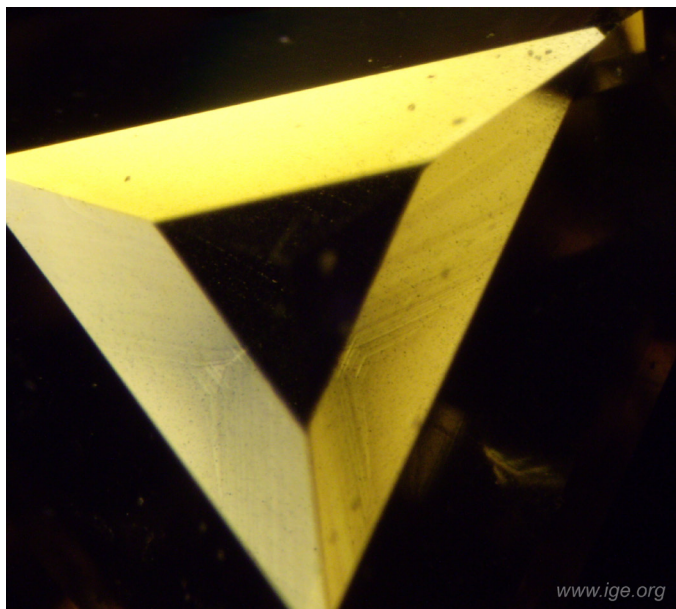


Figure 8: Internal graining in an HPHT synthetic diamond.

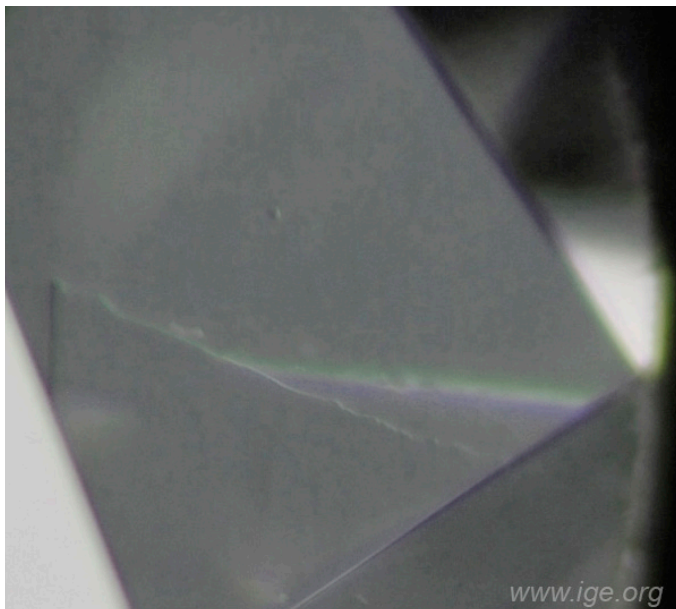


Figure 9: Irregular external graining, often observed on the surface of natural diamonds, proves it is not of synthetic origin.

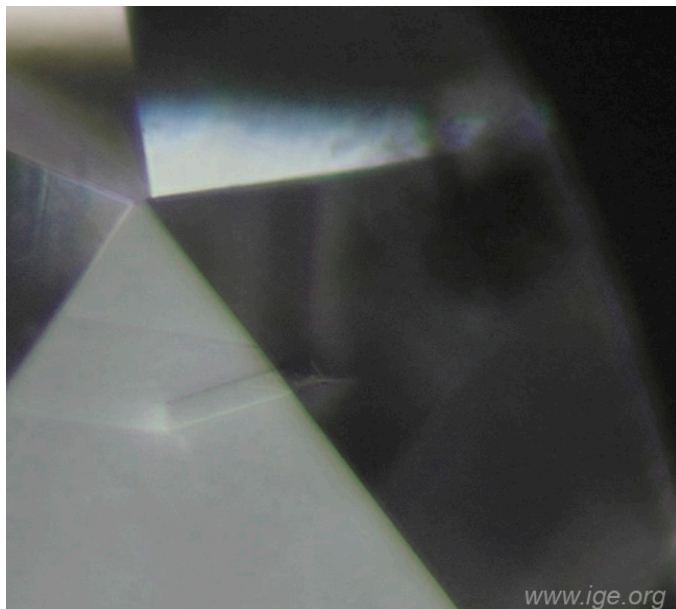


Figure 10: A reabsorbed diamond crystal generates external grain lines in a natural diamond.

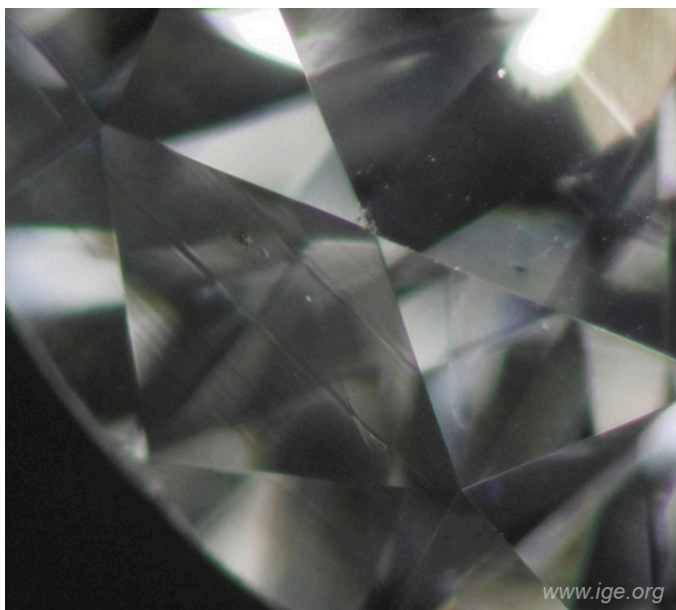


Figure 11: Internal graining in a typical position for natural diamonds, in planes parallel to octahedron faces.

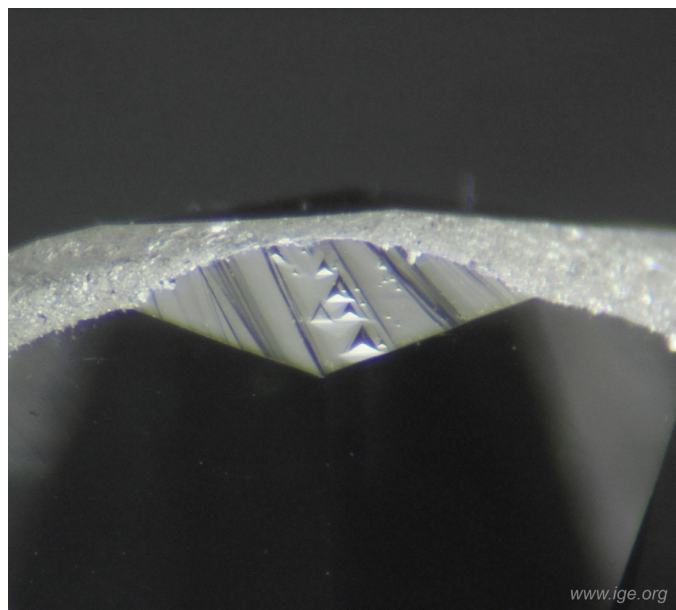


Figure 12: Natural with trigons, typical for natural diamonds.

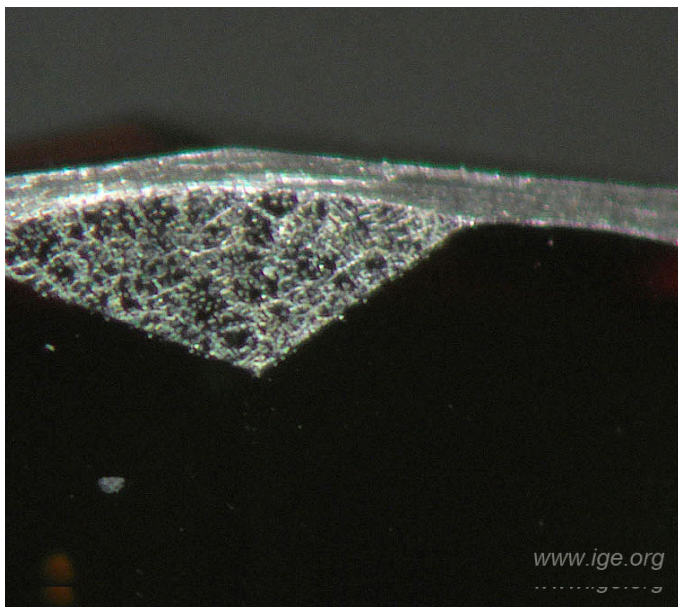


Figure 13: A "natural" observed in an HPHT synthetic diamond analyzed in the GGE Laboratory presents a totally atypical surface for natural diamonds.

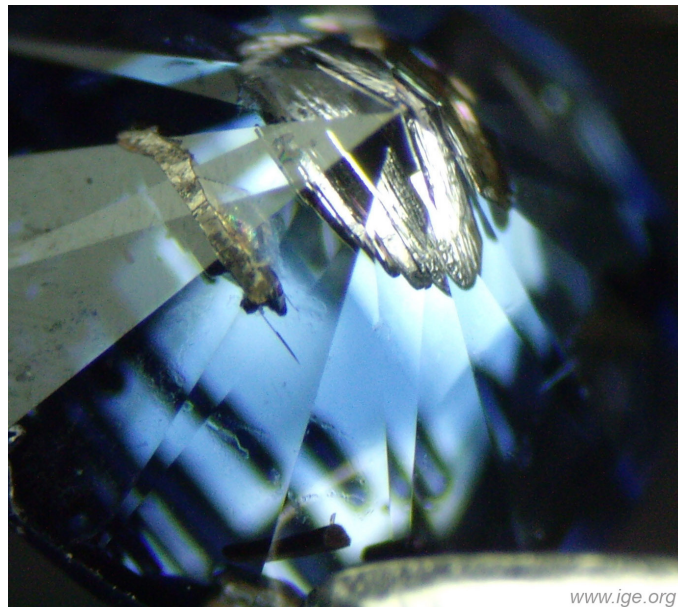


Figure 14: Color zonality in an HPHT diamond.

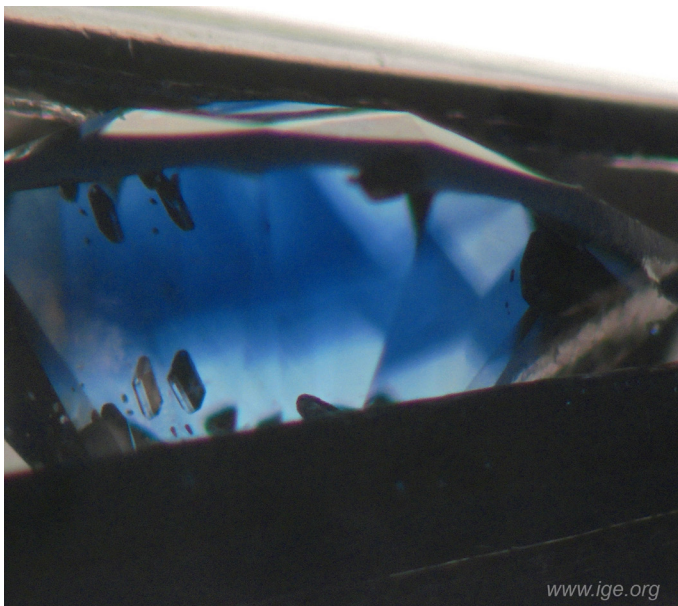


Figure 15: Color distribution in geometric growth sectors, corresponding to cube and octahedron faces, is typical for fancy colored HPHT diamonds.



Figure 16: Laser inscription on a CVD synthetic diamond manufactured by Gemesis.

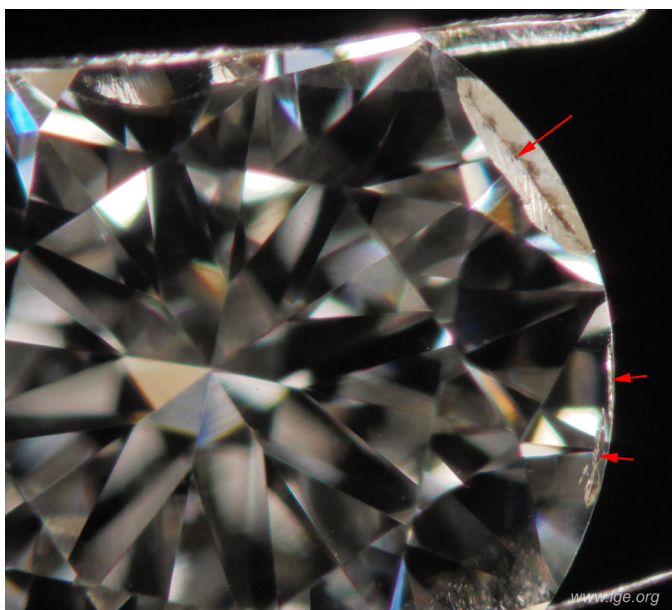


Figure 17: Reflective cracks that reach the surface of the pavilion generating small grooves below the girdle in a synthetic diamond CVD of Gemesis.

