



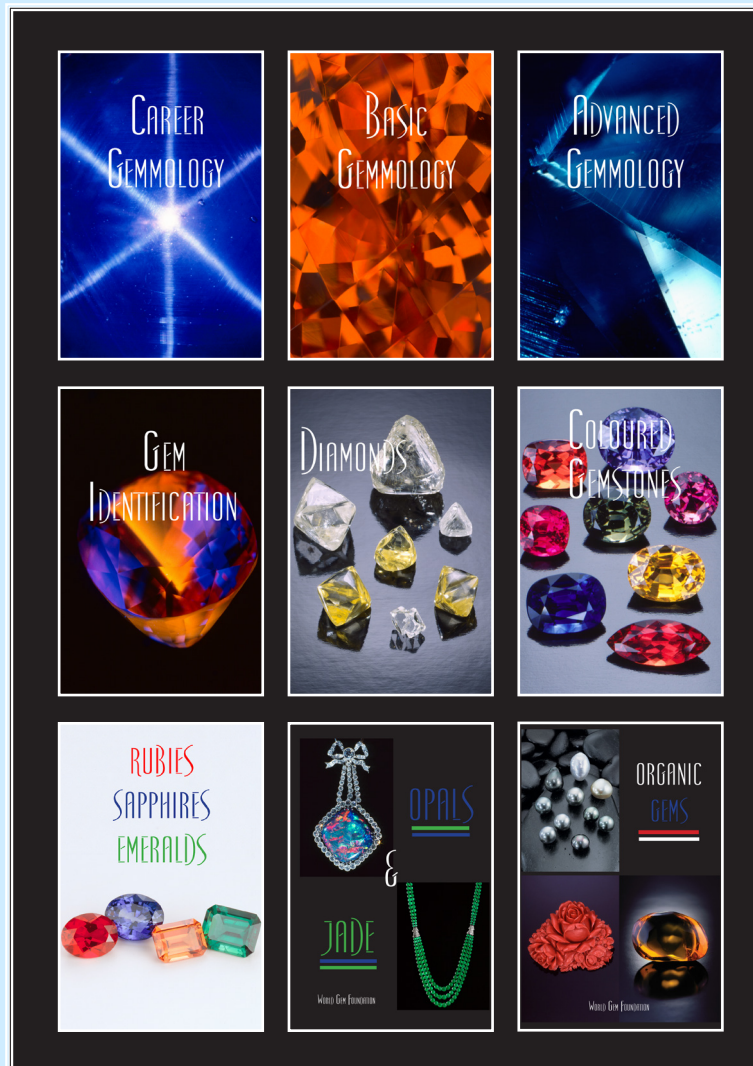
# Gemmology Today

May 2018  
Quarterly Publication



All Things Bright & Beautiful





A comprehensive gemmological program for  
tomorrow's gemmologists.

Three 'Diploma' programs (Career Gemmologist, Diamond  
Professional and Coloured Gemstone Professional)

&

Nine exciting and dynamic courses covering  
all aspects of gemmology.

*'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

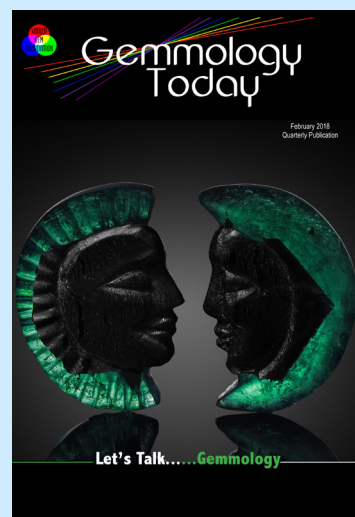
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February 2018 Issue





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



We all have dreams but very few of us are fortunate enough to realise them.

This last month has seen the realisation of two very different dreams for me personally. Musically the recording of our first full length album entitled 'The Sound of Raw Truth' with my musical partner Ava, recorded at the state-of-the-art Palma Music Studios here in Palma, Mallorca under the supervision and guidance of Fredrik Thomander, renowned for his work with NYSNC, Agnetha Fältskog of ABBA, Kim Wilde and The Scorpions and René Shades, bass guitarist with the Danish Heavy Metal band 'Pretty Maids'. Featuring musicians from eight different countries, speaking five different languages, from different cultural backgrounds and age demographics, it was six days of pure heaven. Ten people working together, creating something that we believe is quite magical. No

egos, no tantrums, no angst, just a love of music and trying to make the best record possible.

Gemmologically, the dream of being able to offer the World Gem Foundation courses throughout Asia and translating them into Chinese became a reality and while the official announcement will have to wait until the next issue, the agreements have been signed and we are now all working together to make it a reality.

Two separate examples of how a love for something can manifest itself in the creation of something beautiful.

There is also a further gemmological twist with the album cover featuring a stunning photograph by our friend and co-owner of the Scandinavian Gem Academy, Conny Forsberg. The image is of a Vietnamese blue sapphire with rutile inclusions. We are thrilled that Conny was willing to help us and very proud that his image will become the face of 'AVA MUSICA'.

Once again I would also like to thank all of our contributors and especially our readers who have made the six issues of GT such a success.

The World Gem Foundation is about to make a lot of noise; gemmologically. Stay tuned.....





## South American Diamonds

While South America is well known to any gemmologist when it comes to coloured gemstones, the fact that South America was also one of the oldest producers of diamonds and for over 100 years the most important diamond producer in the world is often less known and sometimes comes as a surprise. The history of diamonds in South America is mainly a history of diamonds in Brazil where the majority of diamonds were found although diamonds have been found in at least five different countries on the continent. Today, diamond production is actively being pursued in Brazil, Venezuela, Guyana, French Guyana and on a smaller scale in Suriname.

The referenced dates diamonds were discovered in Brazil often range from 1714 to the mid-1720's and this is perhaps due to the difficulties in correctly identifying the stones as diamonds, a task that was typically done when the stones reached Lisbon (Cunningham 2011). The first official announcement of the discovery of diamonds was not made until 1729 (Svisero, Shigley, Weldon 2017). Since the annual Indian production of diamonds reaching Europe had decreased in the 1720s to between 2000 and 5000 carats, the discovery of diamonds in Brazil was very timely and by the 1730's the Brazilian production had surpassed that of India with annual estimates ranging between 50000 and 100000 carats (Levinson 1998).

There are several indications of diamonds having been found in Brazil earlier than the discoveries in the early 1700's with some dating back to the late 16th Century. As early as 1576, Pero de Magalhães Gândavo mentions the existence of several gemstones including diamonds found in the Bahia region. Gabriel Soares de Sousa noted in 1587 that eight-sided crystals that could possibly have been diamonds had been found along several rivers. In the late 1590s Anthony Knivet reported seeing what he believed were diamonds while living with natives. None of these early reports of diamonds can be verified and the material observed could have been other minerals but as the reports come from areas where diamonds were later found, it is quite possible diamonds actually were found a lot earlier than previously mentioned. Today the Brazilian production of diamonds accounts for about one percent of the world production.

The first reported diamonds were discovered by garimpeiros, local gold and mineral prospectors, along the Rio Jequitinhonha in the state of Minas Gerais, an area that is synonymous for coloured gemstones (Lucas 2013). These diamonds were sent to Lisbon for proper identification and soon after the stones were confirmed to be diamonds the name of the city of Tejuco was changed to Diamantina (Cunningham 2011, Levinson 1998).

There was widespread skepticism against actual finds of diamonds in Brazil. In 1740 a London jeweller declared in print that the news on Brazilian diamonds were fake. As late as the first half of the 19th century Portuguese merchants still brought Brazilian diamonds to Goa in India, that was under Portuguese control, to sell the Brazilian diamonds (Bruton 1978). That Brazilian diamonds were first exported to India before being sold makes it even more difficult to estimate the total production at the time for both Brazil and India.

In 1755 diamonds were found in the Bahia state but this was kept secret to avoid a diamond rush that risked affecting the agricultural production in the area. A rush still emerged in the early 1800s and today Bahia together with Minas Gerais and Matto Grosso are the most significant diamond producing regions in Brazil (Cunningham 2011). The Coromandel region in Minas Gerais is where the largest rough has been found including the largest known Brazilian diamond; the 726.6 carat 'Presidente Vargas'. Coromandel shares its name with an old diamond-producing region in India and was probably named by Portuguese traders who had been to India (Svisero, Shigley, Weldon 2017).

Kimberlite pipes were first found in Brazil in the late 1960s and since then over 1300 kimberlites have been identified. About 70 of all known kimberlites in Brazil are expected to contain diamonds and several companies are engaged in prospecting for new deposits (Svisero, Shigley, Weldon 2017).

Apart from Brazil, diamonds have been found in several South American countries. In 1887 diamonds were found in Guyana and the alluvial deposits are today mined by small groups of independent miners. Estimations on the production in Guyana



vary considerably from 5000 to 50000 carats annually. In French Guyana diamonds have been known since 1890 and an estimated total of about 4.5 million carats have been mined in the country. There are diamond-bearing ultramafic rocks identified in the country but few gem quality diamonds are found there today.

Venezuela is an active producer of gem diamonds with the initial discovery made in 1901. The deposits in Venezuela are mainly alluvial but diamondiferous kimberlites were discovered in 1972. The total production of diamonds in Venezuela since 1901 is estimated to be close to 15 million carats consisting mainly of smaller stones. Average size for the rough is around 0.2 carat. Small amounts of diamonds have also been found in Surinam and exploration is going on in Uruguay where several kimberlites have been discovered (Cunningham 2011, Levinson 1998).

Brazil, Guyana and Venezuela are members of the Kimberley process while French Guyana and Surinam are not ([www.kimberleyprocess.com](http://www.kimberleyprocess.com)). When it comes to Venezuela some ethical concerns have been raised due to the lack of control over the diamond production and reports that child labour is being used at the mines. Venezuela stopped being an active member of the Kimberley process in 2008 after a discussion on the country's lack of control of the diamond production (Girish 2012). According to the Kimberley process there have been no reliable figures on the production or export of diamonds from Venezuela since 2010.

Even though some exceptional diamonds have been found in Brazil, other producers have overshadowed the Brazilian production for the last 150 years. In 1869, just a few years after diamonds were found in South Africa, Brazil produced 80% of the world's diamonds but two decades later (1889) production was down to 1%, a figure that has remained relatively consistent each year ever since (Janse 2017).

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If you are interested in offering World Gem Foundation courses through an existing school, college, university or gemmological organization or you would like to establish your own gem academy, we would love to talk to you.

Please contact us at:

[information@worldgemfoundation.com](mailto:information@worldgemfoundation.com)



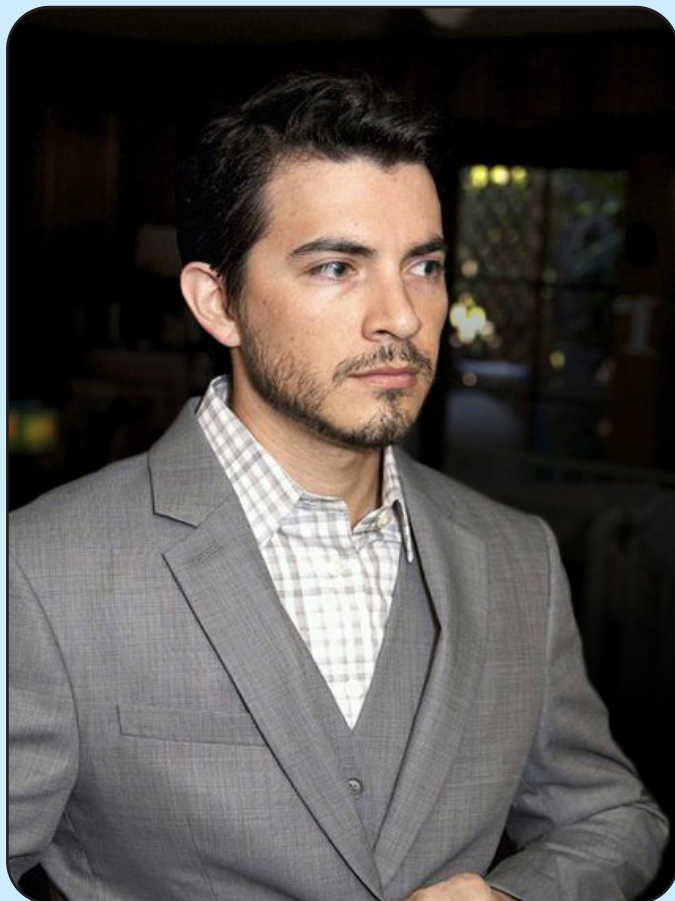


Diamond Drop Earrings (Photo by Tino Hammid)



'Each effort is a selfish act and in that respect, it's certainly more artistic than scientific. It wouldn't be too far off to say that as well as documenting what's happening inside of stones, I'm also documenting what's happening inside of myself.' Danny J. Sanchez

## Meet Danny J. Sanchez



Danny J. Sanchez

Danny J. Sanchez is a Los Angeles-based gemologist and artist. He's a graduate of the Gemological Institute of America in Carlsbad, California and is self-taught in the art of photomicrography.

Initially inspired by the Photoatlas of Inclusions in Gemstones by Eduard Gübelin and John Koivula, Danny's images are thoughtfully created, leveraging his gemological knowledge through meticulously-tuned photography tools.

Danny's work focuses on detailing the imperceptible inclusions and characteristics of gemstones. His creations expose viewers to otherworldly spaces — mountainous horizons hidden in quartz, rutile embedded in sapphire and biotite floating within

blue topaz — each image conceiving a seemingly endless journey into the cosmos of the infinitesimal.

His work is naturally foreign to the eye, subverting scale, depth, and composition, allowing the observer to get lost in their own intimate interpretation of hidden realities.

**GT:** When did you first develop a passion for inclusion photography? Was there a defining moment when you realised this was what you wanted to do?

**DS:** As a student at the GIA, I fell in love with the microscope and the photomicrographs in the course materials and, of course, the Photoatlases. It was while I was working at the GIA, after graduating, that I really caught the photomicrography bug. There's a feeling I get both in the scope and while looking at a particularly compelling inclusion photograph that I've always chased and it was at the GIA when I first started that chase.

**GT:** What is the one inclusion photograph that sticks in your mind the most, either through the sheer beauty of the inclusion or the challenge in capturing it on film?

**DS:** I have a shot titled simply, Mountains in Quartz. I sat on that stone for years, waiting to have the correct equipment to shoot it and, more importantly, to be proficient enough to pull the image I had imagined out of the stone. I had taken several passes at it but was never quite satisfied. On what turned out to be the final run I remember being fairly confident that I had captured it - but when the software rendered the 'stack' of images \*, I was truly speechless. It represented the first, complete start-to-finish execution of exactly what I had envisioned. It was exhilarating and validating on one hand but terrifying on the other. I had finally 'done it' but now I had set the bar for myself and that can be a scary thing.

**GT:** John Koivula's Photoatlas of Inclusions in Gemstones has become an essential reference tool for all gemmologists. What is your motivation? Do you approach inclusion photography more as an art form or more scientifically like John?



**DS:** As I mentioned, I was ravenous for photomicrographs and the GIA course materials and Photoatlases were my only sources. At the time, there wasn't much more on the internet and since I was so hungry for it, I had to feed myself, so to speak. That said, I approach my work as an immersive experience; it's about the environment that 'searching for inclusions' creates. Each effort is a selfish act and in that respect, it's certainly more artistic than scientific. It wouldn't be too far off to say that as well as documenting what's happening inside of stones, I'm also documenting what's happening inside of myself.

**GT:** With software such as Photoshop many photographers are finding it easier to create stunning imagery. Are you a purist or have you embraced this new technology?

**DS:** I have a lot of conversations with photographers about this and the consensus I experience is - once you put something between your eyes and the subject, you've altered the perception of it. So in that respect, what is pure? An example that always arises is the dynamic, direct imagery from Ansel Adams. He took full advantage of darkroom techniques (dodging/burning) to express his vision and believed in 'photography as an art form through purely photographic methods'. His photos are the standard against which all other landscape photography has been judged for  $\frac{3}{4}$  of a century.

To answer the question directly, I have a full suite of editing software on my computer and use it in moderation. So while each image has different needs, I try to keep the final image as close to my experience in the oculars as possible. I'd add that any time I stack images, I'm using software to capture an image that I would otherwise not physically be able to achieve. So fundamentally, these types of images are a product of 'computer-aided' technology.

**GT:** What in your opinion is the one mistake all up and coming inclusion photographers make?

**DS:** Do I have to choose one? I'd say the biggest mistake anyone can make is to think that an informative inclusion photo can be taken without first being a competent microscopist. So many people fall in love with the scope and love geeking out over inclusions (myself included) and that leads to the desire to capture those moments. But buying a microscope and a nice camera, does not a good photomicrograph make. It's the years spent in the scope, finding and lighting inclusions that are fundamental to taking a good photomicrograph.

**GT:** Talk us through a typical photo shoot (if there is such a thing).

**DS:** By the time I sit down and shoot a stone, I'll have already sat in the scope handful of times just to explore. Generally it's about 20-40 minutes at a time with as many lighting environments I can imagine. Sometimes it just takes one sitting

and sometimes it's several. Sometimes it's a re-cut of the stone to achieve a better angle of approach and then I start the process over again.

Once I finally sit down with the intention to shoot, I'm familiar enough with the stone and its landscape that I just need to negotiate with the lighting a bit, lock it all in, then shoot.

**GT:** Guitarists are always asked about the equipment they use and the ones they most prefer. What are the 'essentials' in your photographic arsenal?

**DS:** Definitely the light sources and the light guides that bring it to the stone. I love my microscope but I know, at this point, that I could work with almost any scope and any camera as long as I have enough light, piped through varying apertures to control the environment. Vibration, shutter speed, the gemstone's color, magnification factor - all of those key considerations are handled easily with enough light.

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

**DS:** In ten years gemmology will still be one step behind the science creating the newest synthetics/simulants. Luckily, the way technology evolves, there will be new tools to help us do so and likely, they'll be inexpensive and easy to use. There will still be so much to keep up on and new, wonderful discoveries to read about while commuting in our self-piloting flying cars.

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

**DS:** I'd love to take my work with Mexican opals on a grand scale. I don't know what that means yet but we'll all see in a year at this celebration you'll be hosting.

Honestly, though - if in one year, I can say that I still enjoy the process and I'm still financially and physically able to dive into stones, I'd consider that a great year. Life is so full of surprises, good and bad, hopefully I'll be able to report back that all is well.

\* Focus stacking is a digital image processing technique which combines multiple images taken at different focus distances to give a resulting image with a greater depth of field (DOF) than any of the individual source images.