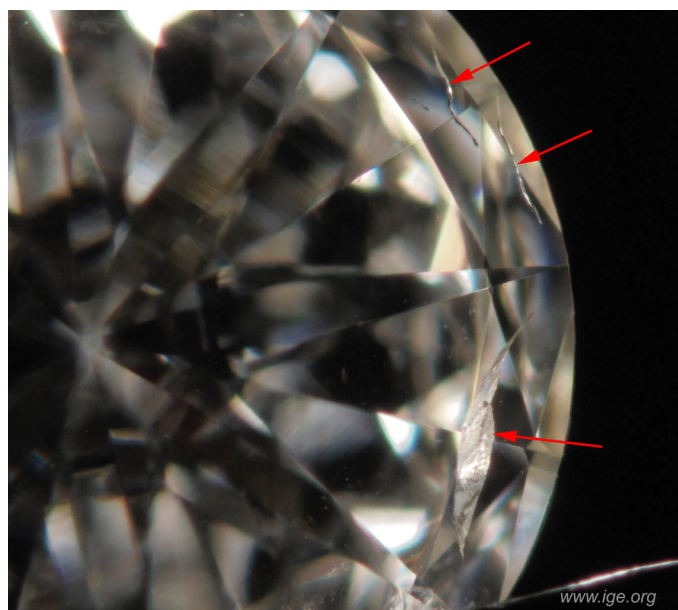


Figure 18: The same cracks observed from the pavilion.

For more information on this type of counterfeiting using natural diamonds treated by HPHT, please click on the link below:

https://accreditedgemologists.org/pdf_file/201409-GIA-colorless-diamonds.pdf

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Idar Oberstein & Sainte Marie

June 17th to June 24th, 2017

If you would like to join Deborah Mazza in 2017, visit an iconic gemstone town and enjoy the gem and mineral show at Sainte-Marie, please contact her at deborah@laetherstone.com



The World Gem Foundation is delighted to announce the five successful scholarship applicants.

Tino Hammid Memorial Gemmological Scholarship



We like to thank all those who submitted applications for the 2017 Tino Hammid Memorial Gemmological Scholarship. Sadly we could not give scholarships to everyone who applied but we would like to remind everyone that this is a yearly scholarship and you are welcome to apply again for 2018.

The five successful scholarship applicants for 2017 come from a variety of backgrounds but all share an enthusiasm for gemmology. The applicants were selected by Tino's wife Petra and his oldest daughter Evelyn who were given the mandate to select those five candidates who, in their opinion, best epitomize the spirit of Tino.

Each successful applicant will now be enrolled in their World Gem Foundation's Career Gemmology (Theoretical) Course. We wish them all the best of luck.

The winners are....



Haimanot Sisay
(Ethiopia)



Joel Dyer
(Finland)



Sandra Eriksson
(Sweden)



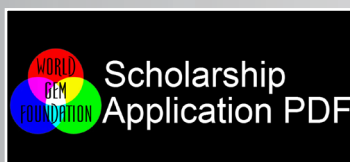
Lemma Beyene
(Ethiopia)



Muhammad Zeeshane
(Pakistan)

In 2018, the World Gem Foundation will again award five scholarships allowing deserving students to take the World Gem Foundation theoretical 'Career Gemmology' course.

The deadline for submitting your application is December 31st, 2017. To download the application form, please click on the image below:



WORLD GEM FOUNDATION WORKSHOPS



For 2017, The World Gem Foundation has developed four one-day workshops and one four-day workshop that are designed to appeal to not only those who are new to our industry but also to 'seasoned' professionals. These fast-paced sessions cover a wide range of topics ranging from the complexities of grading both diamonds and coloured gemstones, to three coloured gemstones (rubies, sapphires and emeralds) that individually and collectively are the cornerstones of the coloured gemstone trade, to an area that is perhaps the most fluid and challenging (gemstone enhancements and treatments) and finally to a complete overview of the twelve primary gemstones that are typically sold in the trade.

Where and When?

The workshops will be offered in the United Kingdom, Holland, Spain, France, Germany & Sweden. The cost of each workshop is £ 100 (United Kingdom) or € 125 (Holland, Spain, Sweden, France or Germany).

Join our 'Gemnastics' four-day gemmological workout in Mallorca (September 28th to October 1st, 2017) or in London (November 6th to 9th, 2017). The cost is € 500 (Mallorca) or £ 400 (London).

For more information, please see the individual course profiles on the following pages.

World Gem Foundation Tuition Credits

If you would like to learn more about gemstones and the science of gemmology, we would like to help. If you enrol in any of these one-day workshops or our four-day gemnastics program, you will receive a 'tuition credit' equal to the value of the workshop towards the cost of any of our 'Career Gemmology' theory component courses (Basic Gemmology, Advanced Gemmology, Gem Identification, Diamonds, Coloured Gemstones) or our complete 'Career Gemmology' program.

There has never been a better time to explore gemmology.....



DIAMOND & COLOURED GEMSTONE GRADING

Where & When

Date	Location	City
April 22nd	Sweden	Kolmården
May 8th	Holland	Laren
May 14th	United Kingdom	London
May 19th	Spain	Madrid
June 26th	France	St. Marie



COURSE CONTENT

This one day workshop will give you a thorough understanding of the grading techniques used to assess the quality of both diamonds and coloured gemstones. Topics covered include the 4 C's (colour, clarity, cut and carat weight), how they are measured and assessed, how to describe the colour of a coloured gemstone, the various colour grading systems currently used by professionals, the clarity classification of coloured gemstones based on their geological environments, and how cut is assessed.

WHO SHOULD TAKE THIS COURSE?

This course is designed for those with some previous jewellery or gemmological knowledge, such as jewellers, goldsmiths, gemmological students and those who are engaged in the wholesale trade.

WHAT WILL I NEED TO BRING?

Students need only bring their energy and enthusiasm, plus something for making notes. Everything else will be provided.

BOOK NOW!

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Your
Place

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RUBIES, SAPPHIRES & EMERALDS

Where & When

Date	Location	City
June 23rd	Spain	Madrid
July 3rd	Holland	Laren
Sept 1st	United Kingdom	London
Oct 25th	Germany	Munich



COURSE CONTENT

This one-day course covers three of the most important coloured stones; ruby, sapphire and emerald. Topics covered include an overview of their physical and optical properties, principal sources, basic testing methods, how they are produced synthetically, common treatments and enhancements, care guidelines, how they are valued and helpful buying tips.

WHO SHOULD TAKE THIS COURSE?

This course is designed for those with some previous jewellery or gemmological knowledge, such as jewellers, goldsmiths, gemmological students and those who are engaged in the wholesale trade.

WHAT WILL I NEED TO BRING?

Students need only bring their energy and enthusiasm, plus something for making notes. Everything else will be provided.

BOOK NOW!

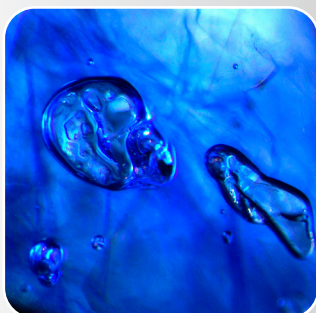
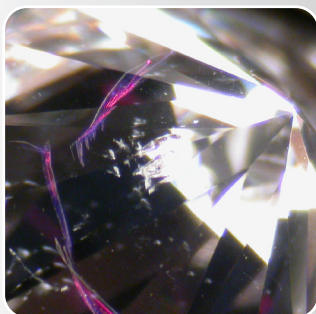
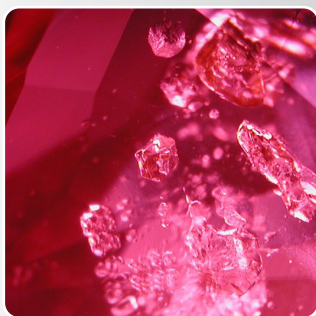
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GEMSTONE ENHANCEMENTS & TREATMENTS

Where & When

Date	Location	City
Sept 2nd	United Kingdom	London
Sept 11th	Holland	Laren
Oct 26th	Germany	Munich



COURSE CONTENT

This one-day course covers one of the most fluid and challenging areas of gemmology; the enhancement and treatment of gemstones. Topics covered include heat treatment, surface and sub-surface diffusion, lead glass fracture filling, flux assisted partial fissure healing, glass fracture filling, cobalt doped glass filled sapphires, clarity enhanced diamonds, HPHT, quench-crackling, surface modifications, coatings and foil backs, laser drilling, and irradiation.

WHO SHOULD TAKE THIS COURSE?

This course is designed for those with advanced gemmological knowledge who deal on a day to day basis with gemstones either at the wholesale or retail level or in the manufacturing process.

WHAT WILL I NEED TO BRING?

Students need only bring their energy and enthusiasm, plus something for making notes. Everything else will be provided.

BOOK NOW!

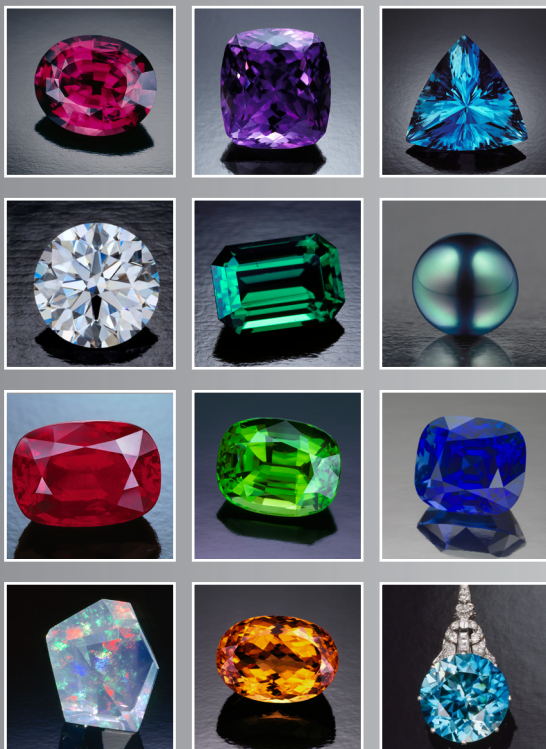
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BIRTHSTONES OF THE MONTH

Where & When

Date	Location	City
June 27th	France	St. Marie
Nov 6th	Holland	Laren



COURSE CONTENT

This fast paced workshop covers the twelve primary 'Birthstones' (garnet, amethyst quartz, aquamarine, diamond, emerald, pearl, ruby, peridot, sapphire, opal, topaz and zircon) and gives a general overview of their primary sources, how they are valued, helpful buying tips, how to care for them, common treatments and enhancements and basic testing methods.

WHO SHOULD TAKE THIS COURSE?

This course is an entry level course but will also appeal to jewellers and goldsmiths who would like to know more about the stones they are selling or using in the manufacturing process.

WHAT WILL I NEED TO BRING?

Students need only bring their energy and enthusiasm, plus something for making notes. Everything else will be provided.

BOOK NOW!

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A four day gemmological workout

The Spanish Gem Academy is pleased to offer our four-day workshop in Mallorca on September 28th, 29th, 30th & October 1st, 2017.

This four-day workshop covers a variety of subjects ranging from how diamonds and coloured gemstones are graded, the twelve primary gemstones used in the trade to the fluid and challenging area of gemstone enhancements and treatments.

The workshop starts with the grading techniques used to assess the quality of both diamonds and coloured gemstones. Topics covered include the 4 C's (colour, clarity, cut and carat weight), how they are measured and assessed, how to describe the colour of a coloured gemstone, the various colour grading systems currently used by professionals, the clarity classification of coloured gemstones based on their geological environments, and how cut is assessed.

From there, we move onto the twelve primary 'Birthstones' (garnet, amethyst quartz, aquamarine, diamond, emerald, pearl, ruby, peridot, sapphire, opal, topaz and zircon) giving an overview of their physical and optical properties, principal sources, how they are produced synthetically, how they are valued, helpful buying tips and basic testing methods.

The workshop concludes with a complete overview of the enhancement and treatment of gemstones. Topics covered include heat treatment, surface and sub-surface diffusion, lead glass fracture filling, flux assisted partial fissure healing, glass fracture filling, cobalt doped glass filled sapphires, clarity enhanced diamonds, HPHT, quench-crackling, surface modifications, coatings and foil backs, laser drilling, and irradiation.

The total cost is € 500 (including lunch)

All participants will receive a € 500 tuition credit towards the World Gem Foundations Career Gemmology Course or any of the five component courses (Basic Gemmology, Advanced Gemmology, Gem Identification, Diamonds or Coloured Gemstones)

**TUITION
CREDIT**

A wealth of knowledge for a fraction of the price.....

LONDON CALLING

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A four day gemmological workout

The British Gem Academy is pleased to offer our four-day workshop in London on November 6th to November 9th, 2017.

This four-day workshop covers a variety of subjects ranging from how diamonds and coloured gemstones are graded, the twelve primary gemstones used in the trade to the fluid and challenging area of gemstone enhancements and treatments.

The workshop starts with the grading techniques used to assess the quality of both diamonds and coloured gemstones. Topics covered include the 4 C's (colour, clarity, cut and carat weight), how they are measured and assessed, how to describe the colour of a coloured gemstone, the various colour grading systems currently used by professionals, the clarity classification of coloured gemstones based on their geological environments, and how cut is assessed.

From there, we move onto the twelve primary 'Birthstones' (garnet, amethyst quartz, aquamarine, diamond, emerald, pearl, ruby, peridot, sapphire, opal, topaz and zircon) giving an overview of their physical and optical properties, principal sources, how they are produced synthetically, how they are valued, helpful buying tips and basic testing methods.

The workshop concludes with a complete overview of the enhancement and treatment of gemstones. Topics covered include heat treatment, surface and sub-surface diffusion, lead glass fracture filling, flux assisted partial fissure healing, glass fracture filling, cobalt doped glass filled sapphires, clarity enhanced diamonds, HPHT, quench-crackling, surface modifications, coatings and foil backs, laser drilling, and irradiation.

The total cost is £ 400 (including lunch)

All participants will receive a £ 400 tuition credit towards the World Gem Foundations Career Gemmology Course or any of the five component courses (Basic Gemmology, Advanced Gemmology, Gem Identification, Diamonds or Coloured Gemstones)

**TUITION
CREDIT**

A wealth of knowledge for a fraction of the price.....

WORLD GEM FOUNDATION COURSES

CAREER GEMMOLOGY

Basic Gemmology

The chemical nature of gemstones, physical and optical properties, basic crystallography, the absorption of light, the spectroscope, refraction and reflection, the refractometer, optical character and sign, dispersion, reflectivity meters, polarized light, the polariscope, pleochroism, the dichroscope, colour filters, specific gravity, luminescence, magnification and thermal conductivity.

Advanced Gemmology

Imitation and composite gemstones, methods used to manufacture lab-created gemstones including Verneuil, Czochralski, Flux Melt, Hydrothermal, Skull Crucible, Zone Melt, Horizontally Oriented Crystallization, HPHT, CVD, Detonation, Ultrasonic Cavitation, Sublimation Method, and Modified Stober Method, their unique identifying features, treatments and enhancements including heat treatment, surface and sub-surface diffusion, lead glass fracture filling, flux assisted partial fissure healing, glass fracture filling, cobalt doped glass filled sapphires, clarity enhanced diamonds, HPHT, quench-crackling, surface modifications, coatings and foil backs, laser drilling, irradiation, and advanced gem testing techniques.

Course	Digital	Print
Basic Gemmology	200	235
Advanced Gemmology	400	430
Gem Identification	225	255

Gem Identification

Introduction to gem identification and the tests that are commonly used to identify gemstones. An in-depth look at each of the ten colour groupings (colourless or white, red, pink, orange, yellow, blue, green, violet or purple, brown, black or grey) plus phenomenal or unusual gemstones. Important varieties and species of gemstones that commonly occur within each colour grouping. How to distinguish gemstones that are commonly confused with each other (i.e. aquamarine and blue topaz, emerald and chrome tourmaline, diamond and lab-created moissanite) or have physical and optical properties that are similar (i.e. amethyst quartz and purple scapolite). All lab-created, imitation, treated and enhanced gemstones that are found in each colour grouping.

Diamonds

Physical properties, geology, localities, principle mines, crystal system, chemical composition and classification, fancy colours, causes of colour, absorption spectra, pleochroism, inclusions, fluorescence, mining, gem identification, methods of synthesis, common treatments and enhancements and a comprehensive examination of the 4 C's (colour, clarity, cut and carat weight) and how they are measured and assessed. We will also compare the various 'Cut' criteria for the GIA, AGS, HRD, IGI, EGL, and AGA and explain how the estimated weight of a 'mounted' gemstone is calculated.

Career Gemmology

Interested in becoming a professional gemmologist? Our 'Career Gemmology' program includes all the information contained in the Basic Gemmology, Advanced Gemmology, Gem Identification, Diamonds and Coloured Gemstone Courses.

Course	Digital	Print
Diamonds	225	255
Coloured Gemstones	500	565
Career Gemmology	1400	1570

Coloured Gemstones

Physical properties, geology, localities, crystal system, chemical composition and causes of colour, varieties, absorption spectra, pleochroism, inclusions, fluorescence, gem identification, synthesis, common treatments and enhancements, and care guidelines. Gemstones covered in this course include corundum (rubies and sapphires), beryl (emeralds, aquamarines and other precious beryl), chrysoberyl (alexandrite and other chrysoberyl), spinel, zircon, topaz, tourmaline, peridot, quartz, garnet, tanzanite, lapis lazuli, turquoise, spodumene (kunzite and hiddenite), feldspars, iolite, andalusite, diopside, apatite, and organic gems (pearls, coral, jet, ivory, and amber). You will also learn how to accurately describe colour based on hue, tone and saturation, the various colour grading systems currently used by professionals, the clarity classification of gemstones, how cut is assessed, opal, jadeite and pearl grading, and how weight is assessed in a 'mounted' stones.

All prices stated are in Euros and include VAT. Fees charged by the individual gem academies are charged in the prevailing currency for that particular area (i.e. Pounds Sterling in Britain). Students taking any of the World Gem Foundation one-day workshops will receive a full tuition credit towards any of our digital or printed 'Career Gemmology' courses. Please note that shipping charges apply to any courses provided in print.

For more information please visit our website at www.worldgemfoundation.com

WORLD GEM FOUNDATION COURSES

GENERAL INTEREST



Opals

From the origins of the name, to their formation within the earth's crust, to the mistaken belief that they are purveyors of bad luck to the optical phenomenon that produces such a mesmerizing and tantalizing array of spectral colours and patterns, opal is indeed a 'stone of mystery'.

Jade

Jade, on the other hand, is not only desired and valued for its beauty but also for the unique and venerable position it has held in the cultural fabric of many great and storied civilizations, from the Chinese empire, where it was once considered its most valuable commodity, to the pre-Columbian civilizations of the Olmec, Maya, and Aztec of Central America (Mesoamerica), who valued it more than gold, to the Maoris of New Zealand.

Topics Covered Include

Topics covered in the course include their physical and optical properties, geological formation, crystal systems, chemical composition, varieties and classification, cause of colour, absorption spectra, common inclusions, fluorescence, mining, grading criteria, methods of synthesis, gem identification, common treatments and enhancements, cleaning and care instructions, and pricing.



Organic Gems

The science of gemmology is still relatively young, a hybrid of many different scientific disciplines including not only geology, mineralogy, physics and chemistry but also biology, zoology and botany. This course explores a very select group of gemstones (coral, jet, amber, ivory and pearls), formed through organic processes rather than through geological forces deep within the earth's surface.

Topics Covered Include

Topics covered include their physical and optical properties, geological formation, crystal systems, chemical composition, varieties and classification, cause of colour, common inclusions and internal characteristics, fluorescence, pearl grading criteria, methods of synthesis, gem identification, common treatments and enhancements, and cleaning and care instructions.

Practical Workshops

Diamond Grading & Lab-created Diamonds (8 Days)

This workshop includes practical instruction on how to clarity and colour grade diamonds, techniques to determine table percentage, crown angle, girdle thickness and pavilion depth percentage, how to access polish and symmetry and the identification of lab-created and treated diamonds.

Course Cost: 1,750 Euros

Coloured Gemstone Grading #1 (5 Days)

This workshop includes practical instruction on how to access the hue, tone and saturation of coloured gemstones and how to grade pearls, jadeite and opals. During this practical class three colour grading systems; GIA, GemDialogue and World of Color will be discussed.

Course Cost: 500 Euros

Coloured Gemstone Grading #2 (100 Hours Online)

This online coloured gemstone course consists of a comprehensive overview of the GemeWizard Colour Grading System and includes practical exercises that are completed online and a six month subscription to their program.

Course Cost: 1000 Euros

Gemstone Identification #1 (5 Days)

This workshop covers the identification of red, pink, orange, yellow and green gemstones plus a section on crystallography.

Course Cost: 500 Euros

Gemstone Identification #2 (5 Days)

This workshop covers the identification of blue, violet/purple, brown, black and phenomenal/unusual stones.

Course Cost: 500 Euros

Lab-created and Treated Gemstones (5 Days)

This workshop focuses on coloured gemstones produced synthetically or treated to improve their appearance.

Course Cost: 500 Euros

Sessions

Classes run from 9.00am to 12.30pm and 1.30pm to 4.30pm with scheduled coffee/tea breaks of 15 minutes. Students are required to supply their own 10X loupe and polishing cloth. All other equipment will be provided by the 'Host' Gem Academy.

Please Note: To complete the 'Career Gemmology' program and receive the diploma, students must complete the 'Career Gemmology' theory course or the five component courses (Basic Gemmology, Advanced Gemmology, Gem Identification, Diamonds and Coloured Gemstones) plus all of the aforementioned practical workshops and the online Coloured Gemstone Grading course.



If imitation is the sincerest form of flattery, blue sapphires certainly have their fair share of admirers.....

Identification Blues

Gemstone	R.I. Range	D.R.	D	O/S	S.G. Range	H
Sapphire	1.762 – 1.778	.008	.018	U-	4.00	9
Lab-created Sapphire	1.762 – 1.778	.008	.018	U-	4.00	9
Benitoite	1.757 – 1.804	.047	.046	U+	3.64 – 3.68	6 – 6 ½
Taaffeite	1.719 – 1.730	.004 – .009	–	U-	3.60 – 3.62	8 – 8 ½
Kyanite	1.710 – 1.734	.015	.020	B-	3.53 – 3.70	4 to 7
Lab-created Spinel	1.727	–	.020	I	3.54 – 3.63	8
Spinel	1.712 – 1.730	–	.020	I	3.54 – 3.63	8
Idocrase	1.700 – 1.723	.002 – .012	.014	U+	3.32 – 3.47	6 ½
Tanzanite	1.691 – 1.700	.009	.030	B+	3.35	6 ½ – 7
Euclase	1.650 – 1.677	.019 – .025	.016	B+	3.10	7 ½
Apatite	1.628 – 1.649	.002 – .006	.013	U-	3.16 – 3.23	5
Smithsonite	1.621 – 1.849	.228	.014	U-	4.00 – 4.65	5
Tourmaline	1.614 – 1.666	.014 – .032	.017	U-	3.01 – 3.11	7 – 7 ½
Topaz	1.610 – 1.620	.010	.014	B+	3.49 – 3.57	8
Aquamarine	1.564 – 1.596	.004 – .005	.014	U-	2.68 – 2.74	7 ½ – 8
Quartz	1.544 – 1.553	.009	.013	U+	2.65	7
Iolite	1.542 – 1.578	.008 – .012	.017	B-	2.58 – 2.66	7 – 7 ½

Fortunately the four transparent blue gemstones that are most likely to be confused with blue sapphire are either isotropic (natural or lab-created blue spinel), or biaxial (tanzanite, topaz, and iolite).

The separation of sapphire and benitoite relies on four key observations, namely; the ability to determine whether or not the stone is uniaxial positive or negative and the strong birefringence, much higher dispersion, and pronounced dichroism of benitoite.

While the refractive index of idocrase is relatively close to sapphire, careful measurement of the R.I. will reveal that idocrase is optically positive while sapphire is negative. In a solution of undiluted diiodomethane (S.G. 3.33), idocrase will either freely suspend or gently sink, while sapphire will sink.

Apatite, smithsonite, tourmaline and aquamarine are all uniaxial negative however there are substantial differences in their refractive indices, and with the exception of smithsonite,

will all float in a solution of undiluted diiodomethane (S.G. 3.33). Tourmaline will also exhibit noticeable birefringence when viewed under magnification.

Quartz is not only distinguishable by its characteristic bulls-eye when viewed between crossed polars with a polariscope but also by its lower R.I, specific gravity, and hardness.

Lab-created Blue Sapphires

Verneuil Flame Fusion Sapphires

Flame fusion blue sapphires are characterized by a profusion of small gas bubbles, almost certainly caused by the excess hydrogen gas used in the manufacturing process and broad curved colour bands that are quite different to the strong hexagonal colour zoning or straight lines that meet at 120-degree angles and run parallel to the outlines of the hexagonal crystal in natural blue sapphires. These bands are often more evident when the stone is immersed



Stunning Blue Sapphire (Kashmir)

Photo by Tino Hammid



Blue Sapphire

Photo by Tino Hammid

in methylene iodide. However, by reheating Verneuil flame fusion gemstones to very high temperatures, over a prolonged period of time, the curved colour zoning can be substantially diminished giving them a more natural appearance.

Through a spectroscope, variations can be seen in the absorption spectra between natural blue sapphires and their lab-created counterparts. In natural blue sapphires, absorption bands at 450nm, 460nm and 471nm are usually visible and quite strong. Occasionally, only a fine, sharp line will be seen at 450nm, however this is normally absent in lab-created blue sapphires. In the event it is present, it is normally very weak and quite unlike the sharp line seen in natural stones.

Under short wave ultra violet light, lab-created blue sapphires will fluoresce either green or blue while their natural counterparts, other than stones from Sri Lanka, will remain inert.

Using the flotation method, lab-created blue sapphires are diamagnetic while certain natural sapphires with higher iron content will show some magnetic attraction when floated. Natural blue sapphires from certain geographical regions can at times be diamagnetic, however any magnetic attraction rules out laboratory grown stones.

For flame fusion sapphires that do not exhibit noticeable colour banding or gas bubbles, one can use the Plato Method. This involves isolating and referencing the optic axis using the conoscope and then viewing the stone under 20 to 30X while immersed in methylene iodide between crossed polars. Verneuil flame fusion sapphires will often exhibit two sets of bands intersecting at 60-degrees proving their 'synthetic' origin.