## Exhibitions

2015.03 - 5450 Collective, The Icon, Los Angeles, CA  
2014.12 - 3154 Collective, Art Basel, Miami, FL

## Website Publications

2017.06.26 - Vice Motherboard  
2016.01.11 - Faculty.ac  
2015.11.02 - Cosmos Magazine  
2015.02.25 - El Definido  
2015.01.23 - Paradijs Vogels  
2015.01.16 - Lost at E Minor  
2015.01.15 - Smithsonian  
2014.12.22 - Sierra  
2014.11.28 - Feature Shoot  
2014.08.01 - Gizmodo  
2014.07.30 - PetaPixel  
2014.07.01 - New Scientist  
2014.06.23 - The Dish  
2014.06.13 - Wired  
2014.06.06 - You Need to Know

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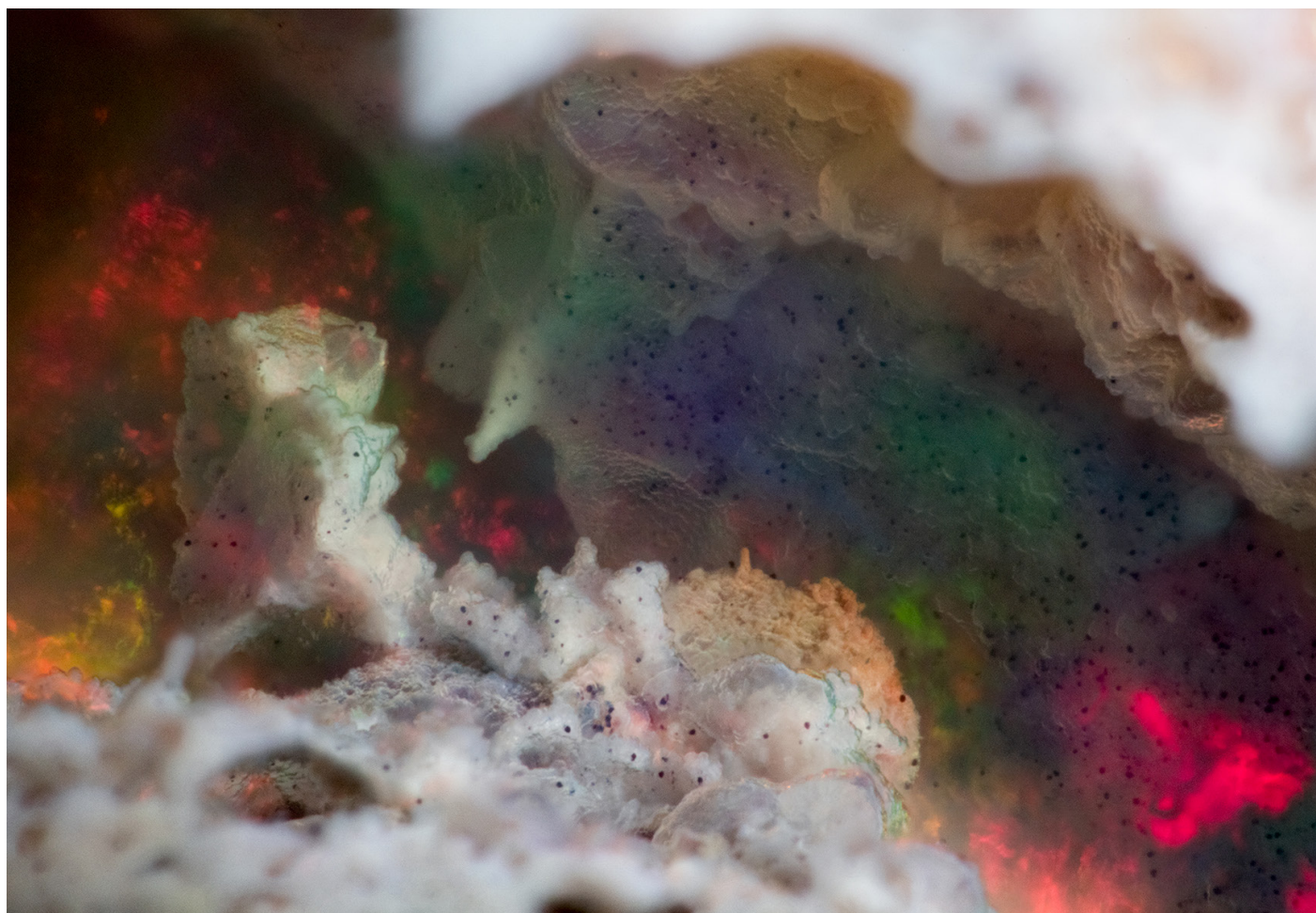
Hughes, Richard - Ruby & Sapphire: A Gemologists Guide  
Gems & Jewellery, 2016 Vol. 25 No. 3  
The Journal of Gemmology, 2015 Vol. 35 No. 35  
Gems & Gemology  
New Scientist  
Geoffrey M. Dominy - Handbook of Gemmology 3rd Edition

## Website

Visit Danny's website at: <http://www.dannyjsanchez.com>

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Mexican Opal (Field of View 3mm) (Photo by Danny J. Sanchez)



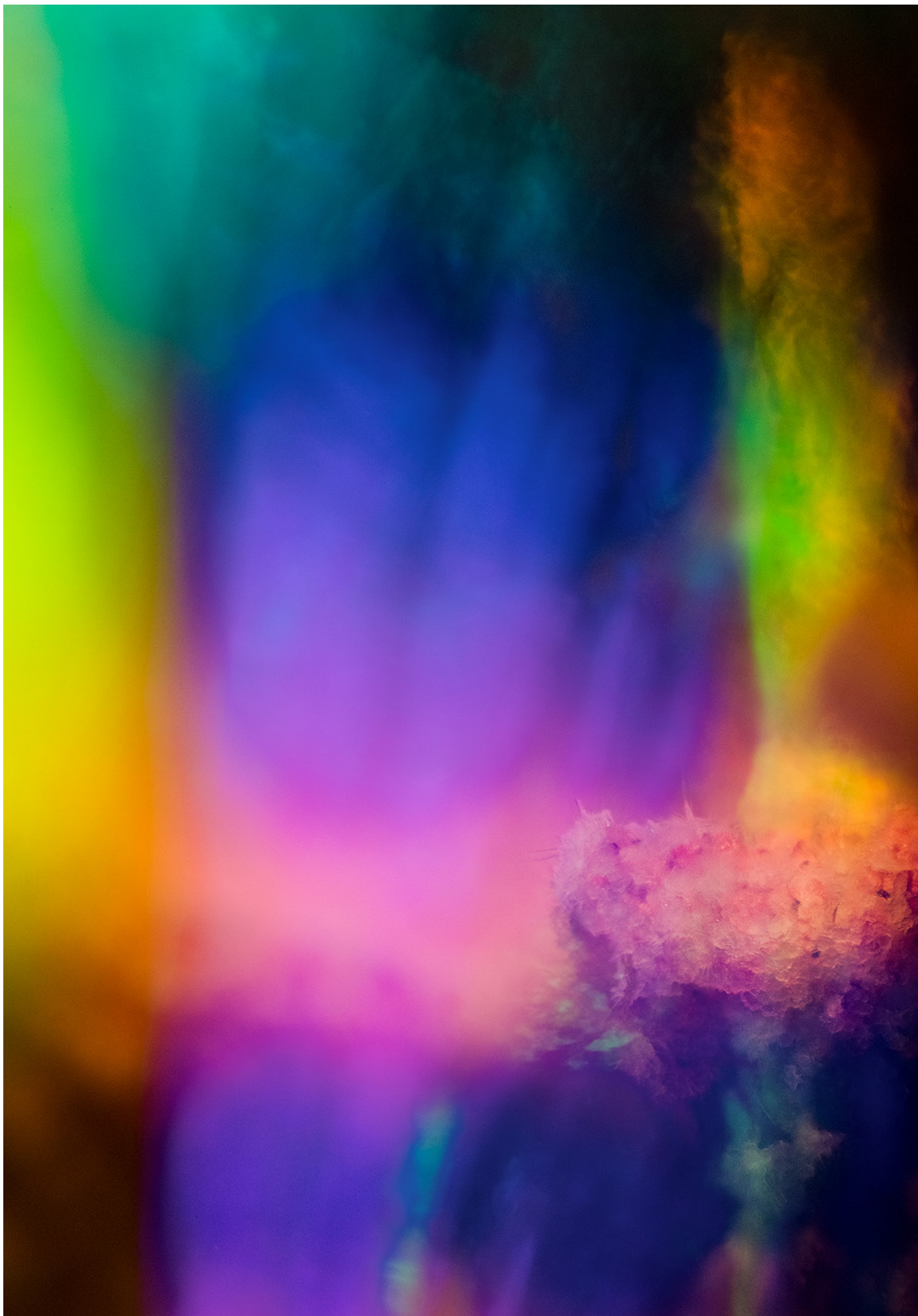


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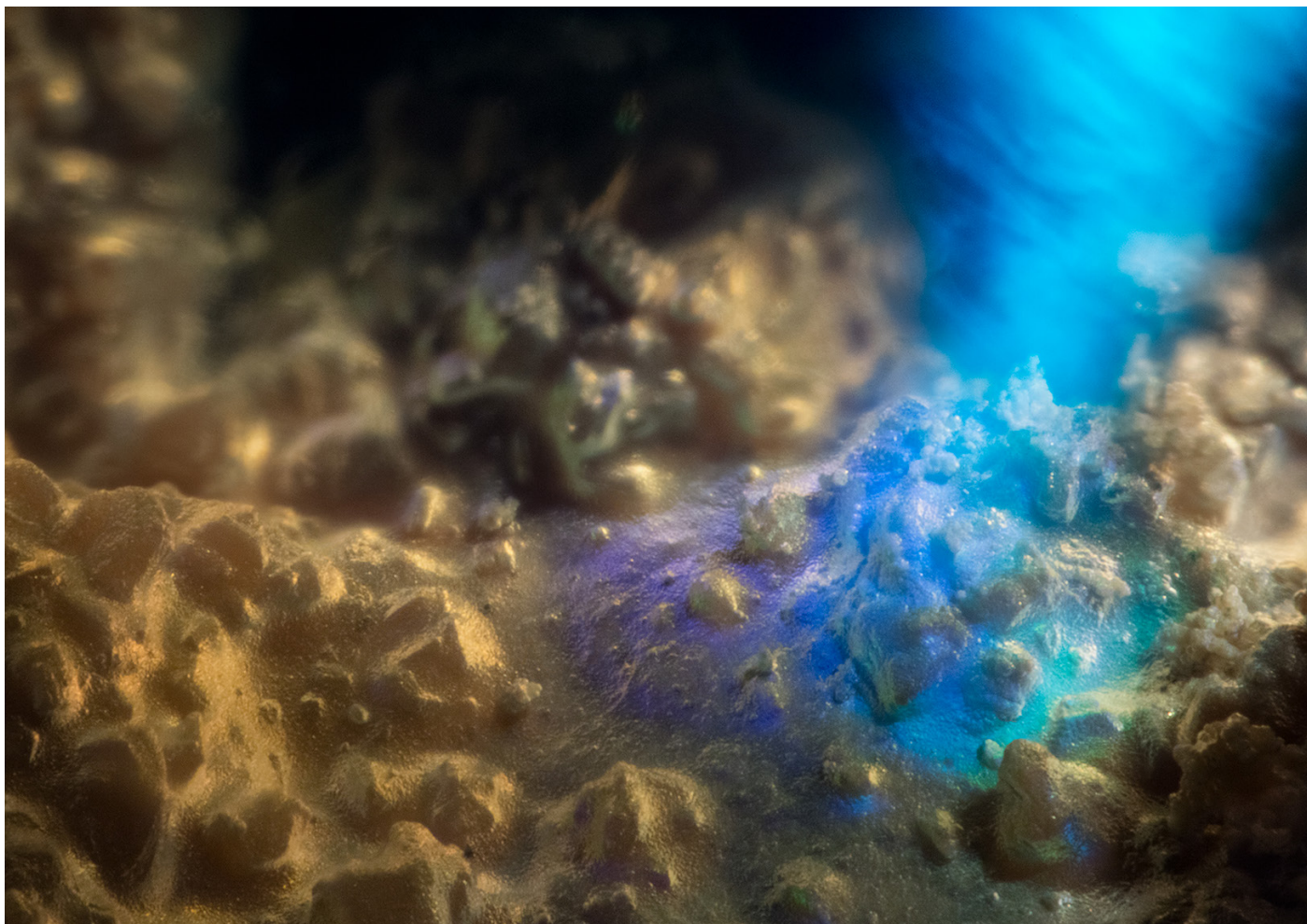
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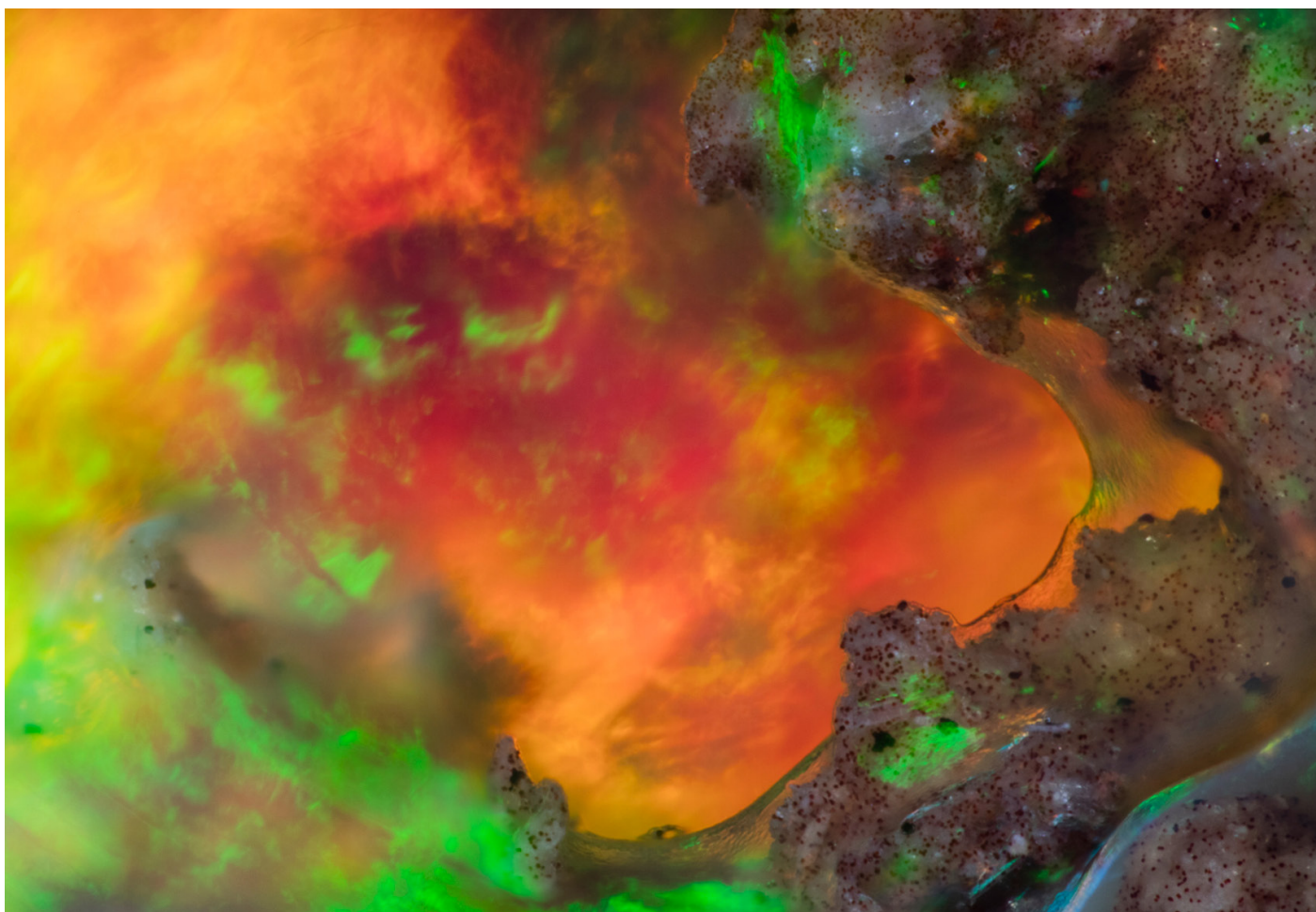


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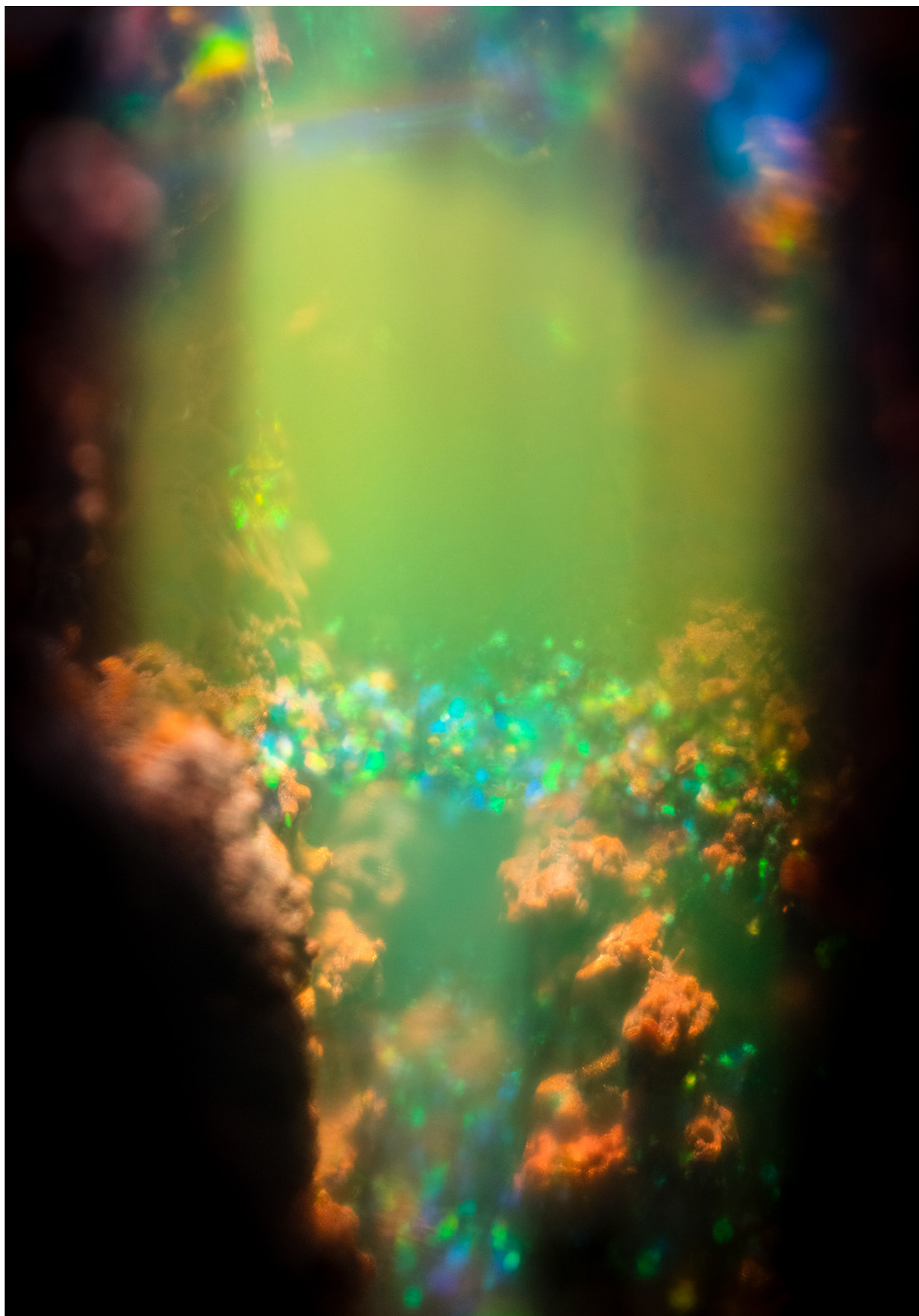


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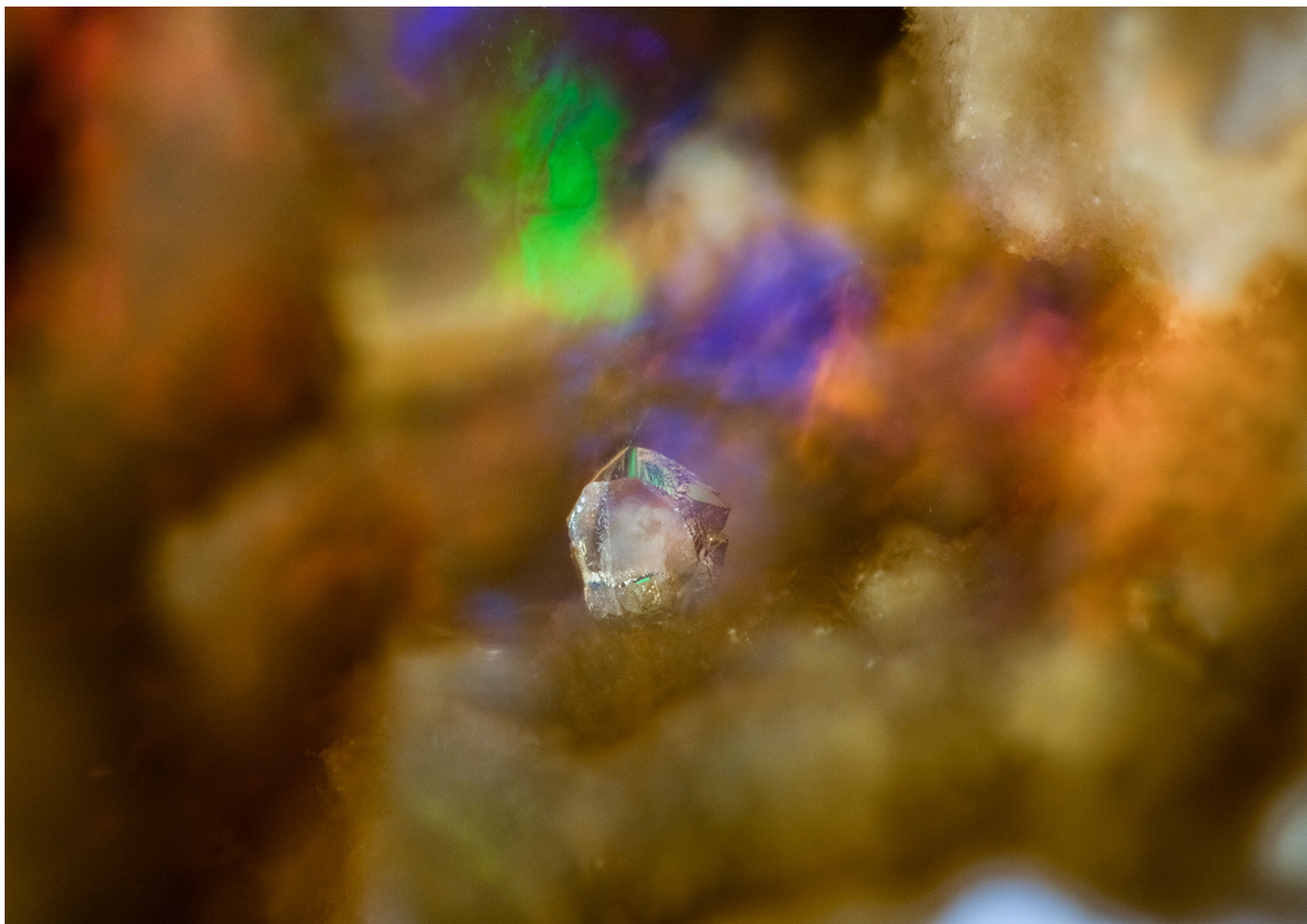
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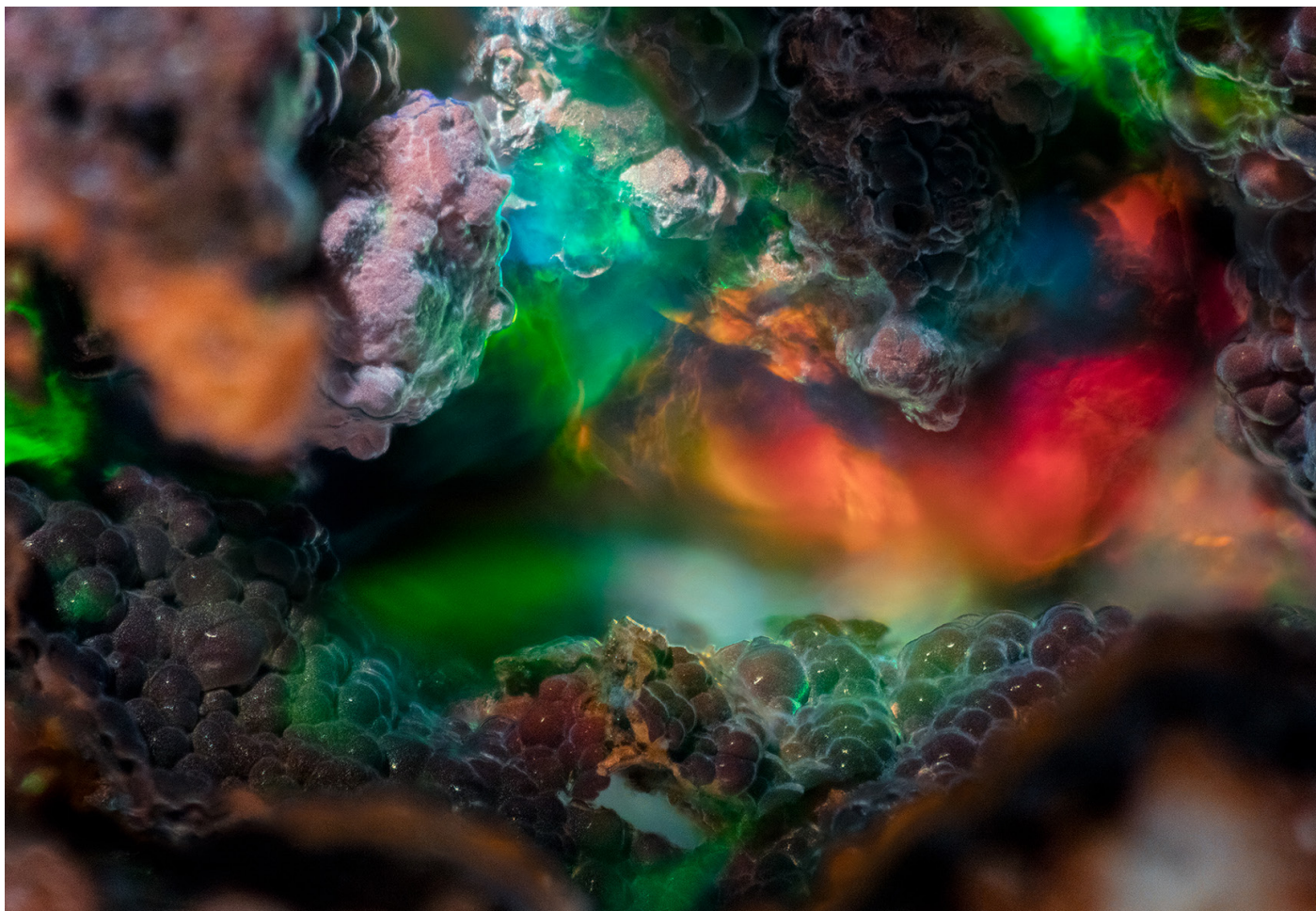