Czocharlski Blue Sapphires

Microscopically, one can expect fine curved growth lines, similar to Verneuil flame fusions, gas bubbles, whitish smoke or rain-like wisps, and black prismatic crystals.

Flux Melt Blue Sapphires

Chatham Blue Sapphires

Chatham sapphires often contain twisted-veil like inclusions, fingerprint inclusions or platinum inclusions which take the form of either hexagonal, triangular or needle-like inclusions. Under long wave UV light, the stones will appear yellow with dark blue and greenish patches, and under short wave UV light, they will appear blue. Stones also exhibit strong hexagonal colour zoning.

Hydrothermal Sapphires

In earlier hydrothermal sapphires, one can expect to see the Verneuil seed crystal when they are immersed in methylene iodide along with inclusions typical of the flame fusion seed crystal including curved strata, gas bubbles, and surface crazing.

In more recent hydrothermals, where the finished stone has been cut to exclude the seed plate, strong irregular striated and heavily roiled growth features often referred to as chevron, mosaic or zigzag patterns will be evident. Blue sapphires produced in Russia by Tairus apparently use nickel as the dopant instead of iron and titanium. Greenish-blue sapphires will show a red fluorescence under UV light, may contain crystalline copper inclusions and will show three strong absorption bands located at 970nm, 599nm and 377nm with two weaker bands at 556nm and 435nm due to the nickel.

Treated & Enhanced Blue Sapphires

Heat Treatment

Due to the substantial difference in price between certain gemstones, laboratories are now not only required to determine the country of origin but also whether or not a stone has been treated.

The presence and interaction of titanium, iron and magnesium in blue sapphire plays a crucial part in the overall colour. By heating stones in a reducing (oxygen-free) environment, at temperatures ranging from 1500 to 1800 degrees Celsius, it is possible to convert the ferric oxide (Fe^{3+}) to ferrous oxide (Fe^{2+}) causing a deepening of the colour. Conversely, if the stones are heated in an oxidized (oxygen-rich) environment, the ferrous oxide (Fe^{2+}) converts to ferric oxide (Fe^{3+}) causing a lightening of the stones.

Heating stones progressively through 1200 to 1800 degrees Celsius can intensify the colour of blue sapphires that contain rutile needles. This causes either a complete or partial dissolution of the rutile (titanium oxide) and slowly diffuses the titanium into the stone. This technique was used to great effect by the Thai dealers who purchased seemingly worthless *geuda* from Sri Lanka in the 1960's.

Interestingly, research conducted on natural blue sapphires (Häger, 1992, 1993, 2001; Emmett and Douthit, 1993) shows that there is little or no correlation between the concentrations of iron and titanium and the saturation of blue colouration. This proved that the interaction of the impurities is often as important as the presence of the impurities.

Detection is often difficult without using sophisticated equipment. In some cases, the appearance and state of certain inclusions, such as the partial dissolution of rutile (silk) or the halos or stress fractures surrounding zircon crystals in Sri Lankan blue sapphires can aid the gemmologist in his determinations, however these are by no means conclusive.

Heat treated blue sapphires often exhibit a chalky-greenish blue fluorescence under short wave UV light, an absence of the iron absorption line at 450nm, and a diffused hexagonal colour zoning.

Surface and Sub-Surface (Lattice) Diffusion Treatment

Early surface diffused blue sapphires can be identified by the colour concentrations found along facet junctions when immersed in methylene iodide, by the absence of the 450nm iron absorption line, and by the poor quality polishing that is purposely done to avoid removal of the coating. In some cases, areas where the coating has been removed may show patchy fluorescence when viewed under short wave UV light. Pitting is also commonly seen, but since it is also prevalent in heat treated stones, this should not be considered conclusive, merely indicative of surface diffusion.

Lead-Glass Fracture Filled Blue Sapphires

Lead-glass fracture filled blue sapphires are characterized by very low-relief fractures, gas bubbles, voids (unfilled areas) in fractures, a blue or orange flash effect and in surface reaching cavities, join lines that are often evident when the stone is tilted in reflected light with marked differences between the lustre of the glass and the sapphire.

Cobalt-Doped Glass-Filled Sapphires

What is particularly interesting about this particular treatment is that since the colouring agent is singly refractive and the host stone is doubly refractive but near colourless, no pleochroism is exhibited when using a dichroscope. Since the colouring agent also happens to be cobalt, their strong red to orange-red reaction under the Chelsea Filter will give a completely different reaction from what one would expect when testing a blue gemstone with a similar R.I and birefringence to natural and lab-created blue sapphires.

Microscopically, one can expect to see flattened gas bubbles, marked differences in lustre between the surface reaching glass and the host sapphire, blue concentrations of colour in the many fissures, and a yellow/red/pink colour flash effect when the stones are viewed with dark-field illumination. Due to the presence of lead glass, the S.G may be slightly higher than natural or lab-created sapphires.

Although not necessary, advanced testing using De Beers DiamondView will show a spider-web pattern of fissures exhibiting a strong chalky blue fluorescence. Using a UV-Vis-NIR spectrometer, cobalt-related peaks at 544nm, 591nm and 625 nm can be seen, while the presence of both cobalt and lead can be confirmed using energy dispersive x-ray fluorescence (ED-XRF). As would be expected with lead glass, analysis by X-radiography will show opaque areas coinciding with the glass filler.

Quench-Crackling

Verneuil flame fusion quench-crackled blue sapphires tend to be characterized by curved colour banding, gas bubbles, an absence of any naturally occurring mineral inclusions, and the presence of odd checkerboard patterned fractures.

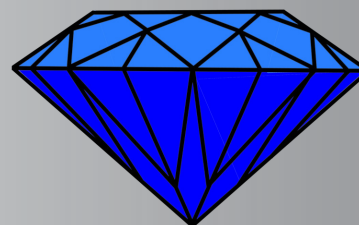
Oiling

Lower quality blue sapphires that have surface reaching unhealed fractures may be oiled to improve their appearance (colourless oil) or value (coloured oil). Detection is possible by gently heating the stone (under a halogen microscope lamp or by using a hotpoint), which causes the stone to 'sweat'. The presence of coloured oils can be confirmed using a cotton swab. Bubbles may also be evident, trapped as the oil was introduced into the cracks, and occasionally, the oils will fluoresce under long wave UV light. A drop of acetone applied to the surface of an oiled stone will dissolve the oil.

The identity of the actual substance used to infiltrate the stone requires the use of sophisticated equipment such as an infrared spectrophotometer or micro Raman spectrophotometry.

Composite Sapphires

Natural Sapphire Crown



Lab-created Sapphire Pavilion

Sapphire doublets are also likely to be encountered and invariably consist of a natural sapphire crown, often with characteristic inclusions and a lab-created sapphire pavilion. Unfortunately both the crown and the pavilion will exhibit dichroism and refractive indices consistent with sapphire. In

some cases, a small section of ruby may be added instead of the natural sapphire to give the appearance of a colour change sapphire.

Identification relies not only on the nature of the inclusions but also how they are oriented within the stone since inclusions are typically found randomly placed rather than confined to a particular plane.

In sapphire doublets, one can expect to see curved colour banding in the pavilion when it is immersed in methylene iodide, and gas bubbles, particularly trapped in the epoxy used to fuse the two halves together. UV light can also be helpful since it will often reveal abnormalities in the fluorescence between the crown and the pavilion. In this case, the lab-created pavilion may fluoresce green or blue under short wave UV radiations while the natural sapphire crown will remain inert.

Submissions

If you would like to submit an article to Gemmology Today, we would love to hear from you.

The deadline for the next issue is
April 15th, 2017

Guidelines:

- We do not accept highly scientific articles. These are better suited to either the Journal of Gemmology or Gems & Gemology
- All articles should be a minimum of one page
- All accompanying photographs must be high resolution and must be accompanied by written permission to use the images unless the author owns the rights
- We reserve the right to refuse articles

E-mail all submissions to information@worldgemfoundation.com.

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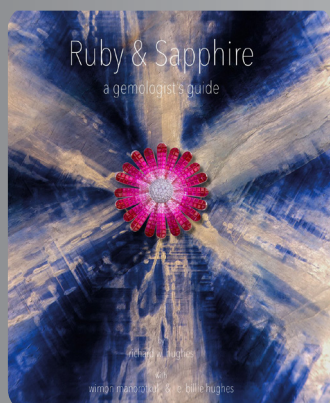
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Literary Speaking

Expand Your Mind

In this issue we look at three new important publications; Ruby & Sapphire - A Gemologist's Guide, Objective Diamond Clarity Grading & Secrets of the Gem Trade 2nd Edition.



In 1997, Richard Hughes published *Ruby & Sapphire*, which quickly became THE reference book on the subject. The one you have to have and sadly for many people, the one that was virtually impossible to acquire a copy of.

Now, imagine that book with 20 more years of experience and 20 more years of visiting mines worldwide. Two additional decades of a diverse and successful career in gems and gemology led to the decision to establish Lotus Gemology, a gem lab focused exclusively on ruby, sapphire and spinel. If you thought the first *Ruby & Sapphire* was “the book of books” well, to mis-quote Al Jolson, you ain’t seen nothing yet!

At 816 pages, this book covers vast amounts of information. What really struck me the most while reading it however, was just how much Richard loves what he does, loves to share what he does and that the man is a natural born educator. The first *Ruby & Sapphire* inspired a number of the prominent gemmologists of today; this new, updated and largely expanded version is destined to inspire those of tomorrow.

Past and present is a theme that runs through every chapter. Richard has clearly done enormous amounts of research on the history of not just rubies and sapphires themselves, not just what we know now, but on how we came to know it and from whom. Technical books are all too often served up as a dry plate of knowledge, what we’re being offered here is a veritable gourmet feast with all of the trimmings. In true Hughes fashion, each chapter also has extensive footnotes and a bibliography which are, for those so inclined, a gemmological treasure map of where to find information going far far beyond what can be put into one book.

Contributing to *Ruby & Sapphire, A Gemologist's Guide* are a number of well-known names in gemmology. Richard has enrolled the participation of, amongst others, John Koivula, Ken Scarlett and John Emmett, each of whom enriches this

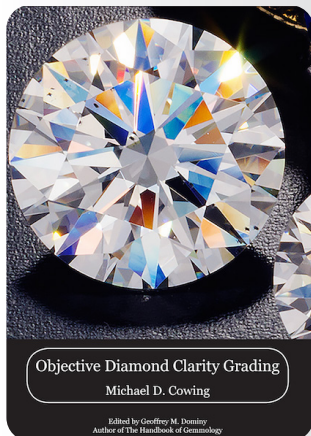
book with their own areas of expertise. Also highlighted are a talented trio of next-generation photomicrographers, whose stunning inclusion photos are truly works of art.

New students will find clear and easily understood explanations of basic gemmological concepts and will probably find themselves wishing that Richard was still teaching in a classroom. The pages on how to choose and use a microscope properly, along with a comprehensive list of different lighting techniques and what they are useful for is, for those at that stage of their education, one to bookmark. Do not ignore the advice given by a pro on the humble stoneholder, which is right on the money. It’s no fun scrambling around on the floor looking for a stone that went zinging off somewhere. It’s even less fun having to take your microscope apart to retrieve a stone that has fallen into the light well.

The World Sources chapter is an encyclopedic compilation of the corundum-producing countries of the world, the mines contained therein and the history of those mines. All generously illustrated with photos—some historical, some contemporary—showing the places, the people and the beautiful gems that they produce. As a reference guide, you will find yourself going back to these pages over and over again. For those with an adventurous bent, it’s also an invitation to journey to these places and be in the thick of things yourself. The superb photos of the many gem adventures of Richard, Wimon and Billie, along with some very entertaining personal anecdotes, take you right there and will likely have you smiling to yourself more than once.

It’s little wonder that it has taken 20 years to produce *Ruby & Sapphire, A Gemologist's Guide*, as this is not a book done in half measures. So many new mines have come into existence during that period of time, others no longer produce. The landscape of treatments has gotten considerably more crowded and infinitely more advanced than what existed two decades ago, as has the instrumentation and the science needed to detect those treatments. The considerable time, resources and energy spent thoroughly documenting all of this for *Ruby & Sapphire, A Gemologist's Guide* is self-evident. Do not miss this one. It’s an absolute “must have” for anyone with an interest in rubies or sapphires, be it on a personal or a professional level.

Reviewed by Julie Poli



Measuring inclusions to determine a clarity grade has been an idea for as long as I can remember, which in actual years puts us back into the late 1970s. It was during that period of my young gemological career when I overheard a conversation between Richard Liddicoat, then president of GIA, and Dennis Foltz, then GIA director of education. They were talking about measuring inclusions,

using such equipment as rotating stone holders, and referring to Okuda's and Huddleston's mathematical work. I do not recall ever seeing the measuring of inclusions as part of the teachings of diamond grading, but the idea of it was something I had never forgotten.

It wasn't until the early 1990s when I started working again with Tom Tashey, then owner of the Los Angeles European Gem Lab, that the idea of measuring inclusions became reality. Tom, who just happened to be my diamond grading supervisor at the Santa Monica GIA Gem Trade Laboratory in the late 1970s, had us using a small transparent plastic grid (transparent plastic "graph paper") to measure the approximate size of an included crystal. It was certainly limited in nature, but it worked well enough to keep us consistent and that's what diamond grading is all about, remaining consistent.

Over the years, Michael's quest for finding an objective mathematical truth to diamond grading has been un-daunting. I remember our conversations starting with color grading, as Michael was trying to figure out mathematically how the grade ranges could be defined. This of course then led to talking about clarity grade ranges, how these too might be mathematically explained.

And that's where Fibonacci and the Golden Spiral and Ratio come in. I was watching a presentation I believe at a Gem-A conference, or was it Diana Singer, New York jewelry historian and Estate Jewelry expert, talking about the Golden Ratio symmetry in a period piece, relating the beauty of an object as perceived to how the brain has calculated it as being aesthetically correct and mathematically appropriate. We say "beautiful" when our brain perceives that an art object is mathematically and aesthetically correct, as it is when proportions align with the Golden Ratio and the Fibonacci spiral.

Michael and I have been talking about the subjective and objective aspects of diamond grading for years. Anyone who has spent more than five minutes with Michael talking about the GIA's diamond grading system has seen and heard Michael's frustration with understanding clarity grading's subjective and unscientific underpinnings.

Though they were experts in diamond grading, it was quite literally developed by "a bunch of guys sitting around the table saying things like 'that looks like a solid SI₁ to me. What about you?'" This then led us directly to the question in our discussion, why? What is it that makes us feel that SI₁ is more appropriate than any other grade?

What is it in our head, when looking at an emerald cut or a pear shape that says to us that the shape is "just right" or "too long" or some such seemingly subjective comment? How do we do that? I would submit that it's our brain, in some sense mathematically determining the proportions of the stone, and liking proportions close to those in nature that obey ratios like Fibonacci's. Whether it's about symmetry of shape, the noticeable amount of color, or the visibility of an inclusion, our mathematical brain is signaling us to make a seemingly subjective comment, to say "it looks like a high VS₂ to me."

Our discussions eventually led us to talking about a sort of Golden Spiral of clarity grades like the Fibonacci Golden Spiral, but where the Golden Ratio relating clarity grades is 2 to 1 rather than 1.62 to 1.

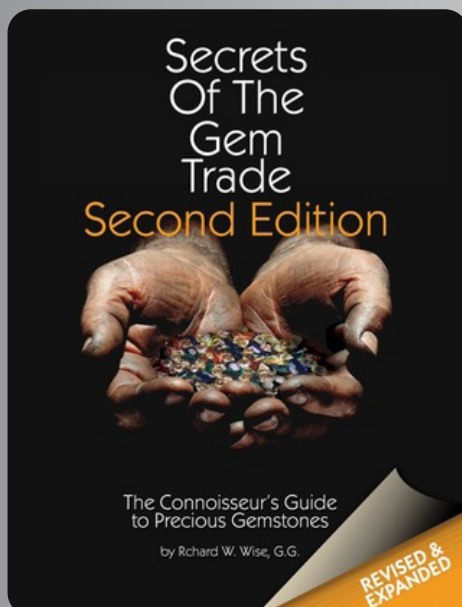
Leave it to Michael to grab on to the math of the Spiral and doggedly work it until he could present a mathematical method for consistent clarity grading.

Michael's historical research with Okuda and especially with Roy Huddleston, endeavoring to prove or correct their work, and then to refine the mathematical algorithm to give us a solid way to objectively clarity grade a diamond, is quite possibly the most significant leap forward towards developing the black box for consistent diamond clarity grading. We still believe that diamond grading is as much an art as it is a science, but what Michael has actually accomplished is to greatly increase the amount of science (the consistency) and he has revealed the natural mathematical underpinnings to the art (the subjectivity) with his System and the discovery of the "Golden Ratio of Clarity Grading."

With over 250 images, this digital publication is an A to Z on how to clarity grade diamonds and have the confidence that you will not only arrive at the right conclusions but have a systematic method and procedure that will back up your grades.

Someday, someone is going to take Michael's work in this book and previous papers, develop a CAD/CAM program with digital imaging to mathematically clarity grade diamonds and other gemstones. My only hope is that Michael receives more than just accolades for figuring this out.

Reviewed by Gary Roskin G.G., F.G.A., Author of Photo Masters for Diamond Grading and Executive Director of ICA.



I am often asked as the author of a digital book if I have an aversion to printed books. I find this question truly baffling. Do we naturally assume that an owner of an Indian restaurant only likes Indian food? A rock musician cannot appreciate other styles of music? A coffee drinker cannot enjoy a cup of tea? Why as a society do we love to force people into corners and try to create conflict when in reality, there is no conflict.

For the record (or cd for that matter), I love printed books. There is nothing more beautiful than a room full of books. To me there is a certain romance to books, something I find quite comforting.

At the same token, there is also something very exciting about digital technology. Apple and Amazon have made a fortune by offering digital music downloads and publications, allowing buyers to view the product, purchase it and enjoy it on their personal computer, iPad, iPhone or android within a matter of minutes. While I mourn the loss of the traditional record shop, for me it is the musical content that matters more than the vehicle in which it is delivered.

When it comes to books or music or anything else for that matter, one does not have to exist at the exclusion of others. In my opinion, they can happily co-exist and are often complimentary to other. Each has its own strengths and weaknesses and these should be embraced rather than discounted.

There are several things that I personally look for in a book. To me the esthetics are very important. It's like a meal in a restaurant. It might taste great but if it is poorly plated, it seems to take something away from the overall dining experience. I hate books, particularly gemmological publications, where it is apparent the publishers have tried to cut corners. There is no excuse for poor quality paper, smaller than normal text, limited imagery or even worse, poor reproduction of those images. I

like a page to breathe; I don't want clutter. I also want a book to speak to me in a language I understand. After all, why do we buy books? To make ourselves appear less intelligent or to engage us and encourage us to explore every last sentence on every last page.

I also want a book that is comfortable to read. Small books that are overly thick are simply impossible to hold or read. Sure you can break the binding but do you really want to do that to a book?

I like Richard's book for all the right reasons. It ticks all the boxes from an esthetics perspective and while we should never judge a book by it's cover, it is human nature to gravitate towards things that have appeal and 'Secrets of the Gem Trade Second Edition' has lots of curb appeal.

Of course, a book is more than just packaging. It's no good if it looks great but tastes bad. To me there is no greater letdown.

When I unpacked Richard's book, it immediately piqued my interest and I am happy to say that that initial euphoria carried right through into the content of the book.

At 385 pages and fifty-two chapters, Secrets of the Gem Trade 2nd Edition has added 127 pages, eleven new chapters, five new introductory essays and 161 additional photographs to the 1st edition (2002).

While this is not a book that will help you identify gemstones or to separate a blue spinel from a blue sapphire, it will teach you how to separate the 'wheat from the chaff'.

I can remember once working as an appraiser in a retail store and being asked by a sales associate for my opinion on a Padparadscha sapphire that a dealer wanted to sell to her. In his words it was 'of the finest quality'. Before she opened the stone paper, I showed her a photograph of a fine Padparadscha sapphire that Tino Hammid had taken and then watched her facial expressions. Clearly, the sapphire contained in the stone paper was not 'of the finest quality' but I wanted her to reach that conclusion. I don't like bursting bubbles but at the same token, I don't like others to create bubbles that have to be burst. The sapphire in question had a hint of orange, no pink and was in my opinion 'commercial quality' at the best. The asking price was over \$ 9,000 Canadian dollars. The dealer left the store with the stone in hand and I could tell from his body language that I was not going to be high on his Christmas list. Still I was simply doing my job and my co-worker was happy that I had helped her avoid making a very bad purchasing decision.

Secrets of the Gem Trade 2nd edition will burst many bubbles by setting the record straight. It will inform and educate those who read it by making them aware of what is good and what is not.

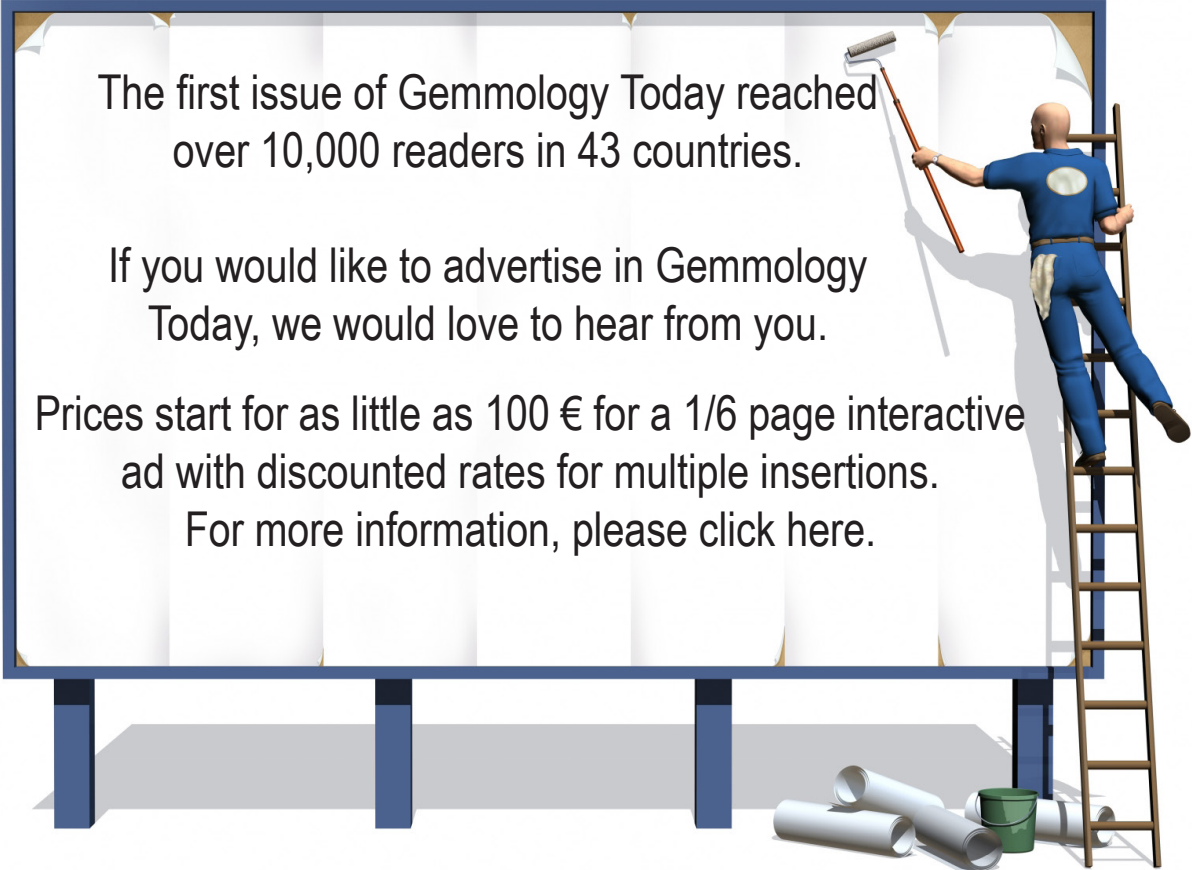
The use of drop shadowing makes the images jump off the page, giving them a life of their own and while some will disagree with Richard's assertion that 'crystal' or diaphaneity should replace carat weight as the fourth 'C', he has a point.

Divided into two parts, the first section covers the 'Essentials' needed to become a 'Gem Connoisseur'. Here you will learn about how the market works, how gemstones are graded, treatments and enhancements and new gem sources. The second section contains important information on no less than forty-seven species or varieties of gemstones from colourless and fancy coloured diamonds through the 'Big Three' (rubies, sapphires and emeralds) to alexandrite, the quartz and garnet families, pearls, opals, jade, tourmaline, topaz, spinel, peridot, feldspar (moonstone and sunstone), tanzanite and lapis lazuli. The real strength of this section is pinpointing what is important and what is not when it comes to buying a particular gemstone.

Richard is a great writer and storyteller. Clearly he is a man who loves his gemstones and what he does for a living. At times he is frank and to the point, while at other times there is playfulness in his writing.

Sadly we work in an industry where many view education as a bad thing. Content to believe what others have told them and perpetuate the falsehoods that have existed for generations. This is an industry that is not only secretive but based on trust. Many people have been quite content to put their own personal gains above all else and betray this trust. This industry needs the 'good guys' who are not afraid to tell it how it is. Richard Wise is one of these guys who has made it his personal mission, based on years of experience, to dispel these untruths and give his readers the tools they need to make informed decisions.

Reviewed by Geoffrey M. Dominy (Handbook of Gemmology)



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The Learning Curve

Educate and Evaluate

Here we look at the importance of finding the right testing methods to suit the learning objective.

Testing Times



I have to confess that when I was preparing for my FGA examinations in both 1986 and 1987, I was left wondering why on earth I needed to memorize the physical and optical properties of more than one hundred gemstones. With the information readily available in a variety of publications, including the course notes, the very idea that in my future career I would make identifications based solely on memory seemed ludicrous. If you are trying to find the one and only round peg that fits into that particular round hole, why would you not check the data you have collected before making a definitive determination?

The problem many educational facilities face is how to effectively gauge a student's knowledge and suitability for their chosen profession? Education, after all, is a business and while having a high failure rate may create an air of 'exclusivity', generally speaking, failing students is not only bad for the bottom line but can also be suicidal from a marketing standpoint.