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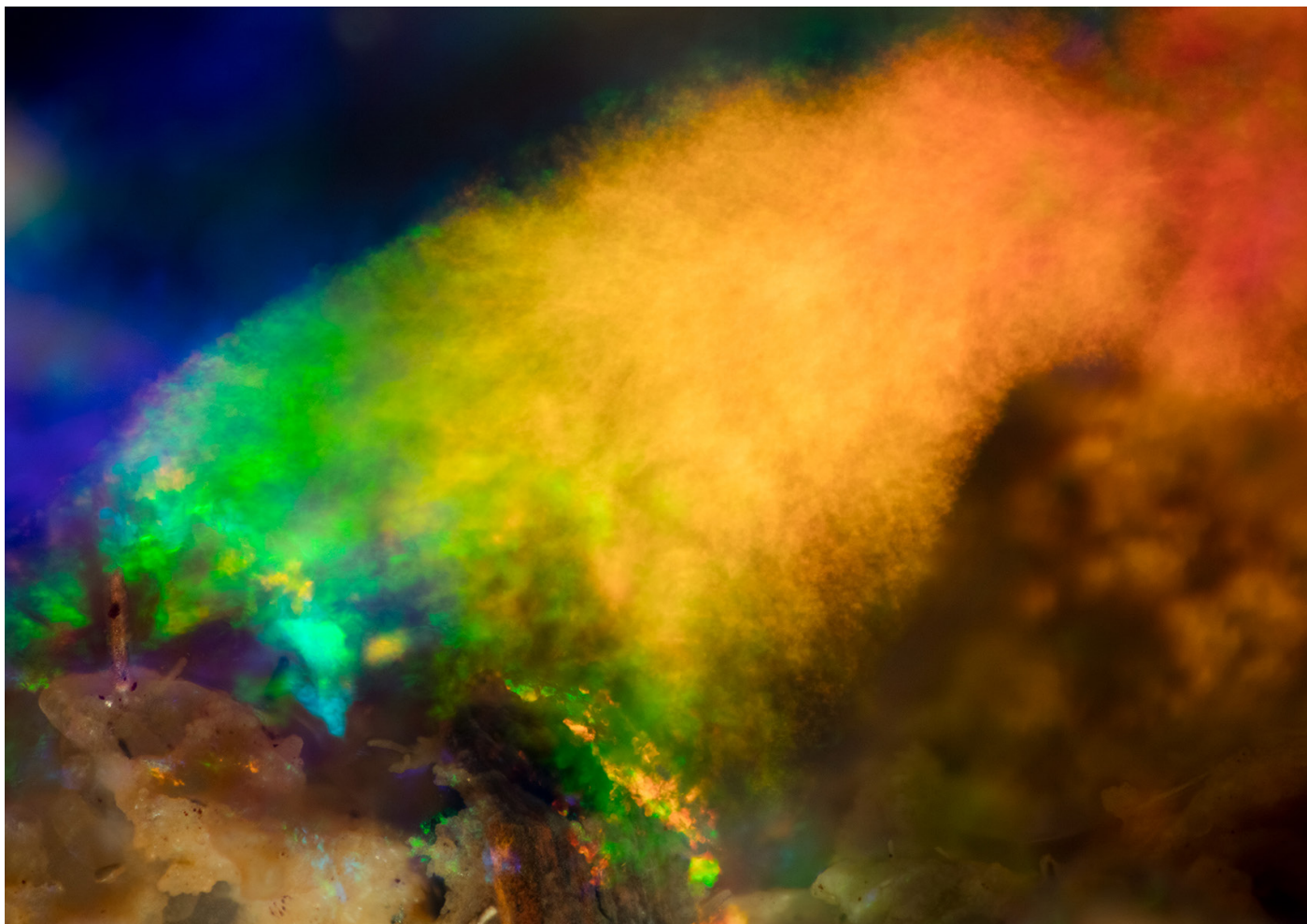


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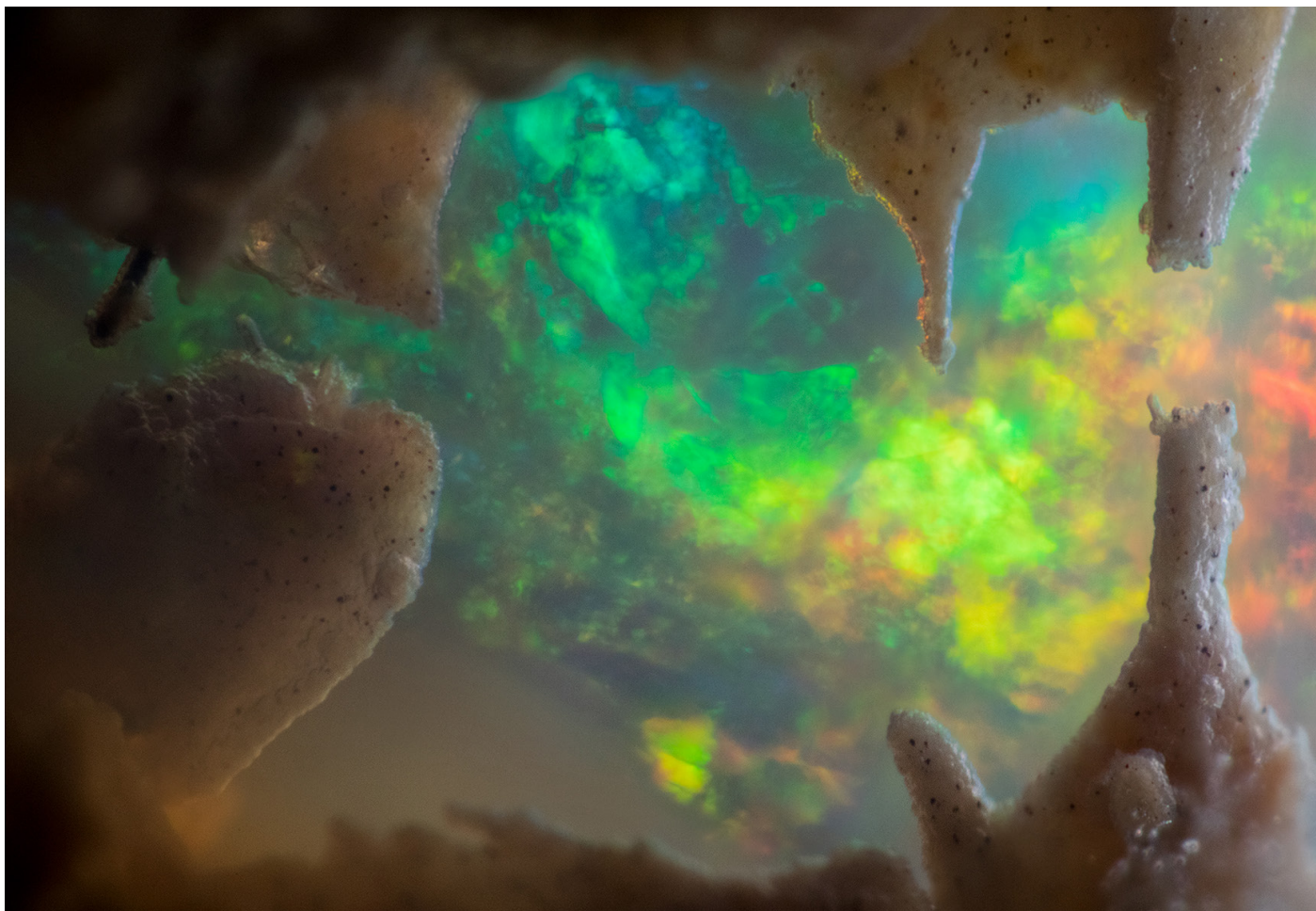


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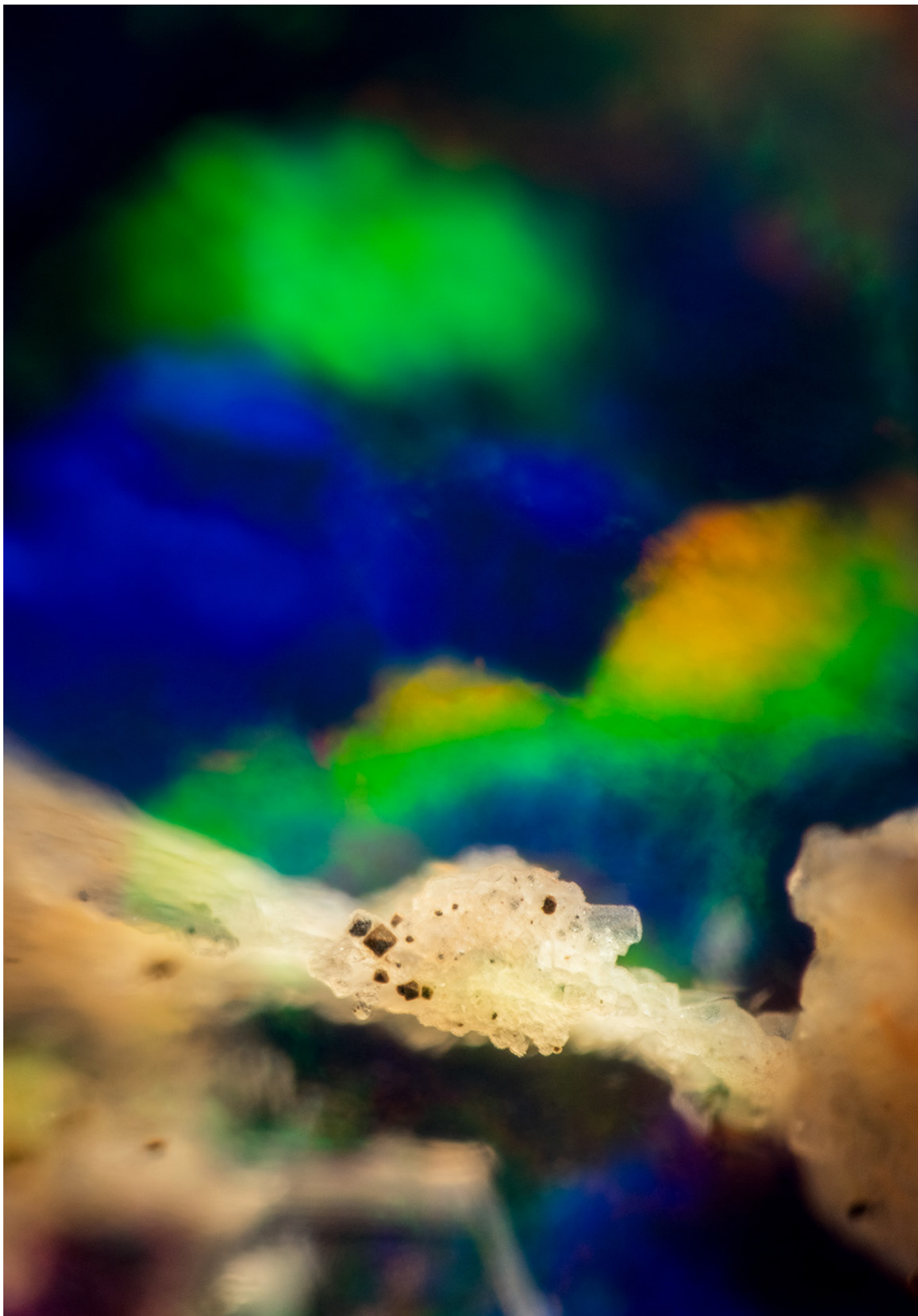


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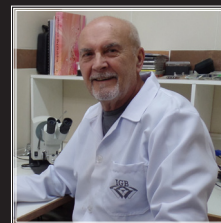
Mexican Opal (Field of View 3mm) (Photo by Danny J. Sanchez)





Cut by John Dyer

**GÉRARD QUINTIN** is the CEO and Director of Education for the South American Gem Academy. He is also the founder of the IGB or Gemological Institute of Bolivia. Who better to talk about Ametrine?



## The Legend of Bolivianite (Ametrine)



34.58ct fan-shaped Ametrine cut by Chris Wolfsberg  
(Courtesy of L. Allen Brown/All That Glitters, Methuen, MA)

The word 'Amétrine' comes from the contraction of Amethyst and Citrine, which was taken, respectively, from the first two and the last two syllables.

'Bolivianite' also known as Trystine is an appellation from the word 'Bolivianita' from Bolivia which must not be confused with the stannite described by the mineralogist A. Pauly in 1926 under the term 'Bolivianite'.

A Bolivian legend says that during an expedition of the Spanish in the seventeen century, through what is today the eastern Bolivian border with Brazil, a soldier called Felipe de Urriola y Goitia, fell in love with the Princess Anahí, the daughter of the King of the Ayoreo tribe.

They were married, and as a wedding gift, the King of the tribe offered to Don Felipe a mine producing a beautiful bicolor stone, to which the conquistador didn't pay attention, deeming it not as worthy as gold, silver or emeralds.

When Don Felipe thought it was time to return to Spain accompanied by his wife, the members of the tribe saw this as abandonment and conspired to try to assassinate him to prevent him from leaving. In the course of the confrontation, Anahí was injured by her own tribesmen.

Just before dying from her wounds, Anahí offered to her husband a beautiful stone from her father's mine, a sign of her eternal love.

When Don Felipe opened his hands and saw the two-colored gem perfectly blended honey and purple, he realized that it symbolized the heart of Anahi, torn between her love for her husband and her love for her people.

The actual mine, named Anahi from the legend, is the only significant deposit of Ametrine known in the world and is situated in the western part of Bolivia at the border with Brazil in the Germán Busch province, district of La Gaiba. Occurring in veins of dolomitic limestone of the Murcielago Group standing up above the surrounding Pantanal (a natural region encompassing the world's largest tropical wetland area).

Some ametrines have been found in the Yuruty Mine 50 km north of Anahi, also in Brazil and other African and Asian countries but without economic interest.

The Anahi mine is owned by Ramiro Rivero, CEO of Minerales y Metales del Oriente S.r.l. He is also the owner of a jewelry business in Santa Cruz de la Sierra which can be seen at <https://www.anahi.com>

The mining exploitation started in 1989 and the extraction of 1.000 kg of ore produces about 4 kg of ametrine. The annual production is about 3.000 kg of gem-quality quartz of which 45% is amethyst, 33% ametrine and 22% citrine.

The exact location of the mining installations and the airstrip are situated 105 km. north of Puerto Suárez, 22 km. west of lagoon Mandiore (18°03'S – 57°48' W) at the altitude of 180 metres. The mining concession covers an area of about 6.000 acres where most of the mining activity is done underground, with a small amount of production at the surface.



The Ametrine is a monocrystalline variety of Quartz which brings together in a single piece the two colors violet/yellow of the Amethyst/Citrine or purple/beige to brown of the Amethyst/Smoky Quartz.

The coloration of both the amethyst and the Citrine is due to the presence of iron in the crystal structure of quartz. The color difference between the two parts of the stone is due to different stages of the oxidation of the iron.

Belonging to the trigonal system, it has a chemical composition of  $\text{SiO}_2$  (Silicon Dioxide) with a density 2.65 and a refractive index between 1.54 and 1.55.

The crystal is generally cut in a rectangular shape to ensure the two colors appear next to each other with a zone of gradual transition between the 50/50 mixture of amethyst and citrine.

Now, to add value to the faceted stone it is common to make some OMF (Optically Magnified Facets), otherwise called curved facets. The curved facets add brilliance, keep the stone looking 'alive' from a wider range of viewing angles, and create some very interesting reflection patterns within the stone. To create an OMF gem, the stone has to be faceted with flat facets, and then moved to a special machine to add the curved facets. OMF gems tend to cost more per carat because this is a very time-consuming process and the stone loses weight when the curved facets are added, but the extra beauty and brightness are worth it!

### Synthetic or Artificial Ametrine

The synthetic monocrystalline colorless quartz, obtained by the 'Hydrothermal' method was developed in the 1950s. The colored crystals, mainly purple (amethyst) and yellow (citrine) have been grown since the beginning of the 1970s. The crystallization from a seed crystal occurs in an autoclave, at pressure and using a moderate heat, in an alkaline solution ( $\text{NaOH}$ ,  $\text{Na}_2\text{CO}_3$  or  $\text{K}_3\text{CO}_3$ ) or sometimes in ammonium fluoride ( $\text{NH}_4\text{F}$ ).

Today, the quantity of synthetic quartz of all colors produced for industrial purposes and for use in jewelry is impressive. In the absence of inclusions, it has become difficult or impossible to determine whether quartz is natural or synthetic without the aid of advanced instrumentation in a laboratory.

Artificial ametrine can be created by differential heat treatment of amethyst. In 1981, laboratory experiments determined that heat and irradiation can be used to convert natural amethyst into a bicolor material that has an appearance similar to natural ametrine. However this is a costly process and is not known to have produced a significant amount of treatment-created 'ametrine'.