Perhaps it is all the modern technology that has 'dulled' our senses and made us less capable of problem solving. We don't seem to rise to challenges anymore, content instead to find a fast and painless way of figuring out the right or in some cases, the wrong answer. Students don't reach for the stars any longer, seemingly more content to find the path of least resistance. To most it is the certificate that hangs on the wall that counts but what is the point of appearing to be intelligent if in reality you are not? You may be able to fool your clients but what about your peers? Sooner or later the cracks will appear in your facade and your deficiencies will become evident.

Of course the million-dollar question is what type of exam questions are best? Many fall into the trap of believing that essay type questions are better and that multiple-choice and open-book examinations are inferior. In reality, nothing could be farther from the truth. The key to establishing effective testing is to understand that it is the 'learning objective' that counts and this in turn will dictate the correct method of testing.

So how do you design fair, yet challenging, exams that accurately gauge a student's knowledge? Should you assign essay questions on your exams? Problem sets? Multiple-choice questions? Should it be open book or closed book? Should we set a strict time limit? Again the answer lies in what your learning objectives are.

If you want your students to articulate or justify an economic argument, then a multiple-choice examination is not ideal since it removes any need for the person to be expressive. They simply need to find the one (or in some cases more than one) answer that is correct. On the other hand if you want to test a student's ability to recognise a logical argument or distinguish it from one that is not, then a multiple-choice examination might be more effective. At the same token, matching technical definitions is difficult to assess using an essay-type question format and is better suited to a multiple-choice option.

The other important consideration to remember is that tests and examinations not only test knowledge, they can also become valuable teaching tools in the overall learning process. The old saying 'We learn from our mistakes' is indeed true for it is the mistakes that we all make in life that provide the most important lessons.

Examination Methods

Written Exams

Written exams are an ideal way of establishing whether or not a student understands certain concepts or principles. This form of testing leaves 'nowhere to hide'. You can bullshit

all you like but if you don't know the 'nuts and the bolts', it will be impossible to fool an examiner.

This testing method relies on two important factors; the ability of the person writing the exam to articulate themselves correctly and the ability of the person marking the exam to get into their 'head' and understand what they are actually trying to say. Basic grammar, like basic mathematics, is generally not a forte for most people and while they may be able to relay what they mean orally, committing their thoughts to paper in an organised and logical sequence is often far more challenging.

In some cases students are given the option to answer a certain percentage of the questions (for example five of the eight questions). This seems a strange way of testing a person by giving them the option of not answering the questions they feel less confident about. In gem identification this certainly does not work. Imagine telling a client that of the five stones they want testing or the five items of jewellery they want appraising that you will select the three you feel most confident about? Giving students an 'easy way out' only reinforces the idea that we should only reach for the 'easy' stars and not strive to reach the most distant ones.

Open Book Examinations

Open book examinations are notorious for being hard because basically you are removing the requirement that a student memorise the information and can therefore ask far more complicated, complex and challenging questions. This examination form is certainly helpful if we want to test a students understanding and ability to apply knowledge, as well as to select relevant information.

From a gem identification perspective, this testing method works well since in reality, this is exactly what we do after we have collected the data. We hit the books trying to find the right answer.

Multiple Choice Examinations

Interestingly constructing good multiple-choice questions is not as easy as it sounds. They can be very time consuming to prepare and also extremely challenging to try and establish realistic alternatives. While some feel that this testing format is not very effective at measuring and stimulating learning for understanding, analysis, synthesis and the application of knowledge, if the questions are properly constructed, it can be a very effective learning tool.

Of course the main criticism of multiple-choice examinations is that at the very least you have a fighting chance. If there are four choices and only one correct answer, you have a one in four chance of being correct. Unlike essay type examinations, there is 'somewhere to hide' and if you are under time restraints and running out of time, questions can be answered rapidly without even reading them.

Penalizing students for selecting the wrong answer helps to avoid the random ticking of boxes. For example if a question is worth two points and a student is deducted one or even two points for selecting the wrong answer, the mistakes can quickly add up, making it a more effective way of testing.

There is also the question of ambiguity and this is often the case in multiple-choice examinations leaving the student wondering what in fact the question really means. Many times I have found myself saying 'if you mean this then the answer is that but if you mean that, then the answer is this'. Unlike essay type questions, multiple choice questions do not give you the opportunity to express yourself and this can be at times quite demoralizing and frustrating.

Computer-Based Assessment Tests

These are invariably multiple-choice but can also include interactive activities. The main advantage to this method of testing is that it gives the student immediate feedback and can therefore be used for continuous self-assessment.

Take Home Exams

Take home exams can be a great way of testing a students' understanding and their ability to apply knowledge, and to select the relevant information. Of course you will not know if they have solicited help and whether the answers are in fact their own and a true reflection of their knowledge.

Oral Examinations

This form of testing is a great way of testing a students' knowledge and understanding of a topic, as well as their ability to articulate their thoughts. Like computer-based examinations, students generally receive immediate feedback either directly (from the examiner) or indirectly (from the disappointed look on the examiners face). This method requires students to 'think on their feet' by giving them no time to prepare. It also adds a great deal of pressure to the examination process and while this may work in certain areas by simulating 'real life' situations (medicine for example), it should only be used if the 'learning objective' merits it.

While group oral examinations can be used, again it is often difficult to access an individuals' knowledge and to prevent one student from dominating the discussion.

Report Writing and Oral or Poster Presentations

Often performed as group work, this method tests a students' ability to co-operate and work as a team. It also tests their ability to perform tasks and apply knowledge to unfamiliar situations, as well as to write and present the outcomes. It does not however assess an individuals' knowledge and again depending on the 'learning objective' this may not be an effective method to use.

So, what examination methods should you choose?

Again depending on your learning objective, using a variety of testing methods might prove beneficial. This will give students the opportunity to display a full range of knowledge and skills while at the same time preparing them for the real world. Testing students for detailed, factual knowledge alone will not achieve this.

Because testing has a significant impact on student learning it is important to provide a continuous assessment rather than an examination at the end of the course. This simply postpones their studying until the end. Typically knowledge obtained in a short period is never well retained so it is important to space the tests or examinations so that they 'stretch' the students.

Whatever type of assessment is used, it is important to give continuous feedback, to make the student feel special, and to ensure that they remain motivated throughout the course. Students learn from their mistakes and it is important that if a student fails a test or an examination that they be given the chance to take a re-test.

Before you prepare a test or an examination, be mindful of why you are giving it? Is it to evaluate and grade students? Motivate them to study? Add variety to their learning process? Identify their faults and correct them? Facilitate students' choices or gain valuable feedback? Provide statistics for the course or to accredit your students?

So what testing methods are ideally suited to studying gemmology?

Firstly, students need to have a complete understanding of the equipment they will be using, the principles they are based upon and what information they will yield. This is critical because unless they understand the 'tools of the trade', how will they ever be able to effectively identify gemstones? The best way to assess this is through closed book examinations using essay type rather than multiple choice questions.

Secondly, students need to learn how to collect and analyse the data. Clearly this can only be achieved through practical instruction where the students have full access to the reference materials. The same is true of the practical examinations. Committing this information (such as physical and optical properties) to memory does not make any sense at all because it in no way reflects how we would want a professional gemmologist to work.

Finally, we need to develop a 'research mentality' and again this can only be cultivated by using open book examinations. Whether it is online testing, multiple choice, short answer or essay type questions, the students should have full access to the reference materials. However since in 'real life' mistakes can prove very costly, a mechanism should be built into the examinations where students are penalised if they get a question wrong. After all, why should examinations be any different to the real world?

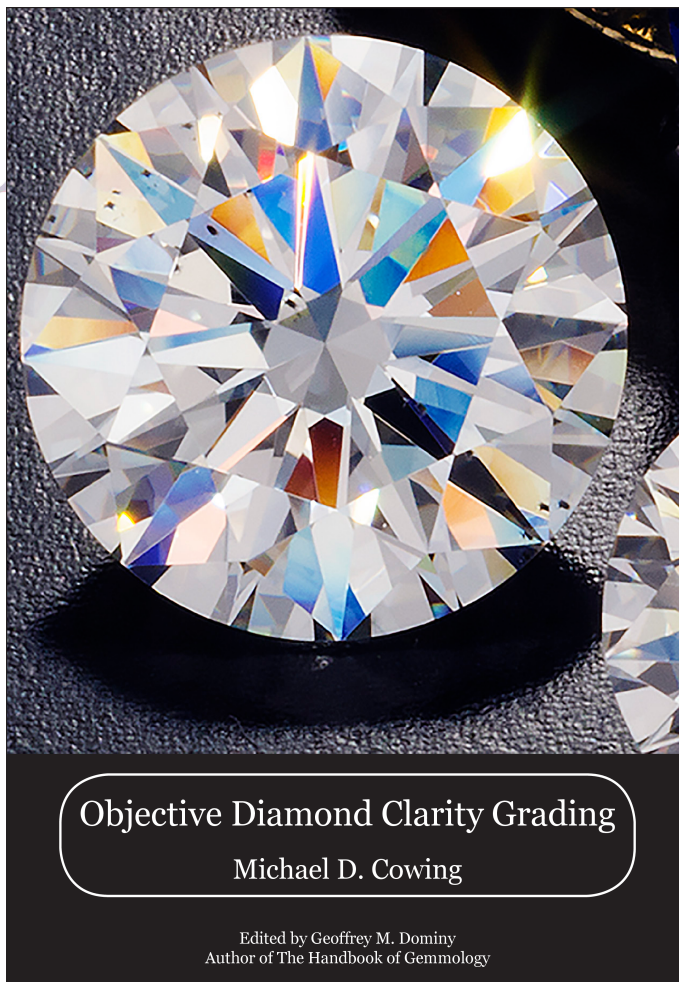
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VANESSA PATERSON is a GG, FGA, IAA member and international amber expert with over thirty years of industry experience ranging from retailing, jewellery valuation, antique jewellery and research.



Amber from the British Isles

European countries have traded amber for at least 10,000 years. Most Europeans, at this time (around 900 B.C), were sun worshipers and to them amber represented the sun and was often worked, due its colour and warm feel into discs for adornment to emulate it.

The oldest amber artifacts discovered in Europe have been found in the British Isles. In England, archaeologists have unearthed beads from Goughs cave in Cheddar, South England and Cresswell Crags in Nottinghamshire that date from around 900 to 11,000 B.C. A Bronze Age amber cup was discovered in Sussex in 1856 when excavating a building site. This Bronze Age grave also contained other objects including a volcanic stone axe hammer, and a copper alloy dagger. The amber cup measures 5 inches in height and has a rounded flat base with a handle. The body of the cup has been finely decorated with fine raised lines and is made from one piece of amber. The hove amber cup, believed to have been fashioned in Germany, resides in the Brighton Museum and Art Gallery. Another amber cup was found in Dorchester but is in fragments and is employs a completely different style of craftsmanship to the hove cup.



Hove Cup

In 1998 a Bronze Age necklace made of amber was unearthed through an archaeologist excavation in Mellor Stockport in the North West of England. The amber necklace was discovered in a stone lined grave known as a cist. This is the first time in England a 4,000 year old amber necklace has been found. The necklace consists of two rows of amber discs centrally set, attached to two rows of long barrel shaped beads with flat amber plates joining the two rows together. The history

of the location of the amber is believed to be from the Baltic although at present no research has been undertaken to conclude if the amber has in fact come from the British shores.

Documentation exists from around 1,500 AD suggesting that approximately six kilograms of amber was washed up along the shores of England, while annually, a small amount of amber is washed up on the Scottish shores. In York there is evidence of amber workshops dating from the Viking period (793-1066 AD). A considerable amount of amber and partially worked amber beads were found from an archaeological site on Clifford Street in York. These amber items, amounting to over one hundred, are part of the York Museum collection. The amber is succinate (containing succinic acid) and possibly came from the British shores although further research needs to be conducted to confirm if it of English or European origin.

Amber washed up on the British shores today is rare and amounts to approximately two kilograms. Most of the amber that is found is kept by the locals and worked into items of personal adornment.

In the past, it is believed that British amber originated from the Baltic and was transported to Britain, during the latter stages of the Ice Age by ice sheets moving out of southern Scandinavia across the North Sea.

Amber is found along the coastline of eastern England including Lincolnshire, Norfolk, and Suffolk with the latter two being the main locations. The amber being found on the Norfolk shore may be due to cliff erosion from old glacial deposits, along with off shore amber being washed up on to the local beaches after a tidal surge or storm. The average size of amber found in recent years ranges from a few grams to pieces weighing over 100 grams. In 2013 a local dog walker found a 700+ gram piece of amber washed up after a storm in the Spring near the pier at Cromer beach Norfolk. The piece has stayed in the finders' possession.

Copal resin, of a light honey colour and of good clarity has also come ashore at Cromer. Some pieces have fauna inclusions; sadly no research has been conducted on the

copal resin. Suffolk is better known for its amber due to large pieces in the past being found in the coastal region most notably near Dunwich. In the past, several pounds of amber have been found annually in this locality. The two largest known pieces of English amber came from the Suffolk shores. One weighing approximately one kilogram came from the beach at Dunwich and is on display at the Museum and Amber Shop in Southwold, Suffolk, the other weighing two kilograms was trawled off the coast at Covehithe, Suffolk.



Amber weighing one kilogram (Dunwich)
(Photo courtesy of Lizzy Wright)



Amber weighing two kilograms (Covehithe, Suffolk)
(Photo courtesy of Lizzy Wright)

The museum and amber shop at Southwold has the largest known collection of British amber on public display. Annually, on average, 10 to 20 pieces of amber with an average weight of 10 grams are found along the Suffolk coastline. Due to the demise of the local trawling industry in Suffolk, very little, if any, amber is being trawled today.

We rarely find amber washed up on the Scottish coastline however three pieces are recorded as being in the collection of the Museum of Natural History of Scotland. All three pieces came from the Fife area and measure from 50mm to 70mm in length. Amber beads have also been found at a site in Knowes Trotty in the Orkneys and are believed to have been worked by the Wessex culture in the south of England. The amber beads were also found with gold foil covers and were possibly worn on a cape or gown and have been dated back to the Bronze Age.

Amber has been found in the Bathgate Hill about 3 miles northeast of Bathgate town in Scotland. The amber occurs in small filled druses in basalt lava from the Lower Carboniferous. This amber named 'Middletonite' is also found in rounded pellets in both the calcitic and barythitic gangue of nickel, in the old silver mine at Hilderston near Linlithgow. The amber is dated to between 136 and 140 million years old. One piece is in the collection of The Museum of Natural History of Scotland. It is not of gem quality and no infrared spectra or FTIR has been conducted on the specimen.

Amber from the coalfields of Ayrshire Scotland has also been referenced. It contains fossilized microscopic fungi and coniferous plants. Sadly the amber specimens have been lost to science. The only reference can be found in the Geological Society of Glasgow dated 1896 by J. Smith.

Amber has also been found in Hastings, Sussex and on the Isle of Wight. The latter dates to the Barremian stage (121-127 million years ago) and has been found in several locations.

Amber occurring in four limnetic mudstones in the wood beds at Weldon in the lower green sands was discovered while searching for other fossils. The amber is uncommon and usually of a brown colour and is brittle with frequent pyritous. This is not of gem quality. At present there are sixteen records of amber from Weldon at the Museum in the Isle of Wight of which one record contains about a 100 small fragments. Out of the sixteen records of amber, three contain inclusions of which two are holotypes:

- *Diptera - Chironomidae, Dungeyella gavini* ¹
- *Spider - Cretamygale chasei* ²

Both are in the collection at the Isle of Wight Museum.

In 2001 investigations yielded additional chironomids, another Diptera, a Hymenoptera, a cockroach (Blattodea) and a beetle (Coleoptera). One specimen contains part of a spider's web. To date no further specimens have been found.

Amber has been reported from the east of Galley Hill in Hastings, South England. Here there are exposed cliffs of pale sandstone where the amber is excavated. The amber is of the Early Cretaceous period ranging in colour from translucent red to opaque brown and opaque black appearing as jet. The amber is relatively hard but brittle making it time consuming to prepare. A few kilograms of amber has been excavated however only about 100 pieces of 2mm square have so far been examined due to the lengthy time it takes to prepare each piece. Most of the amber thus far has revealed thread like or web like structures. One specimen contains the world's oldest spider's web. Hastings amber is an ongoing research project with further studies and papers to be published.

Further research into British ambers is required and will hopefully start in the near future as British amber is not only of gem quality but also of scientific interest with the inclusions of fauna and flora.

Footnotes:

1. Jarzembowski et al. 2008
2. Selden. 2002

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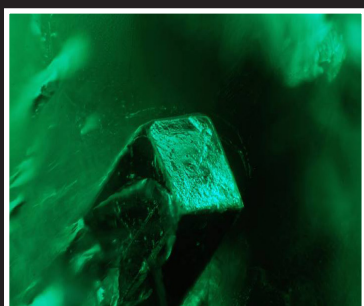
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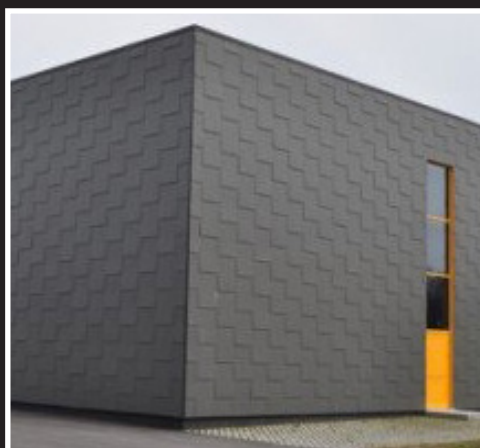
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What Jewelers Don't Tell You..and Untrue Things They DO!

In doing some research on my own with regard to what jewelers are saying to consumers today, I found that the incidence of well-meaning sales people giving wholly unreliable information has increased dramatically as the industry has moved away from the old-fashioned "downtown," mostly family-run, jewelry store in favor of major chain store operations.

But I think it is important to set the record straight, so below you will find my selection of the Top 14 – both the omissions of important facts, and misinformation with regard to what they are saying:

1. Many jewelers won't tell you that the sapphires, rubies, & emeralds they are selling have been treated to improve appearance.

There is nothing wrong with selling treated stones -- without treatments most people wouldn't be able to afford beautiful sapphires, rubies or emeralds-- but it's important to KNOW whether or not a gem has been treated because it affects VALUE and treated stones may require SPECIAL CARE.

For example, a natural emerald may easily cost 75 - 100% more than one that has had some oil added to reduce the visibility of cracks that are commonly found in emerald because of how they are formed, and if the emerald has been oiled, the stone should never be cleaned in an ultrasonic cleaner because this will cause the oil to come out and the cracks will be more noticeable. (The stone can be re-oiled however to restore its former appearance). Been heated to enhance its color and clarity, and if the stone has been heated by high heat techniques that leave glass residue 40-50% more than one that has been heated

Those that DO mention treatments often tell you that ALL COLORED GEMSTONES ARE TREATED, and that this has been routine for hundreds of years. This is NOT true. In terms of the treatments now used routinely, this became "routine" only in the 1960s and early 70s. Prior to that time, treatments were the exception and not the norm!

2. There are many gemstones that are naturally beautiful, including sapphires, rubies and emeralds, as well as many other gemstones such as alexandrite, moonstone, iolite, spinel

and garnets (in every color), peridot, and chrome tourmaline. While this is beginning to change, there are still many natural gems that are truly natural, in every way.

3. Most gemstones form in several colors; some are costly while others are very affordable. Sapphire comes in every color of the rainbow and while blue and pink sapphires can be quite costly, green and violet sapphires may be equally desirable and are much more affordable (it even occurs in red, which is the rarest and costliest; it is called ruby!). Red Garnet is common and inexpensive, while green and orange are rare and valuable.

4. Whatever color you like, there are multiple gemstone choices. If you like red, you don't have to buy a ruby -- there are very affordable red garnets, red tourmaline, red spinel, all of which are more affordable than a ruby of comparable size and quality! If you like green but can't afford emerald, there are green sapphires, green tourmaline, green garnets to name a few; if blue is your color, there is iolite, blue tourmaline, blue spinel, tanzanite, and so on.



Natural Ruby from Mogok (Photo by Tino Hammid)

5. Looking at a genuine diamond, ruby, emerald or sapphire does NOT mean you are looking at a "gemstone" -- many low-quality stones are worth only a few dollars per carat. The difference in whether or not it is a "gem" depends on its quality; the rarer the quality the more beautiful and costly the gem, but don't be deluded into thinking that ANY diamond, emerald, ruby or sapphire must be valuable.

6. BEWARE OF RUBY TODAY. Many ruby look-alikes are being made by combining extensive amounts of lead glass with low-quality ruby and then sold as “treated ruby” when this is not the case. Some of these “composite rubies” are over 40% glass and should sell for only \$10-\$20 per carat. These also require extreme care and can be damaged by lemon juice, certain household cleaners, and they can be irreparably damaged by unsuspecting bench jewelers performing basic tasks like re-sizing a ring, not realizing the stone is not a genuine ruby.

7. A “carat” does not refer to SIZE but to weight. In diamonds, people can expect a certain size when they ask for a certain carat weight -- a 1-carat round diamond for example will always measure approximately 6.5 mm in diameter -- because diamonds are cut to very precise formulas. This is not true with colored gemstones, however, so depending on the stone’s weight and color, you can find one-carat stones that look as large or larger than another that weighs 2 carats! Many colored stones are cut overly deep to intensify the color, so be sure to look for a stone that has NOT been cut deep if size is important to you!

8. Where diamonds are concerned, cutting has the greatest effect on beauty, durability and price. It’s the cutting that determines how light moves through the stone and, thus, how brilliant and sparkling it will be. Some cutting faults make a diamond more vulnerable to chipping or breaking, such as points with thin edges, or a large section of the stone’s perimeter being cut extremely thin. More of the original diamond crystal is cut away to get the ideal proportions necessary in a well-cut diamond so this also affects the cost. For these reasons, cutting differences can easily affect cost by 40% or more.

9. The “clarity” grade has essentially no impact on the “beauty” of a diamond. Differences cannot be seen with the eye when looking at a diamond graded “flawless” and most diamonds graded “SI.” So if you prefer a rarer size (larger stones of fine quality are rarer) or a rarer color, don’t ignore stones with SI clarity grades.

10. While a grade or two difference in “color” can affect cost, a couple grades difference can’t be seen once a stone is mounted in a piece of jewelry, so don’t agonize over a couple of grades. This is good to know when working within a budget. Diamonds are not color-graded from the top, the way you see any diamond when it’s worn, but before being set in jewelry, from the backside, against a flat white background. Most people have difficulty seeing the subtle color differences between grades even when looking at them in this way, but when set so you are seeing them with all their sparkle, it’s virtually impossible

11. If size is important, look at diamonds in shapes other than round; oval, triangular, and marquise shaped diamonds will look larger than a round diamond of the same weight. If the jeweler

doesn’t have one, see if they can get one for you to see, or go to another jeweler.

12. Whenever possible, select the stone first, THEN have it set in jewelry. When set, it is much more difficult to accurately and precisely grade any gemstone, yet subtle differences can have a dramatic impact on value. Mountings can hide things such as chips, nicks, cracks or repairs to a stone. If accompanied by a lab report, it can be difficult, if not impossible, to confirm the details shown on the report in order to confirm the report and stone match. In some cases, where diamonds have been damaged and re-cut, it will have a report that no longer matches the stone; the stone may have a different weight and a different clarity grade depending on the type of damage done to it.

13. As mentioned above, important factors affecting rarity and value of gemstones -- whether diamonds or colored gems -- are not immediately visible. So be sure to ask explicitly about each of the 4Cs -- color, clarity, carat weight, & quality of the cutting -- and whether or not the stone has been treated in any way to improve the appearance of any of these factors; in the case of rubies, ask explicitly whether or not the stone has been treated with lead-glass (indicating a composite).

14. Not all lab documentation is “the same.” A major problem online and in wholesale diamond districts is the use of fraudulent GIA reports and professional looking documents from fictitious laboratories. In addition, stones can be damaged and re-sold with original reports that are no longer valid, and wrong reports can be sent out with a stone inadvertently. Some legitimate labs issuing reports are also using “GIA” terminology on their reports, but not using the same “grading standards” as the GIA laboratory, so the reports may show a grade for color or clarity that is higher than what would be on a GIA diamond grading report.

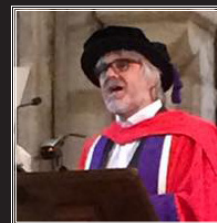
For all of these reasons, be sure to get all representations made about any stone you are purchasing, in writing, on the sales receipt. And finally, seek a gemologist-appraiser -- with respected credentials such as the Master Gemologist Appraiser (MGA) awarded by the American Society of Appraisers, or the Certified Master Gemologist (CGA) or “Independent Certified Gemologist Appraiser (ICGA), both awarded by the American Gem Society, or other credentials awarded by the NAJA (National Association of Jewelry Appraisers) or the AGA (Accredited Gemologists Association) -- to verify what you’ve been told.

If the jeweler has misrepresented what you bought, consumer protection laws require the seller to refund your money, regardless of store policy, even when posted prominently in the store.

Fair Play

Ethical Business Practices

GREG VALERIO was awarded an MBE in 2016 for services to Fairtrade Gold and artisanal gold mining communities in South America and Africa. He received an Honorary Doctorate from Winchester University for services and work in the field of social justice in 2016 and was the winner of The Observer Ethical Awards Global campaigner in 2011.



Four Pillars of Modern Gemmology

I start with a quote from Jason Williams who was the Chairman of the Gemmological Association of Great Britain (Gem-A) until 2015.

“Best practice education and training is an important growth area and we are currently working in conjunction with CIBJO, the World Jewellery Confederation, on Corporate Social Responsibility (CSR) initiatives and supply chain accreditation. Educational courses are in development and should start late in 2014. Branded Trust, a complete CSR solution for the jewellery industry, has recently received recognition from the UN through ECOSOC”. (Chairman’s Statement for year ending 31 December 2013)

In one simple paragraph, Jason Williams gave Gem-A all the rationale it needed to recognise the future of the gemmological world. Strength in education, best practice principles, recognition of the future landscape of gems and jewellery, strategic partnerships, international alignment with global issues and a clear leadership position for the organisation. In fact what Jason Williams was correctly articulating was the future landscape of modern gemmology.