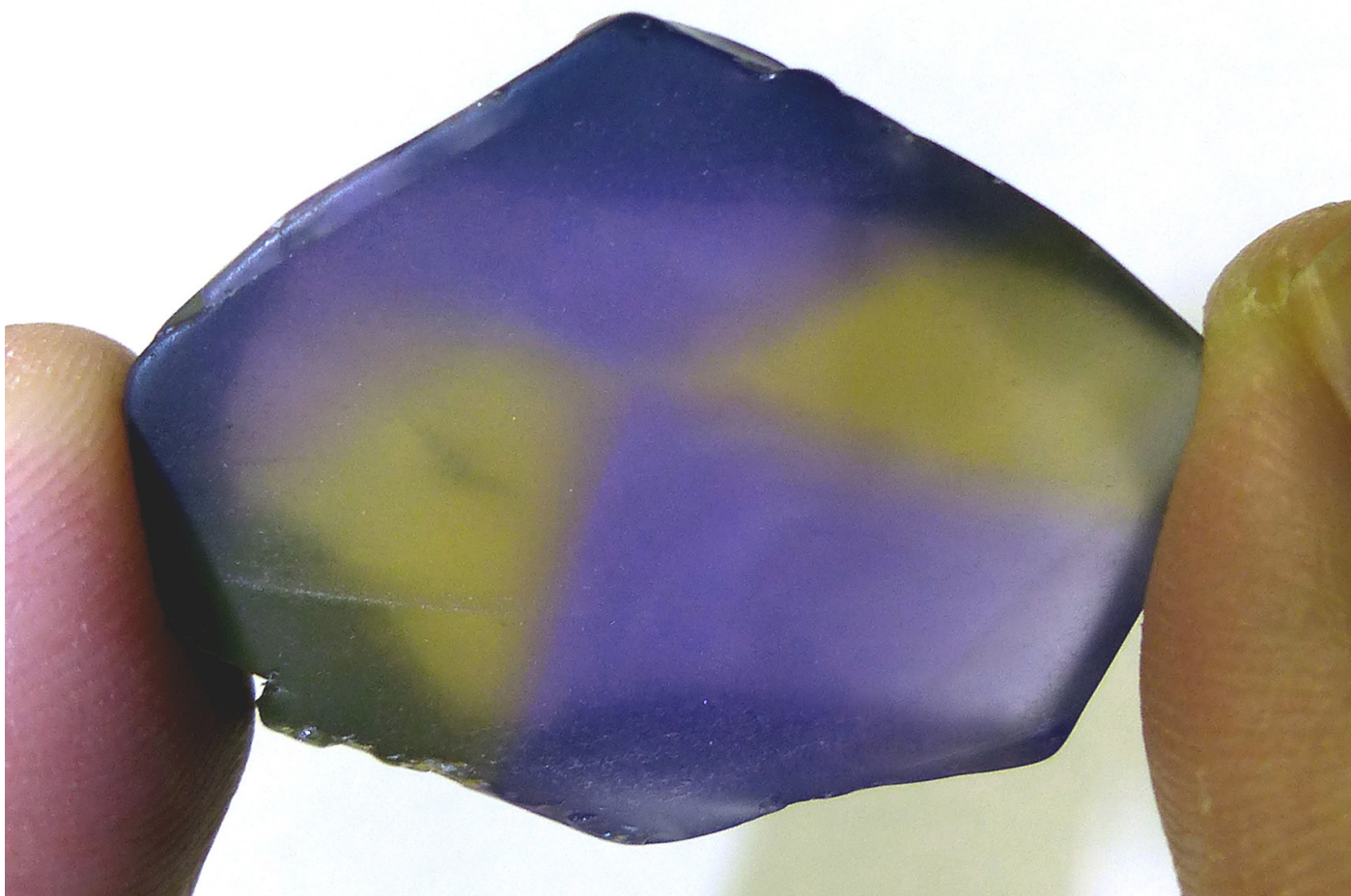
In 1994 in Russia, the Russian Research Institute for Material Synthesis started producing small quantities of synthetic bicolor quartz from alkaline solutions using a hydrothermal process. This synthetic material was cut, mounted in jewelry and sold in the Russian jewelry market. Some of it was exported to other countries and sold as 'ametrine'. However to the trained eye, a majority of this material had a coloration that was different to natural ametrine.

Synthetic ametrine can be identified by employing a combination of techniques, such as EDXRF chemical analysis and IR spectra, inspection of twinning and color zoning using observation and conventional equipment.

The citrine and amethyst color in synthetic ametrine is often more intensely colored than that found in natural ametrine of a similar thickness. Natural ametrine commonly displays a sharp straight boundary between the citrine and amethyst portions. Synthetic ametrine, especially when cut in fancy shapes, sometimes displays a sharp bend in the color boundary. The amethyst-citrine color boundary in the synthetic ametrine is generally oriented roughly parallel to the rhombohedral faces; in natural ametrine it is oriented roughly parallel to the optic axis. The crystallographic orientations of the color zones and the rare stream-like structures in the synthetic citrine portions are distinctive. The color zones are oriented perpendicular to the optic axis, and the stream-like structures are oriented parallel to the optic axis. To locate the optic axis in faceted gems, cross-polarized light should be used in order to provide a reference for checking the orientation of color zones and stream-like structures. For these observations a polariscope with a conoscopie will be helpful. In natural ametrine, the color zoning in both the amethyst and citrine portions is oriented parallel to the rhombohedral faces, and the bands usually are spaced irregularly. In the amethyst portions of natural ametrine, Brazil-law twinning is almost always present, and Brewster fringes are often observed. However, Brazil twinning can be seen only rarely in the amethyst portions of synthetic ametrine, in the form of subtle parallel twin lamellae. Due to the variety in forms and patterns displayed by Brazil twinning in both natural and synthetic amethyst this feature should not be used alone to identify a stone as synthetic. However, if a sample does show the 'ideal' curved Brazil twins with Brewster fringes it can be identified as natural. Irregular planes of two-phase (liquid-gas) inclusions are commonly observed in both color portions of natural ametrine. In synthetic ametrine, elongated two-phase (liquid-gas) inclusions are rarely seen.

With the increasing quantity of high quality synthetic ametrine in the market, caution should be of prime importance when buying faceted gems.





107.50 carat Ametrine Rough (Courtesy of L. Allen Brown/All That Glitters, Methuen, MA)



70.20 carat fan-shaped Ametrine cut by Chris Wolfsberg from the above rough (Courtesy of L. Allen Brown/All That Glitters, Methuen, MA)



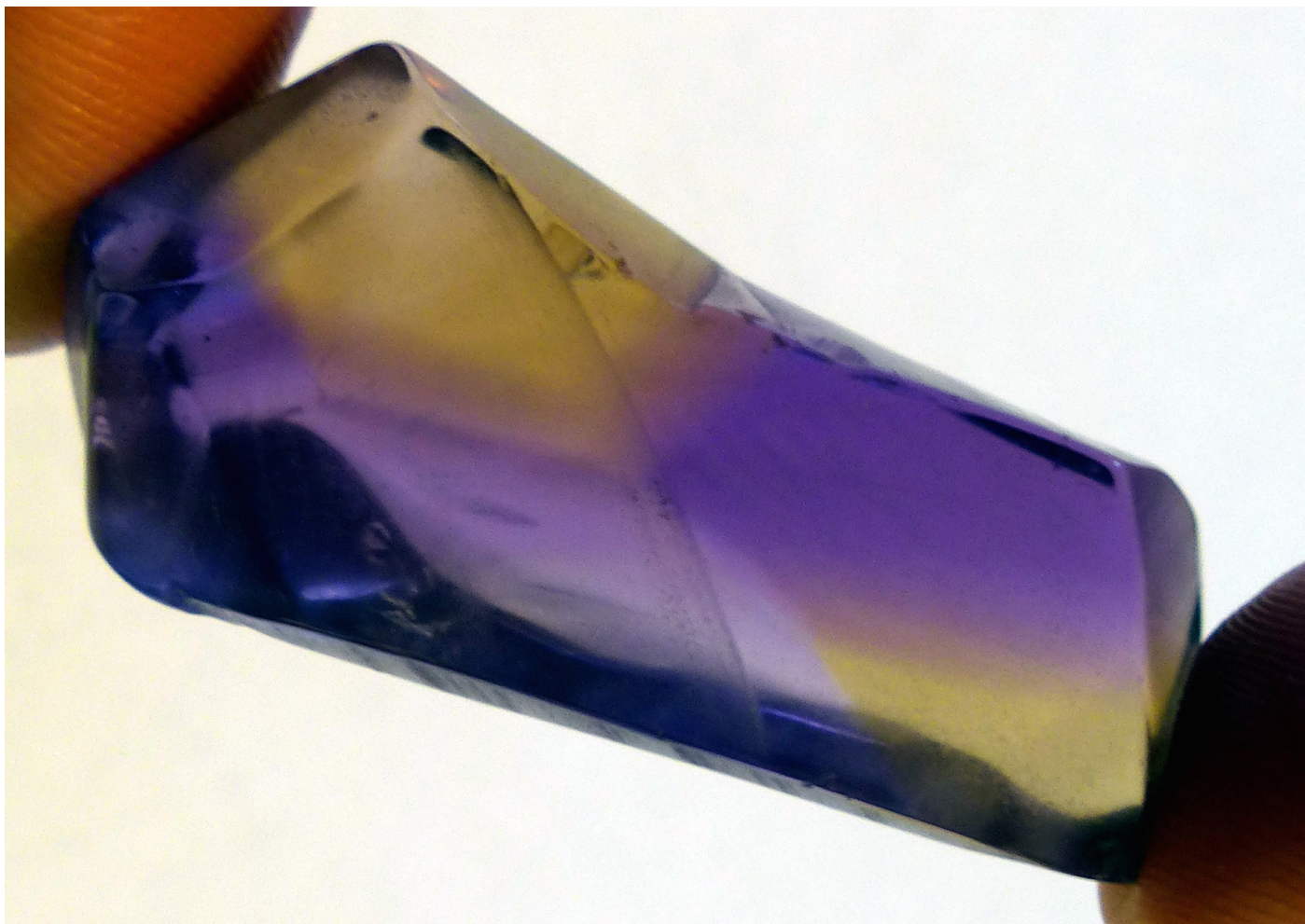


119 carat Ametrine Rough (Courtesy of L. Allen Brown/All That Glitters, Methuen, MA)



45.60 carat Ametrine cut by Chris Wolfsberg from the above rough (Courtesy of L. Allen Brown/All That Glitters, Methuen, MA)



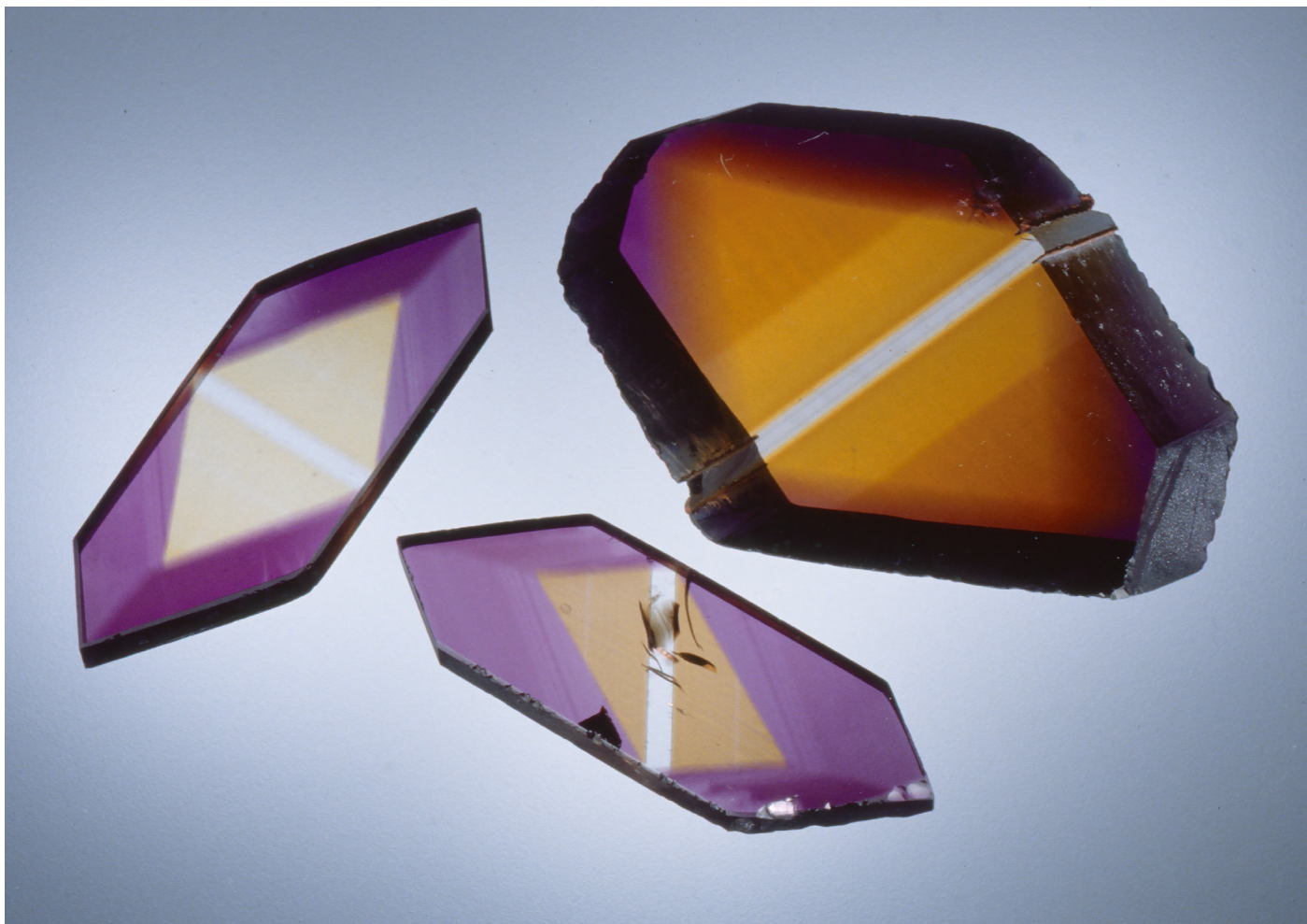


95.35 carat Ametrine Rough (Courtesy of L. Allen Brown/All That Glitters, Methuen, MA)



56.64 carat kite-shaped Ametrine cut by Chris Wolfsberg from the above rough (Courtesy of L. Allen Brown/All That Glitters, Methuen, MA)





Lab-created Ametrine Crystals (Photo by Tino Hammid)



Lab-created Ametrine (Photo by Tino Hammid)





## The Chromium Factor: King Maker or Fortune Taker?



Ruby or Pink Sapphire? (Photo by Tino Hammid)

Chromium is the first element in Group Six of the Periodic Table. With an atomic number of 24 and an atomic weight of 51.996, it is the 22<sup>nd</sup> most abundance element in the earth's crust.

Since by law, stainless steel must contain a minimum of 10.5% of chromium based on content mass, it is an element that we come into contact with on a daily basis. The bathroom and kitchen faucets you used this morning and the cutlery you ate your breakfast with all contain chromium. Chromium is also prized by vintage car and motorcycle aficionados, who spend endless hours polishing their fenders, handle bars and exhaust pipes to ensure that they 'gleam' in the sunlight.

Perhaps the most unusual use of chromium can be found in the Terracotta Army, the brainchild of Qin Shi Huang, 1st Emperor of China 2200 years ago, who instructed his workers to coat the blades of all the swords with chromium to give them a 'realistic look'.

Gemmologically, chromium is one of eight transition elements (chromium, iron, titanium, cobalt, nickel, vanadium, copper and manganese) that play a crucial part in the colouration of

gemstones. In allochromatic gemstones, these transition elements appear as impurities while in idiochromatic gemstones, they are an essential part of the chemical composition. The distinction is quite simple; gemstones that appear in a multitude of colours (i.e. corundum, garnet, tourmaline) are allochromatic while those that appear in only one colour (peridot, turquoise) are idiochromatic.

In the case of corundum ( $\text{Al}_2\text{O}_3$ ), if no transition elements are present, it will appear colourless. However if iron and titanium are present, we will get a blue sapphire. If only iron is present, the resulting colour will be yellow while a combination of iron and chromium will give us a purple colouration.

However if only chromium is present we will get either a ruby or a pink sapphire. The difference between the two based purely on how much chromium is present. This is where it gets interesting and a little confusing.

You see the main problem with 'gemmology' is that science and commerce have always been uneasy bed partners. Like oil and water, they rarely mix. In the case of rubies and



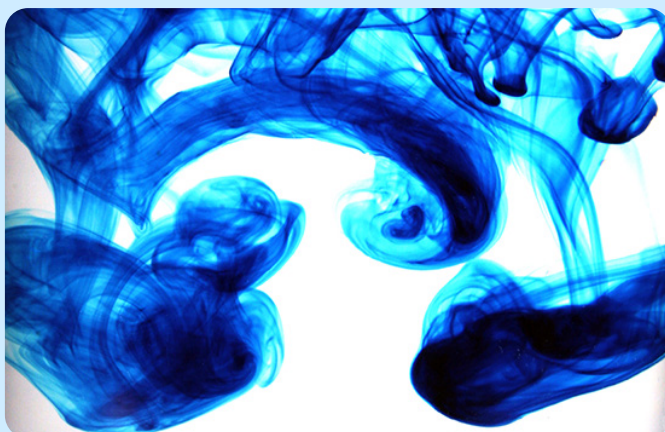
| Gemstone      | Hue                     | Tone  | Saturation |
|---------------|-------------------------|-------|------------|
| Ruby          | Orange/RED              | 5 – 8 | 4 – 6      |
| Ruby          | RED                     | 5 – 8 | 3 – 6      |
| Ruby          | Slight Purplish/RED     | 5 – 8 | 3 – 6      |
| Ruby          | Strong Purplish/RED     | 5 – 6 | 6          |
| Pink Sapphire | RED                     | 2 – 5 | 1 – 6      |
| Pink Sapphire | Slight Purplish/RED     | 2 – 4 | 1 – 6      |
| Pink Sapphire | Strong Purplish/RED     | 2 – 4 | 1 – 6      |
| Pink Sapphire | PURPLE/RED – RED PURPLE | 2 – 4 | 1 – 6      |
| Pink Sapphire | Reddish/PURPLE          | 2 – 4 | 1 – 6      |
| Pink Sapphire | PURPLE                  | 2 – 4 | 1 – 6      |

pink sapphires, the huge differential in price and the inability to quantify how much chromium is present without the use of sophisticated and expensive equipment results in the desire of many dealers and indeed jewellers to push the limits of what is acceptable as a ruby.

Renowned and respected gemmologist Michael O'Donoghue summed up this dilemma when he stated 'It is often said that whether or not a red to pink corundum specimen is ruby or pink sapphire depends upon whether or not you are buying or selling it'. With a 648% price difference between an extra fine quality non-origin heat-treated 4.00 carat ruby and an equivalent quality pink sapphire, this is hardly surprising.

In an attempt to create parameters that would ensure that reddish/pink corundum was described correctly, the Gemological Institute of America created a classification system based on hue, tone and saturation (see table above). While this does help those gemmologists who do not have access to more definitive testing equipment, the grading of coloured gemstones has always been highly subjective leaving the door open to 'individual interpretation'.

What is curious is the amounts of chromium we are talking about are extremely small (ranging from 5 to 10 parts per million atomic), however it is not hard to see how even small traces of a colouring agent can impact on the overall colour. Try adding a few drops of blue food colouring to a bucket of water and you will be amazed how quickly the colour changes.



The esteemed position that chromium holds in the world of coloured gemstones is unquestionable when you consider that the four most valuable coloured gemstones (emeralds, rubies, green jadeite and alexandrite) all owe their colouration to chromium.

While various treatments (i.e. heat-treatment or irradiation) can alter the valency of a transition element (i.e. heating an aquamarine to 400 degrees in a reducing environment will change ferric oxide to ferrous oxide, remove the yellowish component and produce a bluer stone) or cause an infusion of titanium (by melting the rutile inclusions in a blue sapphire) chromium is not affected in the same way. A gemstone either has chromium or it does not and to what extent it is present is purely dependent on Mother Nature not the skill of a treater. This is why the price of a gemstone that is naturally coloured by chromium must reflect this unique quality and why lab-created gemstones produced in a controlled environment where the chemical constituents can be regulated must always sell for a fraction of the price of a naturally occurring gemstone.

In the case of beryl, we do not have the same dilemma as we do with corundum. Whether or not a green 'variety' is an emerald or a green beryl is easily determined by using a Chelsea Filter since emeralds owe their colour to chromium (producing a reddish colour through the filter) while green beryl is coloured by vanadium (producing a greenish colour). While this does not allow us to separate natural emeralds from their lab-created counterparts it does allow us to make the distinction between emerald and green beryl. A distinction that must be made because in this case a 4.00 carat extra fine quality emerald would sell for 3900% more than an equivalent quality green beryl.

The same is true of chrome green tourmaline and verdite tourmaline coloured by iron with a 2.00 carat good quality chrome tourmaline selling for 477% more than a verdite tourmaline of a similar quality. Fortunately the presence of chromium in chrome green tourmaline also allows us to separate the two using a Chelsea Filter with the former appearing red while the latter will appear green.





The 'The Sound of Raw Truth', debut album by AVA MUSICA will be released on June 1st, 2018 as a free digital download.

The album cover features a stunning image by our very own Conny Forsberg, renowned gemmologist, gem cutter and inclusion photographer and co-owner of the Scandinavian Gem Academy. The image is of an untreated Vietnamese blue sapphire with rutile inclusions. This is perhaps the first inclusion photograph to be used as an album cover. Recorded at the state of the art Palma Music Studios under the guidance of Fredrik Thomander (known for his work with NSYNC, Agnetha Fältskog of ABBA, Kim Wilde and The Scorpions) and René Shades (bass guitarist with the Danish Heavy Metal band 'Pretty Maids'), the album features twelve original compositions by Geoff Dominy and the ethereal voice of Ava.

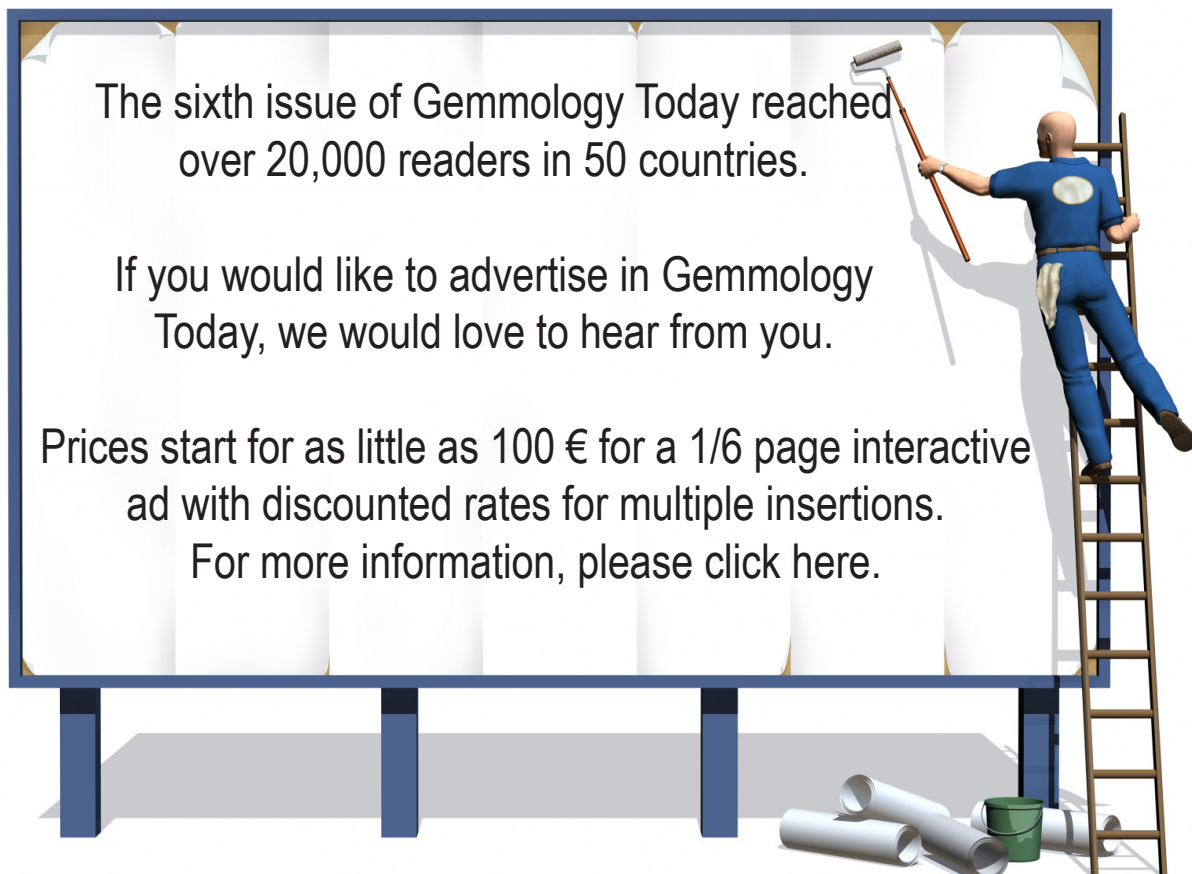
#### Tracks

1. Barren Lands
2. Breathe
3. Perfect Sky
4. Fame
5. End of the World
6. The World As We Knew It
7. Freedom
8. Heaven
9. Motherlode
10. Shattered
11. Tell Me Why
12. Celebration



To download the album, please go to [www.avamusica.com](http://www.avamusica.com)





## Article Submissions

The deadline for the next issue is

July 15th, 2018

### 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. Wherever possible please try to supply images from the same photographic source or at the very least are compatible with each other. This will ensure that the article is aesthetically pleasing as well as informative.
- We reserve the right to refuse articles

E-mail all submissions to  
[information@worldgemfoundation.com](mailto:information@worldgemfoundation.com)



From an identification perspective, the 'Stone of Heaven' can be hell. Due to the high prices fine quality jadeite commands nowadays, the risk of buying one of the many gemstones used to imitate jadeite or a treated stone are high. Buyer Beware!

## Jadeite - Stone of Heaven



Stunning Jadeite & Diamond Ring (Photo by Tino Hammid)

The jade family comprises of the highly valued jadeite jade from Myanmar (Burma) and the more common nephrite jade found in a variety of localities, including Canada, Brazil, China, Russia, Taiwan, Alaska, and New Zealand.

Interestingly, up until the eighteenth century, nephrite jade was used by Chinese carvers with large boulders of amphibole jade being transported great distances from the region known as East Turkestan, which borders China and Mongolia to the east, Russia to the north, Kazakhstan, Kyrgyzstan, Tajikistan, Afghanistan, Pakistan, and India to the west, and Tibet to the south.

Separation is relatively straightforward due to the marked differences in their refractive indices, specific gravities, and overall appearance with green nephrite jade being characterized by a spinach green body colour with numerous black flecks of magnetite and graphite.

Whereas nephrite owes its colour to iron, more richly coloured specimens may contain small traces of chromium with a faint narrow band sometimes visible at 689nm although it is never as distinct as the 691nm line found in jadeite. Additional lines may be seen at 509nm, 498nm and 460nm; however, there is no absorption band at 437nm in the violet.

### Jadeite & Other Simulants

Due to the high value of top quality jadeite, a number of 'jadeite-like' materials, such as grossular garnet (Transvaal jade), serpentine, aventurine quartz, jasper, chalcedony, chrysoprase, amazonite, Maw-sit sit, chrysocolla and nephrite are often sold as jadeite. Treated jadeite is also a major concern with bleaches, polymers and dyes used to enhance the appearance and value of lower grade material.

| Gemstone | R.I. Range    | D.R. | D | O/S | S.G. Range  | H       |
|----------|---------------|------|---|-----|-------------|---------|
| Jadeite  | 1.652 – 1.688 | .020 | – | B+  | 3.30 – 3.38 | 6 ½ – 7 |
| Nephrite | 1.600 – 1.627 | .027 | – | B-  | 2.90 – 3.03 | 6 – 6 ½ |



While the correct identification of jadeite would be relatively straightforward if it were a transparent faceted gemstone due to the marked differences in the refractive indices, the fact that jadeite is translucent to opaque and is cut *en cabochon* or carved, makes this determination difficult if not impossible at the best of times.

The same is true of the marked differences in the specific gravities. Using undiluted diiodomethane (S.G. 3.33), all known simulants other than grossular garnet and possibly smaragdite, depending on its chemical composition, will float while jadeite would freely suspend but unless one is testing small loose cabochons, this is not particularly helpful.

The testing of large carvings is also problematic since it is time consuming to use the hydrostatic method and while this could be set-up and used by gemmologists or appraisers who encounter carvings on a regular basis, the greatest concern with the identification of jadeite comes at the buying level where imitations are often sold to unsuspecting buyers.

Natural jadeite, coloured by chromium, will have prominent absorption bands at 691nm and 437nm with weaker lines at 655nm, 630nm, 450nm and 433nm.

Treated B jade refers to lower grade jadeite that has been soaked in strong acids, such as hydrochloric or nitric acid, to

leach out discoloured iron compounds, and then impregnated with a colourless polymer. This enhancement can be identified by noticing the colourless polymer in any surface reaching fissures. Some stones will also exhibit a superficial bluish white to yellowish green fluorescence under long wave UV light.

C jade refers to dyed jadeite that has not been bleached. One can expect to see under magnification concentrations of colour in the cracks and fissures, sometimes an orange-red appearance under a Chelsea filter, and broad absorption bands at 630nm and 670nm, which are different from the three vague lines at 630nm, 660nm and 690nm seen in natural green jadeite coloured by chromium.

B + C jade will show characteristics of both B and C jade. Alan Hodgkinson and Dr. Bill Hanneman suggest that stained and natural violet jadeite should be checked first under both long wave and short wave UV light with the former, usually fluorescing orange. However, in some cases, the stained jadeite will remain inert under UV light; these stones should then be checked under their jadeite filter to confirm whether or not the colour is natural. In addition, they recommend using incandescent light, such as tungsten, halogen or a penlight (not LED), instead of fluorescent, triphosphor or LED illumination when using their filter.



Orange Jadeite & Diamond Necklace (Photo by Tino Hammid)



## Jadeite & Common Natural Simulants

| Gemstone          | R.I. Range    | D.R.        | D   | O/S | S.G. Range  | H         |
|-------------------|---------------|-------------|-----|-----|-------------|-----------|
| Grossular Garnet  | 1.734 – 1.759 | –           | .02 | I   | 3.57 – 3.73 | 6 ½ – 7 ½ |
| Jadeite           | 1.652 – 1.688 | .020        | –   | B+  | 3.30 – 3.38 | 6 ½ – 7   |
| Enhanced Jadeite  | 1.652 – 1.688 | .020        | –   | B+  | 3.30 – 3.38 | 6 ½ – 7   |
| Variscite         | 1.563 – 1.594 | .031        | U   | B-  | 2.42 – 2.58 | 4 – 5     |
| Serpentine        | 1.560 – 1.571 | .008 – .014 | –   | B+  | 2.44 – 2.62 | 2 ½ – 5 ½ |
| Aventurine Quartz | 1.544 – 1.553 | .009        | –   | U+  | 2.64 – 2.69 | 7         |
| Dyed Jasper       | 1.54          | –           | –   | U   | 2.58 – 2.91 | 6 ½ – 7   |
| Chalcedony        | 1.530 – 1.540 | .004        | –   | U   | 2.58 – 2.64 | 6 ½ – 7   |
| Dyed Chrysoprase  | 1.530 – 1.540 | .004        | –   | U   | 2.58 – 2.64 | 6 ½ – 7   |
| Chrysoprase       | 1.530 – 1.540 | .004        | –   | U   | 2.58 – 2.64 | 6 ½ – 7   |
| Amazonite         | 1.522 – 1.530 | .008        | –   | B-  | 2.56 – 2.58 | 6 – 6 ½   |
| Maw-Sit Sit       | 1.520 – 1.740 | –           | –   | B   | 2.50 – 3.50 | 6 – 7     |
| Chrysocolla       | 1.460 – 1.570 | .023 – .040 | –   | B-  | 2.00 – 2.40 | 2 – 4     |
| Prehnite          | 1.611 – 1.669 | .021 – .039 | –   | B+  | 2.82 – 2.94 | 6 – 6 ½   |
| Smaragdite        | 1.608 – 1.630 | .022        | –   | B-  | 3.24 – 3.50 | 6 – 6 ½   |

Natural jadeite, unlike enhanced jadeite, will appear green under the Hanneman-Hodgkinson stained green jadeite filter.

Maw-sit-sit also poses a problem due to the wide variances in both the refractive index (1.52 being the most common with readings up to 1.74) and specific gravity (2.5 to 3.5 ) due to the chemical composition. First identified by the late Edward Gubelin in 1963 and named after the village close to where it was discovered in the foothills of the Himalayas, Maw-sit sit is a mottled ornamental rock consisting primarily of kosmochlor (sodium chromium pyroxene) (60%), chromium-rich jadeite (15%), yellowish-white clinocllore and green eckermannitic amphibole. Like jadeite, it is also translucent to opaque and typically cut *en cabochon* or carved.

Chloromelanite is a dark green to black variety of jadeite. Mineralogically, it is a solid solution of roughly equal amounts of jadeite, diopside, and aegirine (Jackson, 1997).

The physical and optical properties of dyed jasper will always be significantly different to the stone it is imitating, while most dyes can also be removed using a cotton swab moistened with a solvent such as acetone.



Jadeite Carving (Photo by Tino Hammid)





Doubly Fortunate Jadeite Necklace (Photo by Tino Hammid)



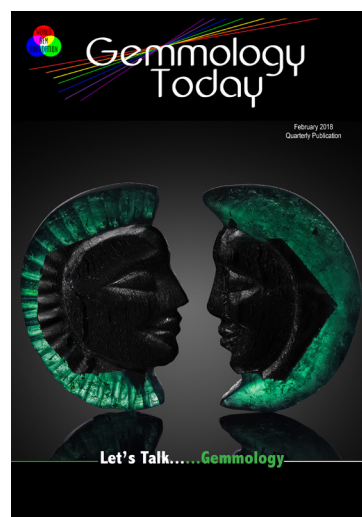
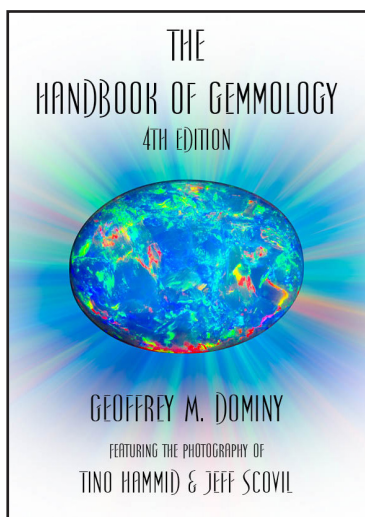
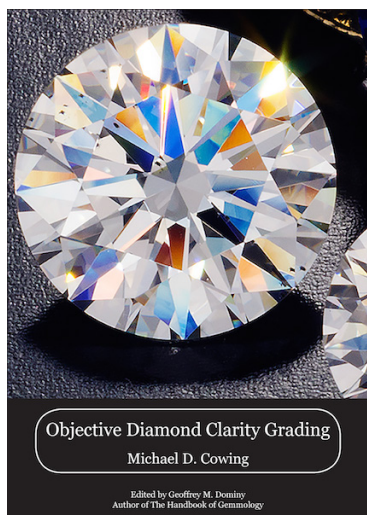


Lavender Jadeite Honorolith (Photo by Tino Hammid)





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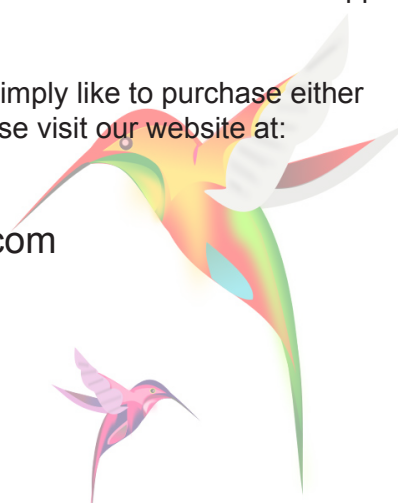
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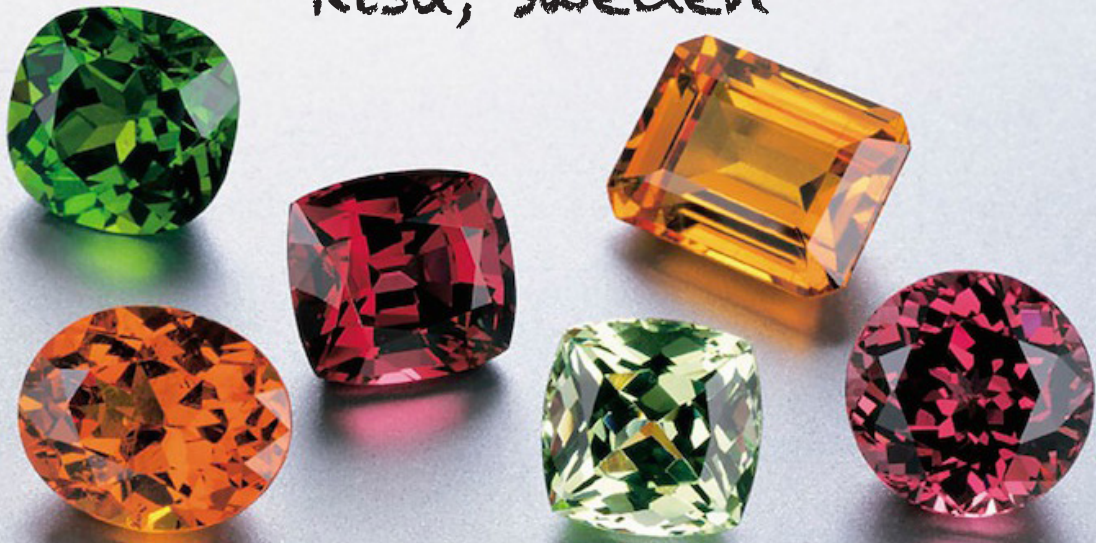
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## Tools of the TRADE

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.



# The Value Of Simple, Portable Instruments – Part 3

## How to Use a Loupe

### Editor's Note:

This is the third of four articles where Antoinette explores everyday tools available to gemmologists and how to truly push their limitations to achieve maximum mileage.

While gemologists certainly have been taught how to use a loupe, in my experience some have either forgotten how to use it properly or simply have not had the benefit of some valuable tips from experienced 'field' gemologists – in this sense, meaning ways to use tools whenever one is away from a well-equipped laboratory! These 'tips' can add significantly to what we may see – or miss – when we use a loupe. For many, this article will not shed any new light on the subject, but for others it might make a valuable difference.

First, not all 10x loupes are the same. For gemological purposes, a 10x triplet loupe is required. A triplet corrects two problems found in other loupes that are not a 'triplet' type – 1) the presence of traces of color found at the outer edge of the lens (color 'fringing'); and 2) visual distortion, usually present at the outer edge of the lens. And remember this: just because the seller describes the loupe as a 10x triplet, it does not mean it is a triplet!

In addition, the color of the loupe casing is very important. A gemological loupe must have a matte grey or black housing around the lens, not chrome ... and not gold! The number of people I've seen around the world, retailers and/or gemologists alike, who use a chrome or gold loupe is somewhat shocking, but to give them the benefit of the doubt, I suspect that in many cases it is worn as a 'status' symbol (and I always secretly hope that they don't really use them when they are seriously examining any stone)!

In any event, the reason you do not want to use anything except matte grey or black is because of the reflectivity of such loupes, which can affect the color you see in the stone you're examining. There was a time when people thought that a chrome loupe was fine because it wouldn't reflect 'yellow' into



anything you were examining, but it was later discovered that the white reflectivity of the chrome can also affect the color you see, by masking any subtle tint of color that might be present; many diamonds—especially those with a borderline color grade—have been unintentionally over-graded. So today, knowledgeable professionals do not use loupes that have a chrome or gold border around the lens itself (the protective covering can be chrome but you must hold the loupe so that your hand is shielding the color of the chrome case from being reflected into the material being examined).

The next thing to be noted is that not all loupes sold as 'triplet' loupe are really triplet loupes. In many cases, they are not properly color corrected so there is still some degree of color fringing. When you find a 'cheap loupe' this is often the reason why; it may not be color corrected to eliminate all traces of color, either at the edges or even across the entire lens. I learned this many years ago when I was watching Dad check a shipment of loupes he'd ordered from a supplier because they were so much cheaper than the Bauche & Lomb loupes he recommended to students at the time.



He would take a flat-white business card and place it under his diffused fluorescent light and then place the loupe on top of it and look at the white card through the loupe; he was looking for any tint of color in the color of the 'white' card. It was simple and effective. And he would always do this when any new shipment of loupes arrived. One day, I heard him get angry and call the supplier to tell him he was returning them all, and asking if he'd changed suppliers because there was color across the lens. The supplier told him the loupes were from the same supplier, so Dad got the number of his own supplier's source. He learned that the actual loupe supplier at the start of the distribution chain had switched suppliers because the 'price was better'! When Dad explained the problem, the supplier-to-the-supplier changed his own supplier back to his original because the cost difference reflected an unacceptable quality! Moral of the story: as with everything, especially in our field, if the price seems more attractive than another, there is usually a reason, and it is usually related to quality differences.

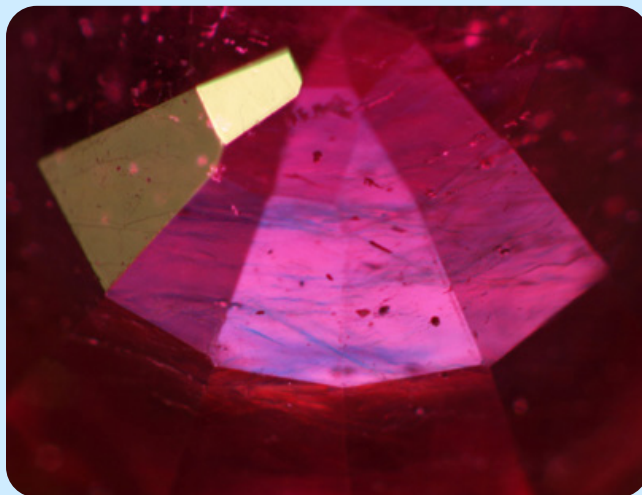
The next area of concern is the actual power of the loupe. By law in most countries today, a loupe used for grading gemstones must be 10x-power. Any inclusion that does not show up under 10x magnification is considered non-existent for grading purposes. This does not mean that you need to limit yourself to 10x; once you see something with 10x, it may be important to examine it with higher magnification.

Most gemologists use a microscope, but it is difficult to carry one with you, so many today use higher power loupes. Just remember that the higher the power of the loupe, the more limited its depth of field. This means that unless your focal point is right on the inclusion, or extremely close to it, you might not see it at all. So you must START with 10x in order to note where the inclusion is, and then, if necessary, you can examine it more closely.

But back to the power of the loupe, here again, just because the loupe says 10x it is no guarantee. If you're shopping for a loupe, compare cost but only in context with using it to view something. Compare what you see using the 'budget' loupe with an expensive loupe, side-by-side: is what you see with the lower-cost loupe the same thing you see with the more costly? Is it as bright/sharp or not? Is it the same 'size' etc. Then decide which loupe you really want.

Now, let's talk about how to get the most from your loupe 'technique':

1. Use the 'wiggly finger' technique: While holding the loupe between thumb and forefinger, you'll see even more if you also use the index finger of the hand holding the loupe. While examining the stone with transmitted light, place your forefinger between your light source and the stone and slowly move it – this moves the light so that it bounces/reflects off inclusions in the stone so that you actually can see the internal characteristics much better...and sometimes you'll notice something you might otherwise have missed!



Lead Glass Filling in Ruby (Courtesy of Lang Antiques)

2. Work with more than one type of light. Be sure to use transmitted light AND reflected light, and diffused fluorescent and incandescent light sources!