Kulusuk, Greenland (Photo: Nasa Earth Observatory)

In my own adventures as a jeweller, I have witnessed first hand what happens when the gem trade ignores the ethical questions in the name of financial expedience. In Greenland, institutional racism, misuse of power, false arrests, confiscations of goods, nepotism, neo-colonialism and abuses of power have all undermined Greenland’s gemmological potential. Having seen the potential of the ruby and witnessed first hand the maleficent behaviour of international

mining companies and mineral authorities I still to this day contend, that unless a stone comes from the hand of a local Greenlandic miner, the stones cannot be called ethical.

Ethics - A Quick Overview

At the centre of the debate in gemstones and jewellery at the moment is ethics. There can be no discussion around ethics unless the discussion is rooted in truth. This is the philosophical and ontological foundation of all ethical discussion. What is the truth? The principles upon which ethical behaviour, whether individual or collective is three-fold.

1. The first pillar of ethical behaviour is natural justice, charity and generosity. Combined these actions both benefit the individual person as well as their community, society or trade. What is important to note here is that ethics do not work effectively in a self-centred, self preferential or selfish environment. Where this kind of negative environment exists, the articulation of ethics becomes a disturbance to the self-preferential status quo and a prophetic call towards more openness, transparency and truth.
2. The second pillar of ethical behaviour is respect, or put another way, treating people as you would like to be treated yourself. This simple idea translates to every area of life and includes business and the sciences. I recently listened to a long-standing member of the Board of Gem-A say, ‘We don’t do CSR, we only do the science of gemmology’. Divorcing ethics and science is a very dangerous and unintelligent practice, as it creates the environment where we can ignore injustice, racial discrimination (as I have witnessed in Greenland), human rights abuses, exploitation and human and ecological suffering. Put another way, we could say ‘I don’t care if this stone comes from indentured slave labour, I only do the science’. We should all, and of course do, deeply care about how we treat people. This applies to gemmology as well. Science should never be used to avoid the truth of a situation.
3. The third pillar of ethical behaviour is the idea of utilitarianism. Where natural justice, charity, generosity and respect are present, we can say a utilitarian outcome is possible. An environment and culture where the greatest happiness can be achieved for the benefit of the greatest

number of people. Surely this is an outcome we all want for everyone in the gemstone world, whether miner, trader, student, staff member or board member. A happy gemstone world that benefits everyone.

A Changing Gem World

Anyone with eyes and ears open will know that the world of diamonds, gemstones and jewellery is changing. Social and digital media is breeding a new consumer awareness of tragedies in the jewellery supply chain. Civil society groups are equally demanding transparency and disclosure are becoming the commercial environment we must all live in. The new world demands gemmology is more than a one-dimensional single issue scientific understanding of gemstones. The ethical nature of a gemstone is as much to do with its social context, and its environmental provenance as it is with its scientific mineral composition. These things are not mutually exclusive, they are in fact proudly complimentary. Education is the primary platform from which this new ethical reality must be embedded. For all the organisations and associations that promote the wonder of gemstones teaching the ethics of gemmology to students is in fact their primary duty of care, in order to prepare students and jewellers for the real world of life and commerce. Trade Associations in particular should not bury its head where the sun don't shine and pretend everything is alright. Promote a science only approach or dumbing down the unpalatable supply chain truths to protect an economic bottom line is simply living in the dark ages. Consumers see through corporate spin.

Four Pillars of Modern Gemmology

Science - Of course we must engage in the science of gemmology. The very fabric, mineralogy and composition of that which has been created as a gemstone is a wonder to explore and a natural beauty to behold and be celebrated. Of course we must talk about the source. If the stone that we scientifically analyse comes from a conflict zone it is profoundly unethical of us to ignore this.

Education - Of course ethics is not easy and any one who says it is, is clearly deluded. Students and trade people need to get a firm grasp on the ethical challenges such as child labour, trade exploitation, conflict minerals (yes gemstones are also a part of the conflict trade), slavery, political corruption, lack of access to markets, systemic poverty of gemstone miners etc. are all. Trade and education bodies need to invest resources into developing ethics courses for all students of gemmology, so we are preparing the next generation of gemmologists and jewellers in the very best practices and supply chain models.

Supply Chain Transparency - Of course we must engage in supply chain issues, mine to market traceability is best business practice and something all students and professionals should be fully versed in. This is the new and emerging currency in jewellery, and there is no gemstone industry without the

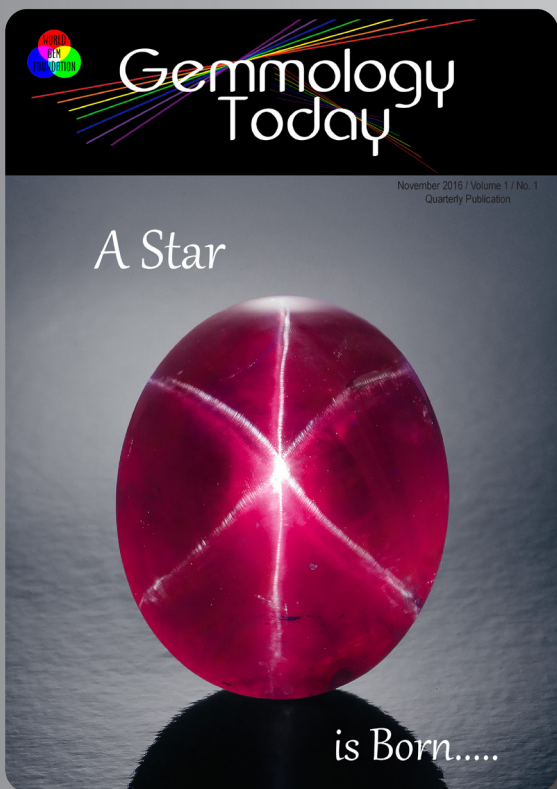


Mogok Ruby from Myanmar (Photo by Peter Grumitt)

jewellery buying public. As gemstone experts, who is better placed to champion colour, the mineralological and of course the ethical nature of the origin of denomination.

Consumer Communication - Of course we must be consumer champions for coloured gemstones. What does the consumer look for? What questions should the consumer be asking the jeweller to ensure the very best quality of purchase? What information does the jeweller need to sell with integrity coloured gemstones to the public? These and more are all issues material to an ethical best practice in gemmology. I do not want to be one of those jewellers who bedazzle a customer with stories of science, mineralological perfection and intensity of colour in order to distract from the truth of the horror of the source. This is unethical practice. What we need to prevent this, and of course to strengthen the jewellery and gemmology consumer story is a Fairtrade gemstone process, similar to that in Gold.

To conclude, the beauty of gems and jewellery rests in its unique ability to bring raw unadulterated pleasure and happiness to people. As a jeweller this is my job. When I buy a gemstone for a piece of jewellery I am asking the happiness question. Is what I am buying bringing happiness to my customer, my supplier and the mining community from whence it came. We should all gain benefit from these treasures of the deep and allow the true light to refract through our profession from mine to retail.



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JULIE POLI attended the book launch of Richard Hughes' new book *Ruby & Sapphire, A Gemologist's Guide* in Bangkok on December 7th, 2016.



Ruby & Sapphire, A Gemologist's Guide - Book Launch



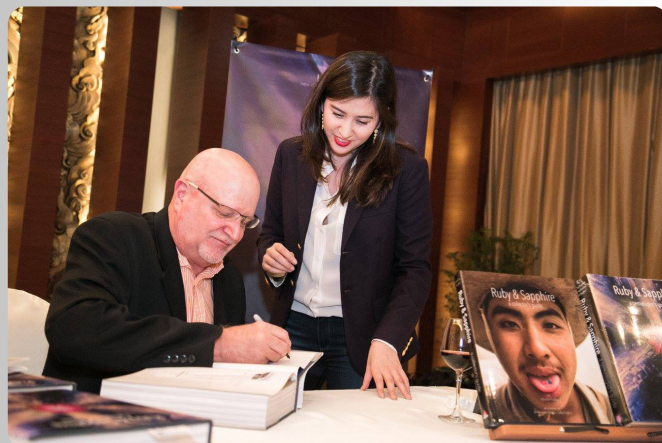
On December 7, 2016, Lotus Gemology hosted the official book launch in Bangkok for what we've all been hoping to see for the past 20 years; *Ruby & Sapphire, A Gemologist's Guide*, the updated and vastly expanded version of Richard Hughes' 1997 *Ruby & Sapphire*.

I'm told they were expecting about 100 people but there was easily 3 times that number who came out to congratulate the team of Lotus Gemology on their latest accomplishment. We got there about 5 minutes early and we were very very glad we did as the lineup to buy the book and have it signed got very long, very quickly after the official start time. With me was Conny Forsberg, who had come all the way from Sweden to attend, and who took advantage of the calm before the storm to catch up with Richard, who will be speaking at the Scandinavian Gem Symposium (<http://iloapp.gemology.se/blog/sgs>) This conference is taking place the 17th and 18 of June 2017 in Kisa, Sweden. If you've wanted to see Richard Hughes speak in person, and you're in Europe, this is a great opportunity. You can also pre-order the book and have it delivered and signed while you are there through the conference organizers by clicking here <http://scangem.se/product/ruby-sapphire>

There were many familiar faces in the room; so many that in fact this may end up reading like a "who's who" of the Bangkok Gem Community. Aside from Richard Hughes, probably the most recognizable was Vincent Pardieu, hatless for once but sporting an arm sling after having the last of the metal removed from his shoulder, the result of a mishap in Vietnam.

Vince, as many of you may know, has recently embarked on the next phase of his gemmological career and I for one am looking forward to following his many new adventures. Nick Sturman, GIA Bangkok's resident pearl expert who I had the pleasure of going on a field trip with to visit a Lombok pearl farm, you can read his report on that trip (<https://www.gia.edu/gems-gemology/fall-2016-bead-cultured-pearls-lombok-indonesia>). Scott Davies of American-Thai who, aside from having very high quality stones, also carries what amounts to paradise for the inclusion geeks and fans of the unusual amongst us. Jeffery Bergman of Primagem, whose spectacular trapiche sapphire is featured on the cover of Richard's new book.

Conny and I spent a considerable amount of time chatting with Hpone-Phyo Kan-Nyunt, the Lab Manager of Gübelin Gem Lab, Hong Kong, both about his home country of Myanmar and his recent day spent with Alberto Scarani and Mikko Alstrom of MAGI testing their FTIR unit, which he seemed very pleased to have done. Also there was Josh Saltzman of Nomads, which, if you've ever visited their booth at any of the various gem shows, is a wonderland of supreme eye-candy. Silvio Irsutti of GILT and his talented gem photographer son Arjuna, whose photos grace the pages of also present Simon Sai Dussart's Asia Lounges and those of the very talented faceting artist Victor Tuzlukov.



I hope the group of nervous GIA students that I spoke to and who were writing their exams the next day did well and enjoyed their trip to Luc Yen that followed shortly thereafter. If you're reading this, please go and tag yourselves on

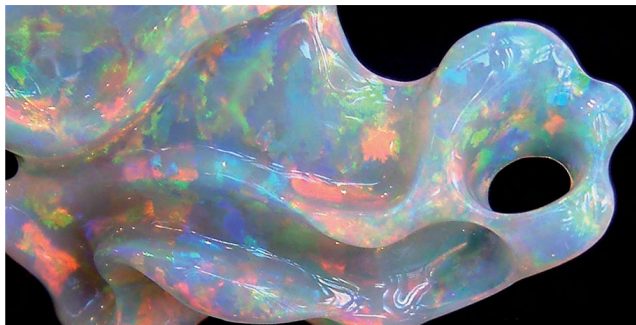
Lotus Gemology's Facebook post with pictures from the evening, (https://www.facebook.com/pg/lotusgemology/photos/?tab=album&album_id=1256509551079396) you're in there!

It was also great to catch up with Ali Mubarak Ashkar, who was of enormous help on my last trip to Beruwala, Sri Lanka. Ali completed a course on heat treatment several months back and we had a fascinating discussion on the many and sundry possibilities this presents. Having had the opportunity to discuss this further with him since that evening, complete with before and after pictures, it looks as if he's well on his way to success in that field of expertise.

People watching was certainly entertaining. There was a great deal of patience while waiting in line to buy the book. More than one expression of "oh my god, this book is huge!" on people's faces once it was in hand as there is nothing lightweight about Ruby & Sapphire, A Gemologist's Guide. At 4+ kilograms and 816 pages, it's more aptly described as a tome, rather than a book. Big, big smiles at meeting Richard Hughes, at having their copies personally signed and many congratulations to the team at Lotus Gemology for producing what can rightfully be called a masterpiece. And then watching the hunt for a flat surface begin, because no matter how much patience there had been to buy the book, it was clear that many, if not most of the people in the room had been waiting 20 years for it to appear and there was no intention of waiting until they got home to start reading it.



I'm told that there were an estimated 120 copies of Ruby & Sapphire, A Gemologist's Guide sold that evening, not including the copies that went to the sponsors, many of whom were in the room. It's probably not much of an exaggeration to say that quite literally, a ton of knowledge exchanged hands that evening, or something very close to it. People left looking very pleased, both to have been there and to have a personally signed copy of Richard's new book. With attendance being far above what was expected, Richard, Wimon and Billie can congratulate themselves on a very successful book launch!



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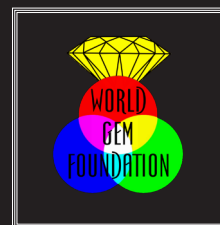
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