One of the biggest mistakes people make is not using reflected light; if people had been using reflected light to examine lead-glass infused ruby imitations they would instantly have seen the lines indicating glass-filled fractures/planes/pits etc! Be sure to move the stone – rock it gently back and forth after examining it holding it still.

Using incandescent as well as diffused fluorescent light can also result in seeing reflectivity, zoning and zoning patterns, differences in luster (thus identifying such things as metallic inclusions more quickly) and so on.

3. Check with dark-field illumination. I highly recommend adding a dark-field loupe to your arsenal of gem-testing tools, but if you don't have one, you can create a dark-field environment by holding the stone between your thumb and forefinger, by the girdle. Then, using an intense Maglite to light the stone, from the back and from the side (or hold the stone up against a strong spotlight), roll it back and forth along the girdle! The flesh of your skin helps to create a 'dark field' and this was the way I first spotted a fracture-filled diamond that was coming up for auction shortly after they entered the market! By creating a 'semi' dark-field environment using my thumb and forefinger I spotted it.

Today I simply always have my 'dark-field loupe' with me (the type that has been adapted for use with stone mounted in jewelry by creating more space between the light and the well over the light source) but if for any reason I don't have it with me (a rare event indeed) I am almost always wearing a jacket with a black lining when at any gem-related event/gem show/ conference, so I can simply remove it and drape it around the light source, using its black lining as a background.

When doing a visual examination with a loupe, there are many clues that can assist you in the identification of a gemstone if you know what you are looking for. For example, if you are examining the girdle area of a gemstone you might see indicators that it is a composite or just by noting the sharpness of facet edges, and whether there are chips, nicks or abrasions, you might be able to ascertain how hard or brittle it is. You may also be able to detect doubling of the back facet joins indicating that the stone is doubly refractive and in some cases, how strong the double refraction is. This leads me to my last story!

Colorless zircon was used as a diamond imitation for many years because it looked more like diamond than anything else at the time (this was prior to the creation of CZ and synthetic diamonds) and is often used in colored gemstone jewelry to add sparkle without adding a lot of cost. Colorless zircons are often seen in estate pieces, and are often 'assumed' to be diamonds because of zircon's pronounced brilliance. However, it chips very easily, so if it's been worn for any period of time, you'll see chipping...and if not, you'll see strong doubling!

I was once at a conference at which there was a panel of gemologists sitting at a table 'identifying' stones in jewelry pieces the participants had brought with them. I wouldn't participate because I don't believe anyone can properly identify or evaluate any piece of jewelry unless in a proper environment with a range of instruments available. So I was in the audience. I was then asked quietly by one of the gemologists if I would come to the podium to take a look at the 'unusual stone' he was examining...and I made an exception to my rule

since I could see this 20-carat stone from my seat in the audience, and I was quite confident I could, in fact, identify this particular stone (and I sensed this gemologist could not and I didn't want him to be embarrassed). So I came up to the podium and said into the microphone, "Ah, I see you're testing me...but I know you had to have seen the VERY strong doubling immediately, so I know you know this is a heated blue zircon!" And he smiled broadly and said, 'Yes, but have you ever seen one this large? And her aunt was told when she bought it that it was a treated-color diamond!' So the day was saved...and his reputation at the same time...because, being much younger than I was, he'd never seen one before that day! And he learned that day that the instant give-away was its strong doubling, combined with the heavily chipped girdle! I explained to him that there just weren't any other stones in the size/color of that one which it could possibly have been!

So the loupe alone can be invaluable, but when you are looking at colored gemstones, add to it the clues you get using the earlier two tools we've discussed in earlier issues, and you'll find that you really can identify most imitations and fakes, as well as synthetics versus natural stones, with just these three tools.

Now I hope you'll be sure to tune in to the next issue to learn how valuable a portable long-wave-short-wave ultraviolet lamp can be...the last of my 'essential' portable tools (without which I never leave home)!



Blue Zircon and Diamond Brooch (Photo by Tino Hammid)



# Studying Gemmology with the World Gem Foundation

There's an expression 'different strokes for different folks' and this is certainly true in the case of gemmology. We are fortunate to work in an extremely diverse industry; one that provides unlimited opportunities in a broad range of disciplines.

Some people want to become a professional gemmologist; to forge a career for themselves working with gemstones. At the World Gem Foundation, gemmology is not just a job, it's a profession. This is why we opted for the 'Career Gemmologist' designation. We not only want to raise the level of consciousness with consumers but also within our industry. An awareness that gemmology is a science that demands a high level of theoretical knowledge and practical experience.

At the same token, we also understand that not everyone wants to become a fully fledged gemmologist. Many choose to specialise in a particular area, such as diamonds or coloured gemstones. To recognise this, we have introduced two new 'Diploma' programs (Diamond Professional and Coloured Gemstone Professional) for 2018.

But what about gemmologists who may have completed their studies five, ten, fifteen or twenty years ago? Since gemmology is constantly evolving, it is important to continually upgrade your knowledge. You simply cannot afford to become complacent. One minute you may be 'up to speed', the next completely 'out of sync'. Each year brings new treatments and enhancements, new lab-created gemstones and new techniques to identify them. It is not the certificate that hangs on your wall that defines who you are as a gemmologist but the knowledge you possess. Our courses can be taken collectively or independent of each other, allowing our students to customise their own personal development programs based on their own specific needs.

Finally, there are many people who share a passion for gemstones but don't necessarily want to enrol in a gemmological program, they simply want to augment their existing knowledge and upgrade their level of understanding.

Regardless of your motivation to expand your knowledge, the World Gem Foundation has a variety of courses and programs that can help you reach your goal.

## Career Gemmologist Program

For students wishing to pursue a career in gemmology, our 'Career Gemmologist' program has been especially designed to give you the knowledge and experience required to work as a professional gemmologist. The World Gem Foundation and our affiliated gem academies offer you two options to earn your Career Gemmologist Diploma with our Gemmology Seven/ Eleven programs.

## Gemmology Seven

This option allows you to complete the entire theoretical requirements by enrolling in our Career Gemmology course (78 lessons) and completing the five practical workshops (Gem Identification #1, Gem Identification #2, Diamond Grading and Lab-created Diamonds, Coloured Gemstone Grading #1 and Lab-created and Treated Gems) and our 100 hour online Coloured Gemstone Grading course.

The theoretical component covers the chemical nature of gemstones, their 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.

From there we move into the most challenging and fluid areas of gemmology; imitation and composite gemstones, lab-created gemstones and the treatment and enhancement of gems.

In the lessons pertaining to lab-created gemstones you will not only learn about the various methods used to manufacture lab-created gemstones (including Verneuil Flame-Fusion, Czochralski Pulling Method, Flux Melt Method, the Hydrothermal Method, Skull Crucible, Zone Melt, Horizontally Oriented Crystallization, the Sublimation Method, and the Modified Stober Method) but also the unique identifying features that allow us to separate them from their natural counterparts.

The use of treatments and enhancements is both demanding and depending on who you talk to, highly controversial. Here we look at not only the techniques used to treat and enhance gemstones (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) but also how they can be detected. We also look at the advanced gem testing techniques that are often needed to identify many of these treatments.

The course then takes a slightly different direction, focusing on the identification of gemstones including the tests that are commonly used to identify them and an in-depth look at each of the ten gemstone groupings based on colour and transparency (colourless or white, red, pink, orange,

yellow, blue, green, violet or purple, brown, black or grey). These lessons include the 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 green tourmaline, diamond and lab-created moissanite) or gemstones that have physical and optical properties that are similar (i.e. amethyst quartz and purple scapolite) to each other. This section also includes gemstones that either exhibit optical phenomena (i.e. asterism or chatoyancy) or are unusual by nature.

The next section looks specifically at diamonds, their physical properties, geology, localities, principle mines, crystal system, chemical composition and classification. You will also find lessons dedicated to fancy coloured diamonds, the causes of colour, absorption spectra, inclusions, fluorescence, mining, gem identification, methods of synthesis (including HPHT, CVD, Detonation and Ultrasonic Cavitation), 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. The lesson on 'Cut' compares some of the most important and recognized 'Cut' grading systems used today including those pioneered by the Gemological Institute of America (GIA), the American Gem Society (AGS), Hoge Raad voor Diamant (HRD), the International Gemological Institute (IGI), the European Gemological Laboratory (EGL) and the Accredited Gem Appraisers (AGA).

The final twenty-nine lessons (29) are devoted to coloured gemstones and covers their 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 include corundum, beryl, chrysoberyl, spinel, zircon, topaz, tourmaline, peridot, quartz, garnet, tanzanite, lapis lazuli, turquoise, spodumene, feldspars, iolite, andalusite, diopside, apatite, and organic gems (pearls, coral, jet, ivory, and amber). You will also learn about the various colour grading systems currently used (GIA, Gemewizard, GemDialogue and the World of Color) including how to accurately describe colour based on hue, tone and saturation, the clarity classification of gemstones, how cut is assessed, opal, jadeite and pearl grading, and how to estimate the weight of 'mounted' stones.

The study of gemmology simply would not be complete without a comprehensive program of practical instruction. This involves five practical workshops (Gem Identification #1 & #2, Diamond Grading and Lab-created Diamonds, Lab-created and Treated Gems and Coloured Gemstone Grading #1) totalling twenty-eight days of in-class instruction and a 100 hour online Coloured Gemstone Grading course where you will work with the Gemewizard Colour Grading system.

## **Gemmology Eleven**

While the information is the same, the theoretical portion of this program is divided into five free-standing courses (Basic Gemmology, Advanced Gemmology, Gem Identification, Diamonds and Coloured Gemstones). This option allows you to take each course separately giving you greater flexibility in terms of time and how you can pay for the courses.

Like the 'Gemmology Seven' program, there are five practical workshops and one 100 hour online course.

## **Diamond Professional Program**

Designed specifically for those engaged in the diamond trade, this program covers the same theoretical information covered in our 'Diamonds' course plus our eight-day Diamond Grading and Lab-created Workshop.

## **Coloured Gemstone Professional Program**

If your area of expertise is coloured gemstones, this program is ideally suited for you. The CGP program involves the completion of four theoretical courses (Basic Gemmology, Advanced Gemmology, Gem Identification and Coloured Gemstones) plus our two five-day practical Gem Identification workshops, our five-day Coloured Gemstone Grading #1 workshop, our five-day Lab-created and Treated Gems workshop plus our 100 hour online Coloured Gemstone Grading #2 course.

## **Courses in Other Languages**

We are currently translating all of our 'Diploma' program courses into Spanish and Chinese to meet the needs of our Spanish and Chinese speaking students.

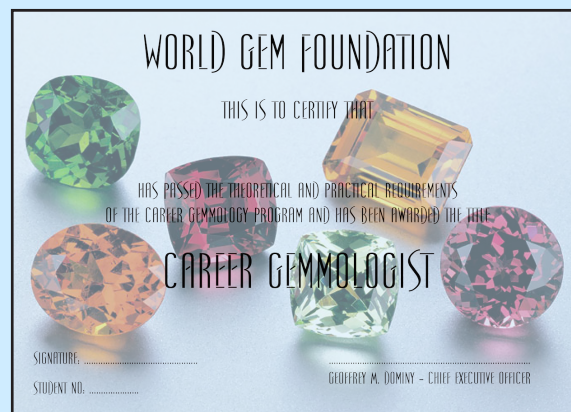
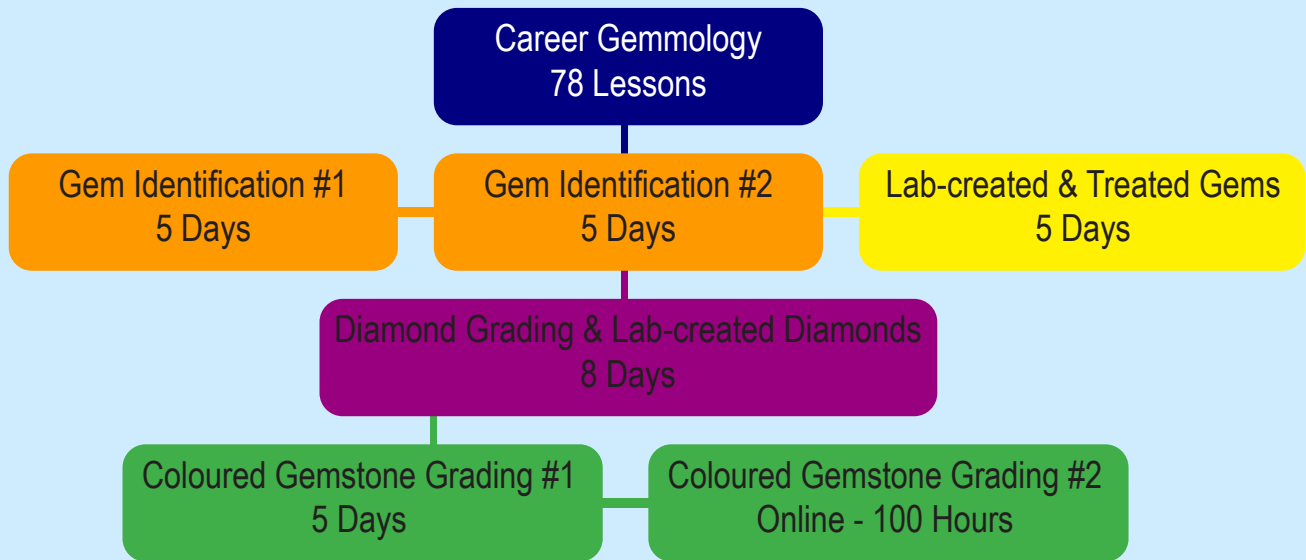
Currently our Gemología Básica (Basic Gemmology) is available in Spanish in both digital and print and also online.

## **General Interest Courses**

For those interested in gemstones but not wishing to take our 'Diploma' programs, all of our theory courses can be taken independently without prerequisites. In addition to the six theoretical courses (Career Gemmology, Basic Gemmology, Advanced Gemmology, Gem Identification, Diamonds and Coloured Gemstones) that make up our Career Gemmologist, Diamond Professional and Coloured Gemstone Professional 'Diploma' programs, we also offer three 'General Interest' courses (Rubies, Sapphires and Emeralds, Opals and Jade and Organic Gems).

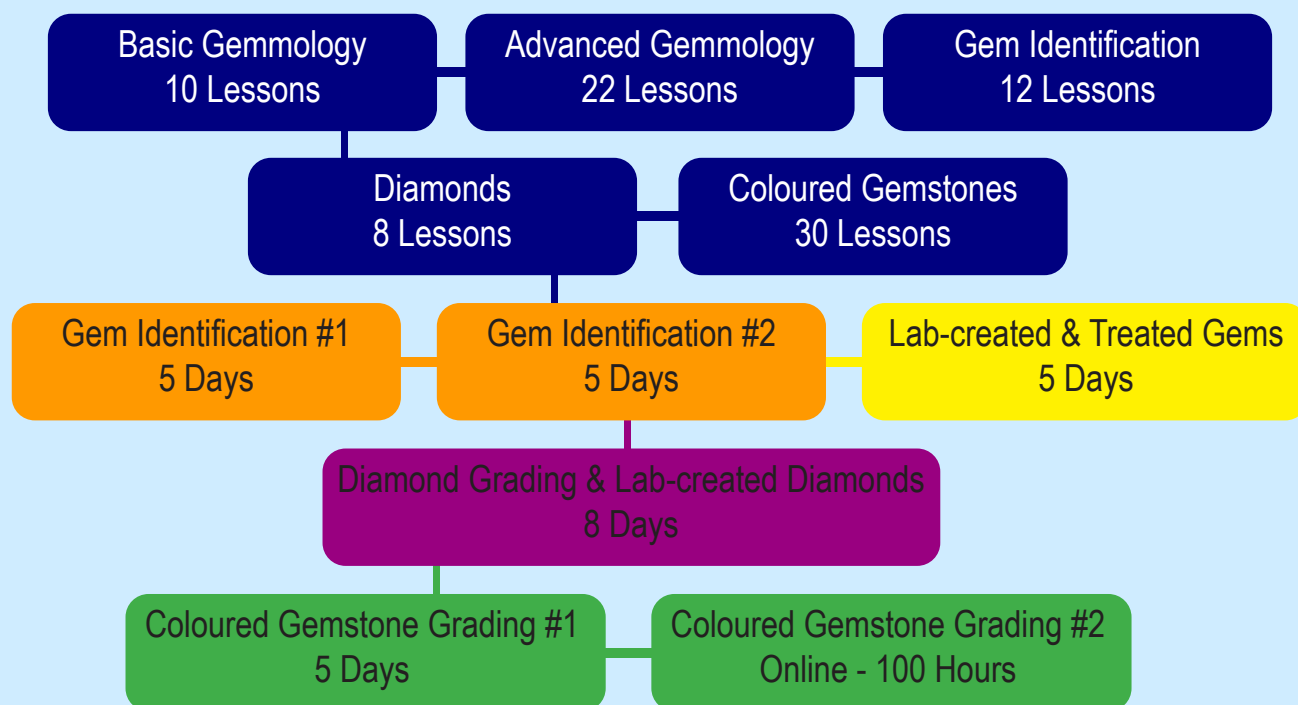


# GEMMOLOGY SEVEN PROGRAM



| Career Gemmology Seven               | Digital Fees |                 |             | Printed Fees |                 |             |
|--------------------------------------|--------------|-----------------|-------------|--------------|-----------------|-------------|
| Course Name                          | Euros        | Pounds Sterling | USD         | Euros        | Pounds Sterling | USD         |
| Career Gemmology (Theory)            | 1400         | 1100            | 1600        | 1570         | 1235            | 1795        |
| Gem Identification #1                | 500          | 400             | 550         | 500          | 400             | 550         |
| Gem Identification #2                | 500          | 400             | 550         | 500          | 400             | 550         |
| Coloured Gemstone Grading #1         | 500          | 400             | 550         | 500          | 400             | 550         |
| Coloured Gemstone Grading #2         | 1000         | 800             | 1150        | 1000         | 800             | 1150        |
| Diamond Grading/Lab-created Diamonds | 1750         | 1400            | 2000        | 1750         | 1400            | 2000        |
| Lab-created & Treated Gems           | 500          | 400             | 550         | 500          | 400             | 550         |
| Examinations Fees ( Final Exam)      | 250          | 200             | 280         | 250          | 200             | 280         |
| <b>Total Cost</b>                    | <b>6400</b>  | <b>5100</b>     | <b>7230</b> | <b>6570</b>  | <b>5235</b>     | <b>7425</b> |

## GEMMOLOGY ELEVEN PROGRAM



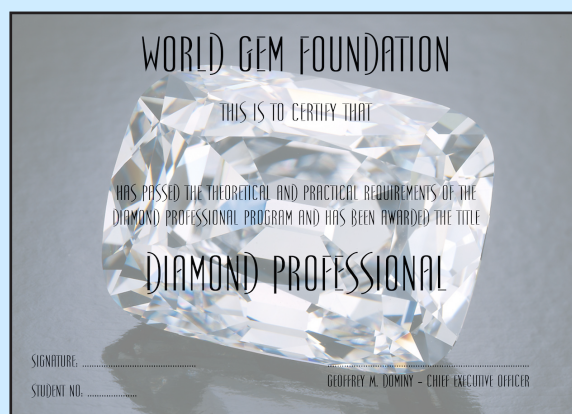
| Career Gemmology Eleven              |             | Digital Fees    |             |             | Printed Fees    |             |  |
|--------------------------------------|-------------|-----------------|-------------|-------------|-----------------|-------------|--|
| Course Name                          | Euros       | Pounds Sterling | USD         | Euros       | Pounds Sterling | USD         |  |
| Basic Gemmology (Theory)             | 200         | 150             | 225         | 235         | 180             | 265         |  |
| Advanced Gemmology (Theory)          | 400         | 300             | 450         | 430         | 325             | 485         |  |
| Gem Identification (Theory)          | 225         | 175             | 250         | 255         | 200             | 285         |  |
| Diamonds (Theory)                    | 225         | 175             | 250         | 255         | 200             | 285         |  |
| Coloured Gemstones (Theory)          | 500         | 400             | 550         | 565         | 450             | 625         |  |
| Gem Identification #1                | 500         | 400             | 550         | 500         | 400             | 550         |  |
| Gem Identification #2                | 500         | 400             | 550         | 500         | 400             | 550         |  |
| Coloured Gemstone Grading #1         | 500         | 400             | 550         | 500         | 400             | 550         |  |
| Coloured Gemstone Grading #2         | 1000        | 800             | 1150        | 1000        | 800             | 1150        |  |
| Diamond Grading/Lab-created Diamonds | 1750        | 1400            | 2000        | 1750        | 1400            | 2000        |  |
| Lab-created & Treated Gems           | 500         | 400             | 550         | 500         | 400             | 550         |  |
| Examinations Fees ( Final Exam)      | 250         | 200             | 280         | 250         | 200             | 280         |  |
| <b>Total Cost</b>                    | <b>6550</b> | <b>5200</b>     | <b>7355</b> | <b>6740</b> | <b>5355</b>     | <b>7575</b> |  |



# DIAMOND PROFESSIONAL

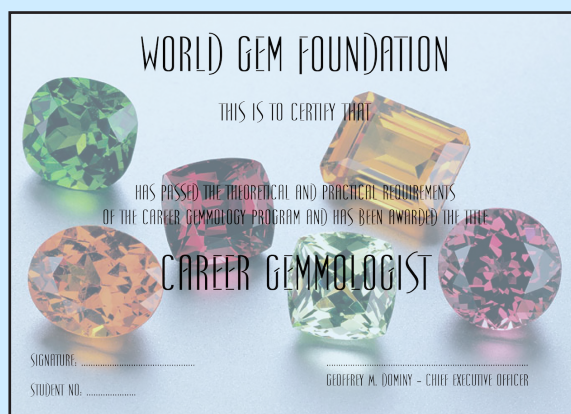
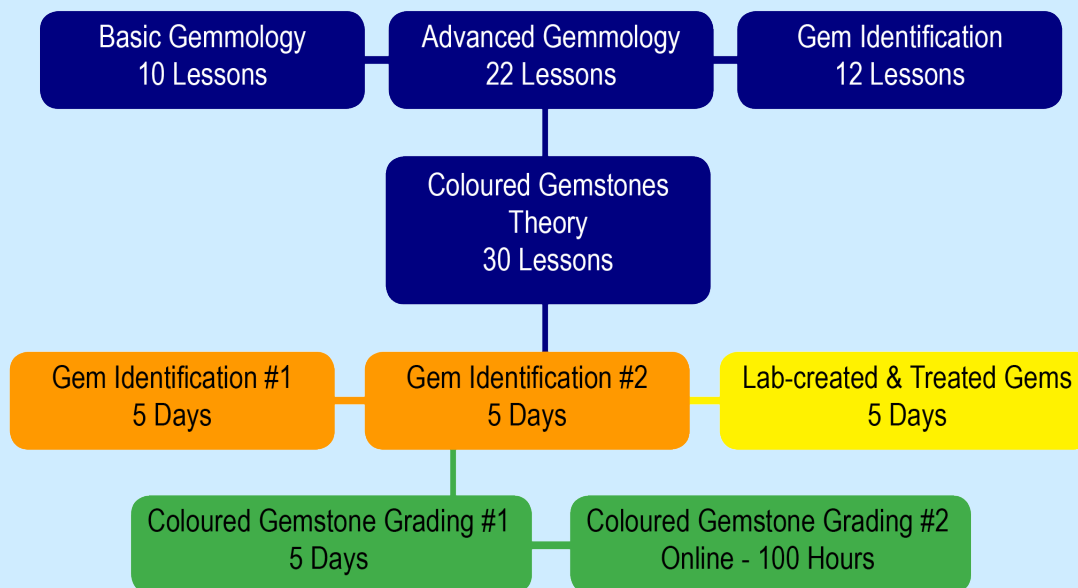
Diamonds  
Theory  
8 Lessons

Diamond Grading & Lab-created Diamonds  
Practical Workshop  
8 Days



| Diamond Professional                 | Digital Fees |                 |             | Printed Fees |                 |             |
|--------------------------------------|--------------|-----------------|-------------|--------------|-----------------|-------------|
| Course Name                          | Euros        | Pounds Sterling | USD         | Euros        | Pounds Sterling | USD         |
| Diamonds (Theory)                    | 225          | 175             | 250         | 255          | 200             | 285         |
| Diamond Grading/Lab-created Diamonds | 1750         | 1400            | 2000        | 1750         | 1400            | 2000        |
| Examinations Fees ( Final Exam)      | 250          | 200             | 280         | 250          | 200             | 280         |
| <b>Total Cost</b>                    | <b>2225</b>  | <b>1775</b>     | <b>2530</b> | <b>2255</b>  | <b>1800</b>     | <b>2565</b> |

## COLOURED GEMSTONE PROFESSIONAL



| Coloured Gemstone Professional  | Digital Fees |                 |             | Printed Fees |                 |             |
|---------------------------------|--------------|-----------------|-------------|--------------|-----------------|-------------|
| Course Name                     | Euros        | Pounds Sterling | USD         | Euros        | Pounds Sterling | USD         |
| Basic Gemmology (Theory)        | 200          | 150             | 225         | 235          | 180             | 265         |
| Advanced Gemmology (Theory)     | 400          | 300             | 450         | 430          | 325             | 485         |
| Gem Identification (Theory)     | 225          | 175             | 250         | 255          | 200             | 285         |
| Coloured Gemstones (Theory)     | 500          | 400             | 550         | 565          | 450             | 625         |
| Gem Identification #1           | 500          | 400             | 550         | 500          | 400             | 550         |
| Gem Identification #2           | 500          | 400             | 550         | 500          | 400             | 550         |
| Coloured Gemstone Grading #1    | 500          | 400             | 550         | 500          | 400             | 550         |
| Coloured Gemstone Grading #2    | 1000         | 800             | 1150        | 1000         | 800             | 1150        |
| Lab-created & Treated Gems      | 500          | 400             | 550         | 500          | 400             | 550         |
| Examinations Fees ( Final Exam) | 250          | 200             | 280         | 250          | 200             | 280         |
| <b>Total Cost</b>               | <b>4575</b>  | <b>3625</b>     | <b>5105</b> | <b>4735</b>  | <b>3755</b>     | <b>5290</b> |



## Rubies, Sapphires & Emeralds

This course focuses on three coloured gemstones (rubies, sapphires and emeralds) that individually and collectively are considered the cornerstones of the coloured gemstone trade. Lessons include a complete overview of their physical and optical properties, principal sources, mining, how they can be identified from gemstones that can be deceptively similar in appearance and their lab-created counterparts, common treatments and enhancements, pricing guidelines, what constitutes the best quality and how to properly care for them.

## Opals and Jade

This course looks at two of the most fascinating and complex gemstones in the science of gemmology. The lessons on opal cover their physical and optical properties, their geology, localities, crystal system, chemical composition and classification, varieties, cause of colour, absorption spectra and pleochroism, inclusions, fluorescence, principal mines, opal mining in Australia, opal grading, synthesis of opal, gem identification, common treatments and enhancements, opal doublets and triplets, cleaning and care and pricing.

The section on jade follows a similar format with lessons covering their physical and optical properties, their geology, localities, crystal system, chemical composition, absorption spectra and pleochroism, inclusions, fluorescence, mining, principal mines, evaluating the rough, jadeite cutting, jadeite nomenclature, grading jadeite, synthesis of jadeite, gem identification, common treatments and enhancements, cleaning and care and pricing.

## Organic Gems

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. Lessons cover their physical and optical properties, geological formation, crystal systems, chemical composition, varieties and classification, causes 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.

## Online Tutoring

While clearly the ideal way to learn a particular subject is with one-on-one tutoring, we appreciate that this is difficult when you enrol in a long distance study program.

Fortunately, new distance learning technologies are changing. Now teachers can connect with their students virtually using a variety of virtual tutoring tools, such as Skype.

The chart below outlines the number of online tutoring hours that are included in your course price. If you require more online instructional tutoring, please contact your education coordinator to discuss availability and pricing.

| Course Name                 | Hours |
|-----------------------------|-------|
| Basic Gemmology - Theory    | 2     |
| Advanced Gemmology - Theory | 4     |
| Gem Identification - Theory | 2     |
| Diamonds - Theory           | 2     |
| Coloured Gemstones - Theory | 5     |
| Career Gemmology - Theory   | 14    |

We strongly suggest that you contact your instructor beforehand by email with your questions so that you will derive maximum benefit from your online session. Please remember that these sessions are designed to provide you with 'coaching' rather than direct instruction.

## Course Fees

Fees charged by the individual gem academies are charged in the prevailing currency for that particular area (i.e. Euros in Europe, Pounds Sterling in Britain). Please note that shipping charges apply to any courses provided in print.

## Practical Workshops

### Gem Identification #1



**Dates:** TBA

**Venue:** Mallorca Teaching Centre

**Course Cost** € 500

[Reserve Your Place Now](#)

This five day (30 hour) practical workshop focuses on the study and identification of six colour groupings (colourless/white, red, pink, orange, yellow and green) and basic crystallography. Gemstones covered in this workshop include:

Natural Diamond, Natural Ruby, Natural Sapphire, Emerald, Beryl, Garnets (Spessartite, Almandite Rhodolite, Pyrope, Colour Change, Hessonite, Demantoid, Tsavorite and Grossular), Spinel, Tourmaline, Topaz, Beryl, Quartz, Zircon, Alexandrite, Chrysoberyl, Apatite, Kunzite, Sunstone, Sphalerite, Sphene, Phenakite, Brazilianite, Scapolite, Hiddenite, Danburite, Benitoite, Diaspore, Epidote, Kyanite, Idocrase, Sinhalite, Diopside, Kornerupine, Enstatite, Euclase, Andalusite, Ekanite, Idocrase, Moldavite, Obsidian, Chrome Chalcedony, Amazonite, Jadeite, Nephrite, Chalcedony, Dyed Jasper, Chrysoprase, Maw-Sit Sit, Rhodonite, Rhodochrosite, Amber, Coral, Fire Opal, Lab-created Moissanite, Cubic Zirconia, GGG, YAG, Lab-created Rutile, Strontium Titanate, Lithium Niobate, Lab-created Spinel, Glass, Lab-created Alexandrite, Garnet-topped Doublet, Spinel Triplet, Copal Resin, Bakelite and Imitation Coral.

**Prerequisites:** Basic Gemmology or Equivalent

### Gem Identification #2



**Dates:** TBA

**Venue:** Mallorca Teaching Centre

**Course Cost** € 500

[Reserve Your Place Now](#)

This five day (30 hour) practical workshop focuses on the study and identification of four colour groupings (blue, violet/purple, brown and black) plus unusual and phenomenal gemstones. Gemstones covered in this workshop include:

Sapphire, Benitoite, Spinel, Tanzanite, Apatite, Tourmaline, Topaz, Aquamarine, Quartz, Iolite, Zircon, Scapolite, Garnet (Grape, Rhodolite and Hessonite), Chrysoberyl, Taaffeite, Idocrase, Ekanite, Sinhalite, Kornerupine, Andalusite, Kyanite, Euclase, Smithsonite, Sugilite, Charoite, Lapis Lazuli, Sodalite, Turquoise, Odontolite, Serpentine, Chrysocolla, Petrified Wood, Hematite, Marcasite, Pyrite, Jadeite, Jet, Chalcedony, Jasper, Coral, Obsidian, Cubic Zirconia, Bakelite, Dyed Jasper, Lab-created Forsterite, Lab-created Spinel, Lab-created Quartz, Glass, Gilson Lapis Lazuli, Gilson Turquoise, Stained Howlite, Star Sapphire, Star Ruby, Star Almandite Garnet, Star Diopside, Cat's Eye Chrysoberyl, Cat's Eye Tourmaline, Cat's-Eye Quartz, Hawk's Eye Quartz, Tiger's-Eye Quartz, Bi-Colour Tanzanite, Bi-Colour Tourmaline, Ametrine Quartz, Watermelon Tourmaline, Usambara Tourmaline, Trapiche Emerald, Labradorite, Moonstone, Bloodstone, Tortoiseshell, Shell Cameo, Hardstone Cameo, Lava Cameo, Ammolite, Fire Agate, Black Opal, Crystal Opal, Semi-Crystal Opal, Larimar, Malachite, Lab-created Cat's Eye Chrysoberyl and Imitation Cameo.

**Prerequisites:** Gem Identification #1 or Equivalent

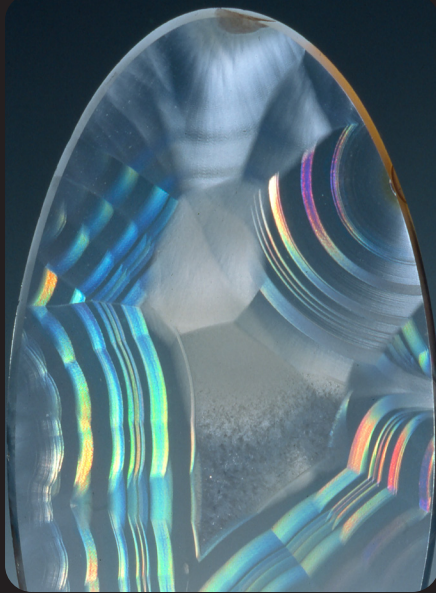


## Practical Workshops

### Coloured Gemstone Grading #1

This five-day (30 hours) workshop includes practical instruction on how to access the hue, tone and saturation of coloured gemstones using three popular colour grading systems (Gemological Institute of America, GemDialogue and World of Color) and how to grade pearls, jadeite and opals.

**Prerequisites:** None

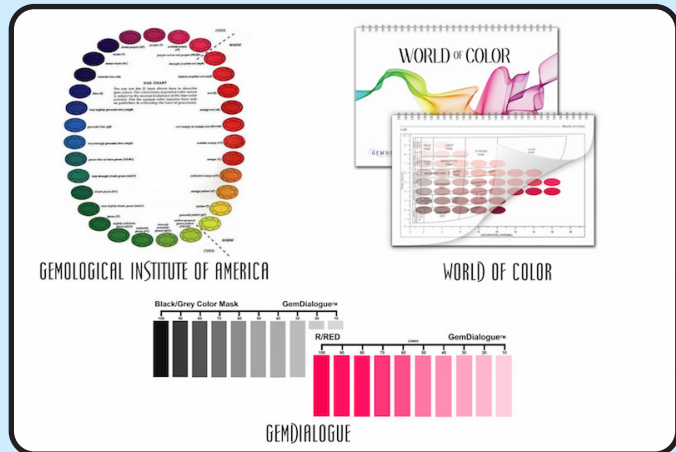


**Dates:** TBA

**Venue:** Mallorca Teaching Centre

**Course Cost** € 500

[Reserve Your Place Now](#)



### Coloured Gemstone Grading #2

This 100 hour online course consists of a comprehensive overview of the GemWizard Colour Grading System including colour theory (hue, tone and saturation), how they impact on the value of gemstones, practical exercises that are completed online, and a six month subscription to the Gemewizard program.

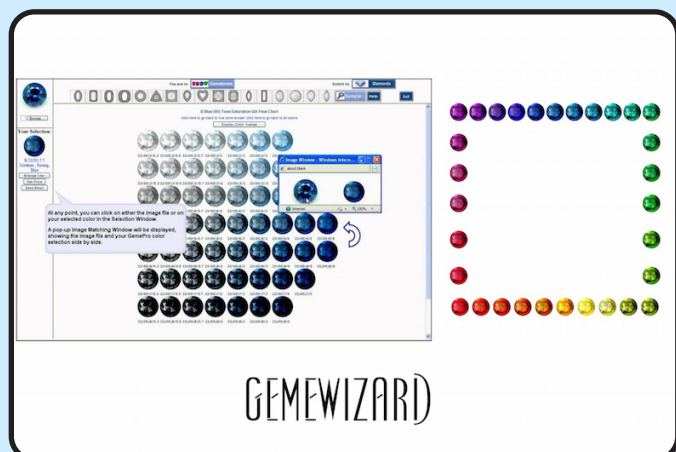
**Prerequisites:** None



**Online Course**

**Course Cost** € 1000

[Reserve Your Place Now](#)



## Practical Workshops



**Dates:** TBA

**Venue:** Mallorca Teaching Centre

**Course Cost** € 500

[Reserve Your Place Now](#)

### Lab-created & Treated Gems

This five day (30 hour) practical workshop focuses on lab-created gemstones (specifically rubies, sapphires and emeralds) and the many treatments and enhancements that are used to improve the appearance and/or value of gemstones, including:

- Heat treatment
- Surface and Sub-surface Diffusion
- Irradiation
- Fracture Filling
- HPHT Treatment
- Oiling
- Waxes & Dyes
- Sugar/Acid & Smoke Inhalation
- Quench-crackling with Dyes
- Coating & Foil Backs
- Laser Drilling

**Prerequisites:** Advanced Gemmology or Equivalent



**Dates:** TBA

**Venue:** Mallorca Teaching Centre

**Course Cost** € 1750

[Reserve Your Place Now](#)

### Diamond Grading & Lab-created Diamonds

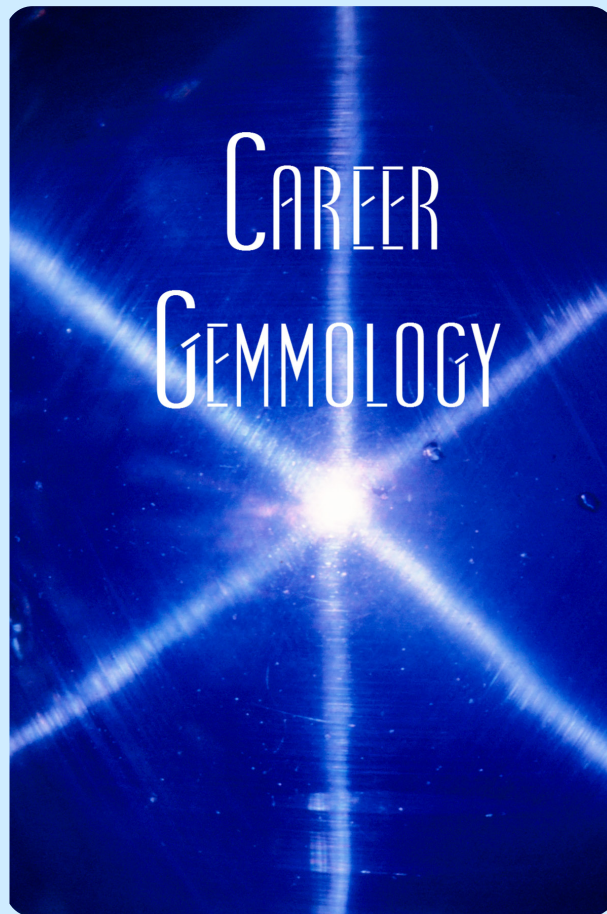
This eight day (48 hour) practical workshop focuses on the clarity and colour grading of diamonds, how to measure the proportions and how to distinguish natural from HPHT and CVD diamonds.

Topics covered include:

- Clarity Grading
- Colour Grading
- Calculating Table Percentage
- Calculating Crown Angle
- Calculating Pavilion Percentage
- Estimating Girdle Thickness
- Assessing Symmetry & Polish
- Lab-Created Diamonds
- Practical Review

**Prerequisites:** Diamonds or Equivalent





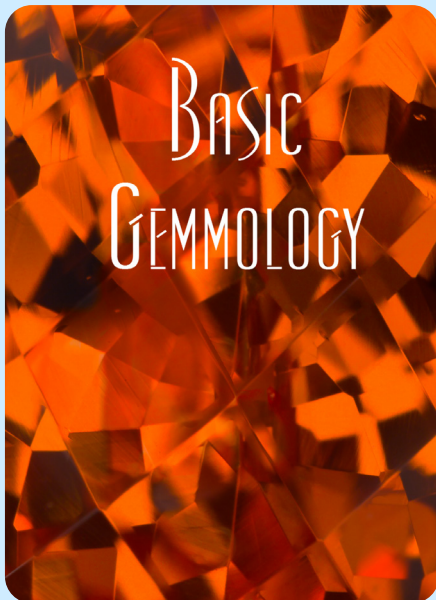
## Course Content

The chemical nature of gemstones, their physical and optical properties, basic crystallography, the absorption of light, the spectroscope, refraction, reflection and the refractometer, polarized light, the polariscope, pleochroism, the dichroscope, colour filters, specific gravity, luminescence, magnification, thermal conductivity, imitation, assembled and lab-created gemstones, the methods used to manufacture lab-created gemstones including Verneuil, Czochralski, flux melt, hydrothermal, skull crucible, zone melt, horizontally oriented crystallization, high pressure, high temperature (HPHT), chemical vapour deposition (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, high pressure, high temperature (HPHT), quench-crackling, surface modifications, coatings and foil backs, laser drilling, and irradiation, gem mining and cutting, diamond and coloured gemstone grading, gem identification by colour and transparency, advanced gem testing techniques and a comprehensive overview of the twenty-seven most common groups, species and varieties including diamonds, corundum (rubies and sapphires), beryl (emeralds, aquamarines and other precious beryls), chrysoberyl (alexandrite and other chrysoberyl), spinel, zircon, topaz, tourmaline, peridot, quartz, garnet, tanzanite, lapis lazuli, turquoise, opal, jadeite, kunzite and hiddenite, feldspars, iolite, andalusite, diopside, apatite, pearls, coral, jet, ivory and amber.

**Course Cost:** € 1400

**Prerequisites:** None

**Please Note:** This course includes all the information contained in the Basic Gemmology, Advanced Gemmology, Gem Identification, Diamonds and Coloured Gemstones courses.



### Course Content

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.

**Course Cost:** € 200

**Prerequisites:** None

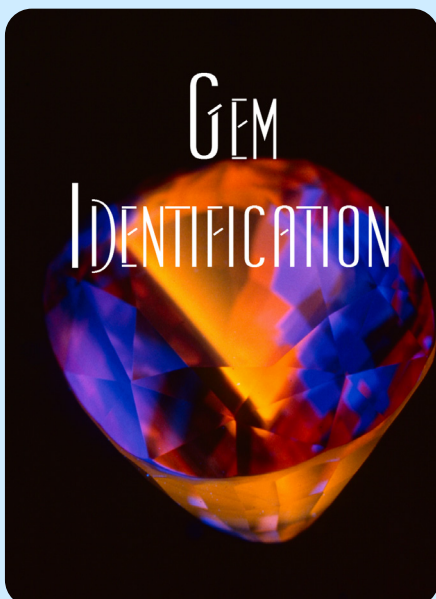


### Course Content

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 Cost:** € 400

**Prerequisites:** Basic Gemmology or Equivalent



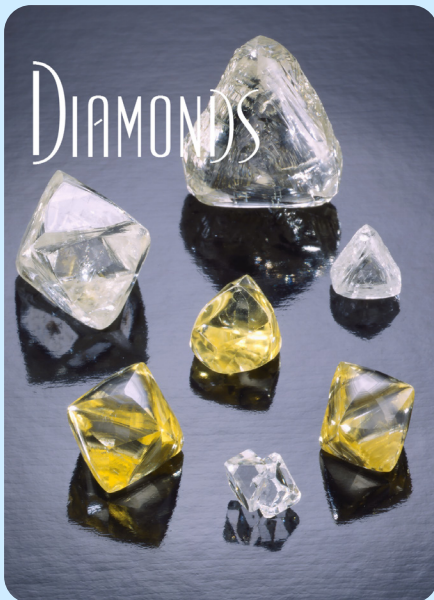
### Course Content

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.

**Course Cost:** € 225

**Prerequisites:** Basic & Advanced Gemmology or Equivalent



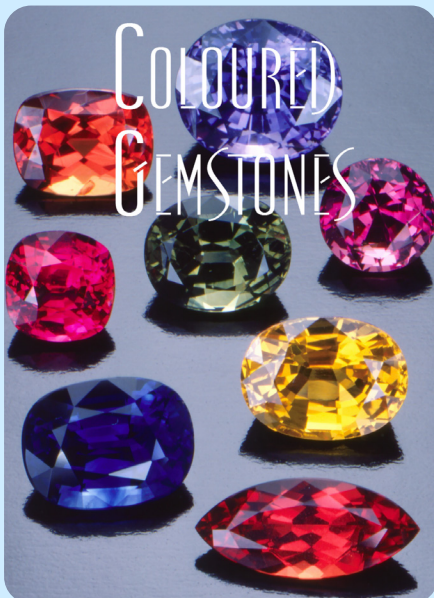


### Course Content

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. You will learn all about 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 Gemological Institute of America (GIA), the American Gem Society (AGS), Hoge Raad Diamant (HRD), International Gemological Institute (IGI), the European Gemological Laboratory (EGL), and Accredited Gem Appraisers (AGA) and explain how the estimated weight of a 'mounted' gemstone is calculated.

**Course Cost:** € 225

**Prerequisites:** None

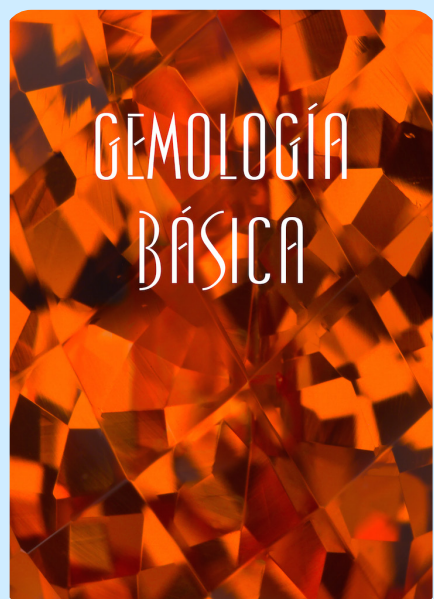


### Course Content

Physical properties, geology, localities, crystal system, chemical composition and causes of colour, varieties, absorption spectra, pleochroism, inclusions, fluorescence, gem identification, synthesis, treatments and enhancements, and care guidelines. Gemstones covered in this course include rubies and sapphires, emeralds, aquamarines and other precious beryls, alexandrite and other chrysoberyls, spinel, zircon, topaz, tourmaline, peridot, quartz, garnet, tanzanite, lapis lazuli, turquoise, kunzite, hiddenite, feldspars, iolite, andalusite, diopside, apatite, pearls, coral, jet, ivory, and amber. You will learn how to accurately describe colour, the various colour grading systems currently used by professionals, the clarity classification of gemstones based on their geological environments, how cut is assessed, and how to grade opals, jadeite and pearls.

**Course Cost:** € 500

**Prerequisites:** None

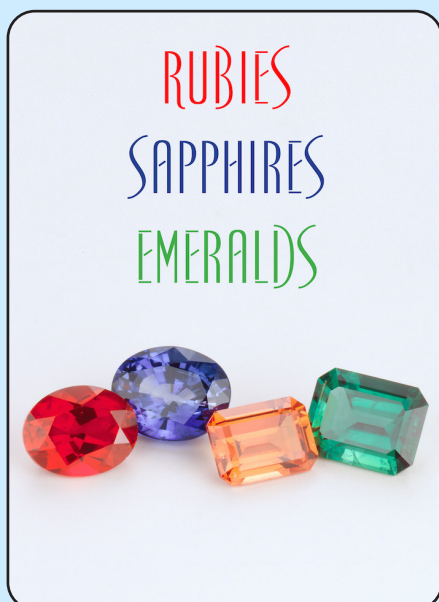


### Contenido del curso

La naturaleza química de las piedras preciosas, las propiedades físicas y ópticas, la cristalografía básica, la absorción de la luz, el espectroscopio, la refracción y la reflexión, el refractómetro, el carácter óptico y el signo, la dispersión, los medidores de reflectividad, la luz polarizada, el polariscopio, el pleocroísmo, el microscopio filtros de color, gravedad específica, luminiscencia, aumento y conductividad térmica.

**Costo del Curso:** € 200

**Requisitos Previos:** Ninguna



### Course Content

Topics covered include a complete overview of their physical and optical properties, principal sources, mining, how they can be identified from gemstones that can be deceptively similar in appearance and their lab-created counterparts, common treatments and enhancements, pricing guidelines, what constitutes the best quality and how to properly care for them.

**Course Cost:** € 95

**Prerequisites:** None



### Course Content

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.

**Course Cost:** € 75

**Prerequisites:** None



### Course Content

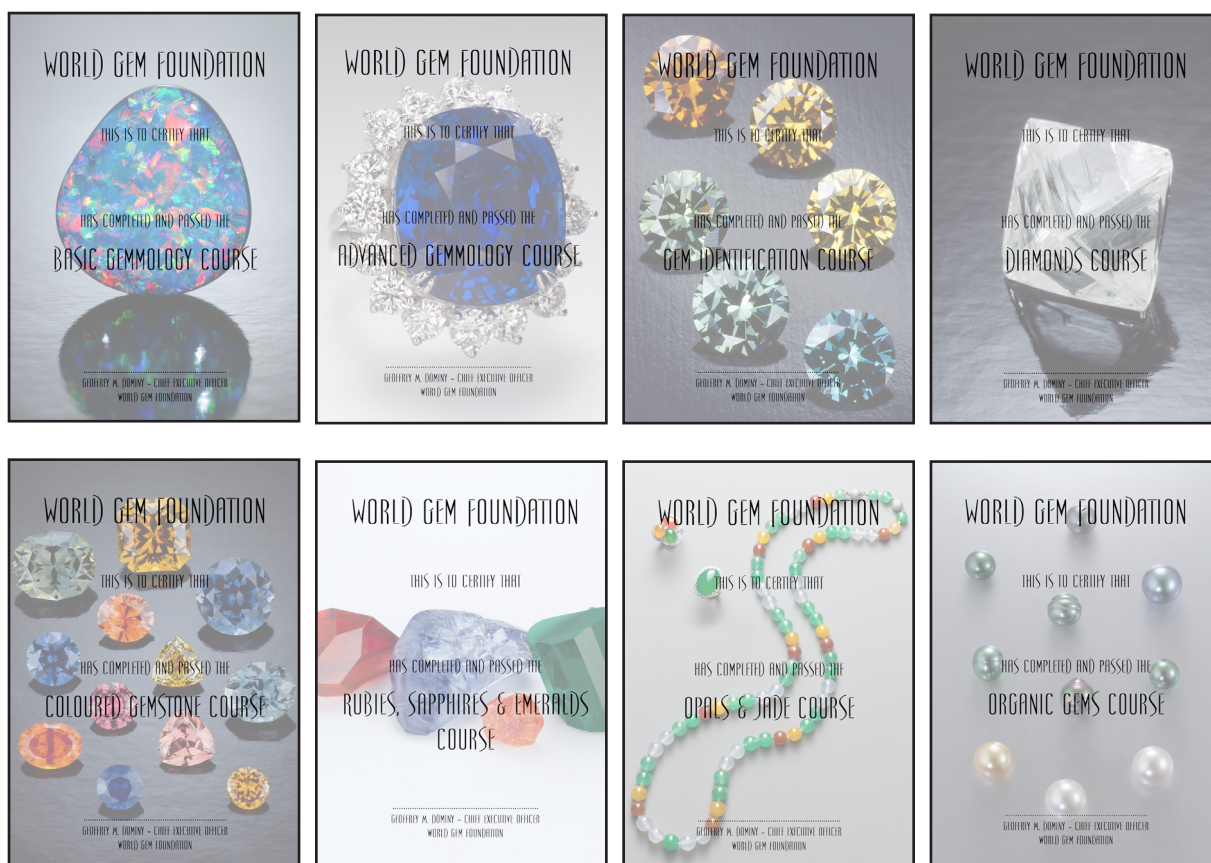
Topics covered include their physical and optical properties, geological formation, crystal systems, chemical composition, varieties and classification, cause of colour, common inclusions and internal characteristics, fluorescence, pearl grading criteria, methods of synthesis, gem identification, common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

**Course Cost:** € 50

**Prerequisites:** None



## Theory Courses - Letters of Completion



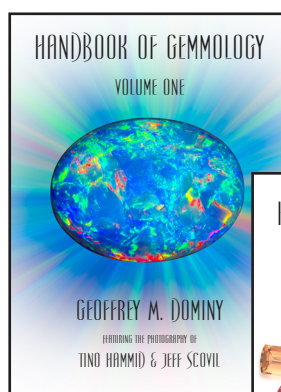
## Practical Workshop - Letters of Completion



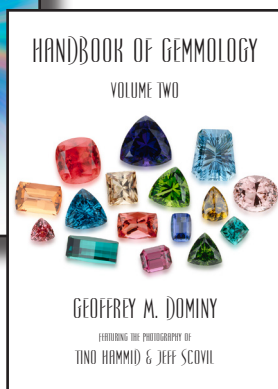


# MALLORCA GEMQUEST GEMMOLOGICAL CONFERENCE

SEPTEMBER 22 - 23, 2018



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# Our Speakers



Dr. Katrien de Corte (Belgium)



Dr. Laurent Massi (Thailand)



Alan Hodgkinson (Scotland)



Antoinette Matlins (U.S.A)



Menahem Sevdemish (Israel)



Guy Borenstein (Israel)



Geoff Dominy (Spain)

## Eight Informative Lectures & Two Exciting Workshops

# Conference Schedule

**September 22nd, 2018**

## Lectures

| Time          | Event   |
|---------------|---|
| 9.00 - 9.15   | Welcome & Introduction  |
| 9.15 - 10.15  | Synthetic Diamonds - Better, Cheaper and More with Dr. Katrien de Corte |
| 10.15 - 11.15 | Spinel - Stepping out of the Shadows with Dr. Laurent Massi             |
| 11.15 - 11.45 | Refreshments  |
| 11.45 - 12.45 | Pushing the Polariscope with Alan Hodgkinson                            |
| 12.45 - 13.45 | Tanzanite - Gemstone of a Generation with Menahem Sevdemish             |
| 13.45 - 15.15 | Lunch   |
| 15.15 - 16.15 | Testing Times with Antoinette Matlins                                   |
| 16.15 - 17.15 | Objective Diamond Clarity Grading with Geoff Dominy                     |
| 17.30 - 18.30 | 5th Anniversary Printed Edition Handbook of Gemmology - Book Signing    |
| 19.30 - 21.30 | Conference Dinner   |

**September 23rd, 2018**

## Lectures & Workshops

| Time          | Event  |
|---------------|--|
| 9.30 - 10.30  | Rags to Riches - the Genesis of a Gemstone with Dr. Laurent Massi                                |
| 10.30 - 12.00 | Workshop - GeneWizard: Putting the 'U' back into Color with Menahem Sevdemish and Guy Borenstein |
| 12.00 - 13.00 | Lunch  |
| 13.00 - 14.00 | Pearls of Wisdom - Making the Grade with Antoinette Matlins                                      |
| 14.00 - 15.30 | Workshop - The Hodgkinson Blues with Alan Hodgkinson   |

Please check our Mallorca GemQuest Conference website for more information at:

[www.mallorcagemquest.com](http://www.mallorcagemquest.com)



## Sóller, Mallorca

The authentic town of Sóller sits in the heart of the 'Valley of Oranges' or 'Valley of Gold' as it is sometimes known, and offers much to visitors and residents.

Located in the northwest of Mallorca, Sóller became wealthy due to the valley's abundant citrus groves. In the 19th century, when the area was isolated from the rest of Mallorca by mountains, the oranges were shipped to France from the nearby Puerto de Sóller. Many locals went to work in France and returned – their fortunes duly made – to build some of the many handsome Modernista properties that grace Sóller today.

## Gran Sóller Hotel

The Gran Sóller Hotel is located in one of the most characteristic buildings in Sóller, a depiction of the architecture of the town in the XIX Century. Built by the architect Joaquín Pavía Birmingham, creator of the Diputación de Mallorca (headquarters of the Council of Majorca) and the extension works of the Cathedral of Palma de Majorca, this 5 star hotel provides an oasis of culture and relaxation; classic luxury with a hint of glamour with modern services for the comfort and enjoyment of its guests.







# Conference Packages

We are delighted to offer you three conference options:

## Full Conference Package

This conference package includes:

### September 22nd, 2018

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- Three Course Lunch
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- Two Lectures & Two Workshops
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**Plus:** Complimentary Signed Copy of the 5th Anniversary Handbook of Gemmology (Printed Edition) (Volumes One & Two)

**Price: € 359** (After March 31st, 2018: € 399)

## Conference A Package

This conference package includes:

### September 22nd, 2018

- Six Lectures
- Coffee/Tea & Snacks
- Three Course Lunch

**Price: € 199** (After March 31st, 2018: € 219)

## Conference B Package

This conference package includes:

### September 22nd, 2018

- Six Lectures
- Coffee/Tea & Snacks
- Three Course Lunch
- Four Course Conference Dinner

**Price: € 249** (After March 31st, 2018: € 269)

**Please Note:** Due to the conference venue, space is limited to 75 Delegates

# Presentations

## **Synthetic Diamonds - Better, Cheaper and More with Dr. Katrien de Corte**

Synthetic diamonds of top quality (D colour, loupe clean) are on the market and vary in size from 0.005ct to 3.00ct and even larger. The identification of these stones in a laboratory is based mainly on optical defects visible in photoluminescence spectroscopy and on the analyses of growth patterns. This lecture provides an overview of the growth methods, characteristics of synthetic diamonds and the screening instruments used to detect them.

## **Spinel - Stepping out of the Shadows with Dr. Laurent Massi**

For centuries, spinel has lived in the shadows of the nobler ruby and blue sapphire, often misunderstood, certainly undervalued and most definitely under appreciated. Finally, spinel is getting noticed, not only by gem collectors and connoisseurs but by jewellers who are struggling to find alternatives to fine quality rubies and blue sapphires and the stratospheric prices they are commanding. If life is all about timing, there has never been a better time for spinel to shine. Dr. Laurent Massi is passionate about spinel and he hopes by the end of his talk, you will be too!

## **Pushing the Polariscope with Alan Hodgkinson**

In an age of modern technology, renowned gemmologist Alan Hodgkinson brings us back to earth, looking at an instrument that will not only tell us if a gemstone is singly or doubly refractive but so much more! From faceted gemstones to rough, there is more to the polariscope than meets the eye.

## **Tanzanite - Gemstone of a Generation with Menahem Sevdemish**

Discovered in the 1960s and named after Tanzania by Tiffany & Co. the famous jewellery firm declared it to be the most beautiful stone discovered in the last 2,000 years. However with a very limited supply it is entirely likely that this generation will be the last one able to buy stones from the primary market before the supply is exhausted. What does the future hold for this rare and beautiful gemstone?

## **Testing Times with Antoinette Matlins**

When it comes to gem identification it's not who you know but what you know and Antoinette knows an awful lot. In 'Testing Times', Antoinette breathes new life into basic gem instruments and shows you how to get maximum mileage out of them without breaking the bank!

## **Objective Diamond Clarity Grading with Geoff Dominy**

Two of the cornerstones of diamond grading are accuracy and consistency. Pioneered by Michael D. Cowing, 'Objective Diamond Clarity Grading' alters the 'playing field' considerably by introducing a system that removes the subjectivity of diamond clarity grading. Now it is even possible for 'novice' diamond clarity graders to reach a level of consistency that up until now has only been possible after years of experience and the examination of thousands and thousands of diamonds.

## **Rags to Riches - The Genesis of a Gemstone with Dr. Laurent Massi**

Forged through heat and pressure, adorned, revered and treasured by Man, gemstones have held an esteemed position since the beginning of time. In Rags to Riches – The Genesis of a Gemstone, Dr. Laurent Massi looks at the metamorphosis of a gemstone from rough mineral to dazzling rock.

## **Workshop - GemeWizard: Putting the 'U' back into Color with Menahem Sevdemish & Guy Borenstein**

One of the challenges facing our industry is the effective communication of colour and how we assess the quality and value of coloured gemstones and fancy coloured diamonds. Test drive GemeWizard, find out how it works, why it works and why you should not leave home without it. Please Note: Participants must have a laptop or iPad to access the digital aspects of this presentation.

## **Pearls of Wisdom - Making the Grade with Antoinette Matlins**

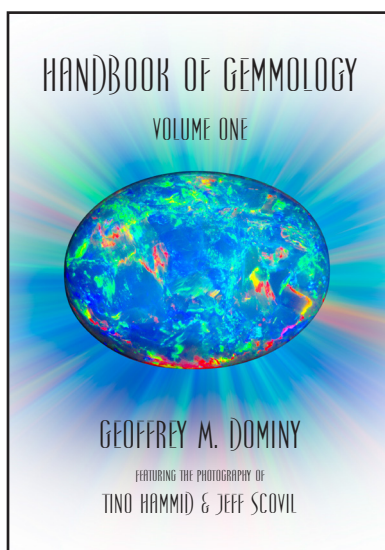
Known as the 'Queen of Gems', pearls have aroused passion, desire and fascination since before recorded history. Symbolizing perfection, modesty and purity, their unparalleled beauty is one of nature's great treasures. In 'Pearls of Wisdom – Making the Grade', Antoinette discusses their origin and the seven factors that determine their value.

## **Workshop - The Hodgkinson Blues with Alan Hodgkinson**

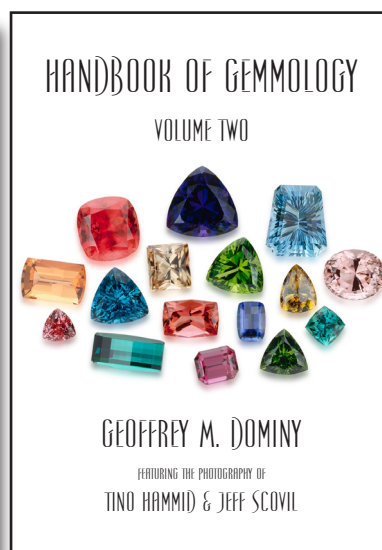
Always passionate, always engaging and always full of enthusiasm, join Alan as he explores all things blue and beautiful. This workshop covers the A to Z of blue gemstones with a few surprises along the way.



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**VOLUME ONE** covers the science of gemmology, including the chemical nature of gemstones, their physical and optical properties, basic crystallography, the absorption of light, the spectroscope, polarized light, the polariscope, pleochroism, the dichroscope, colour filters, specific gravity, luminescence, magnification, thermal conductivity, imitation, assembled and lab-created gemstones, gemstone treatments and enhancements, mining, diamond and coloured gemstone cutting and coloured gemstone and diamond grading.

**VOLUME TWO** covers the identification of gemstones based on their colour and transparency, 'Reflections', consisting of 134 pages of photographs that capture the true beauty and talent of award winning gem cutter John Dyer, and GEMFACTS™ focusing on the seventeen most common gem species and varieties.

Featuring the photography of internationally renowned gemstone/mineral photographers Tino Hammid & Jeff Scovil, Conny Forsberg, John Dyer, David Dyer, Lydia Dyer, Priscilla Dyer, Ozzie Campos, Dmitry Stolyarevich, Arjuna Irsutti and Sergey Pryanechnikov.

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*'A must buy for any gemmologist, student or jeweller'*

## Smart Thinking

Smart  
is good.

Kirk Feral is a man who is passionate about gemmology. He particularly likes to make it more accessible by getting back to basics. In a world of high-tech instrumentation, Captain Kirk brings us down to earth.

## Let There Be Light - Light Sources for Colored Gemstones

The beauty of any gemstone is inspired not only by its color, clarity and cut, but also by the lighting under which the gemstone is viewed. Every jeweler and gem dealer knows that lighting is everything when it comes to displaying gemstones. Different light sources bring out different optical qualities. A gem that appears dull and unappealing under one light can dazzle us with 'fire' and brilliance under different lighting conditions.



Yellow Zircon Gem in Cloudy Daylight and Bright Artificial Light

As the source of the light varies, the color of the gem can also vary significantly. The gem color that we see at the time of purchase, either at a gem show or online, can seem different than the color we find when we unwrap the gem at home and inspect it under different lighting conditions. Gem color can also be modified by indirect light reflecting off colorful clothing and other nearby surfaces and objects, including other colored stones.



Green Fluorite in Daylight and LED Light

To appreciate interesting optical phenomena such as asterism, chatoyancy, and color change in gems, specific lighting conditions are required. Such phenomena can also be important for gem identification.

Many gems also fluoresce in bright colors when viewed under ultraviolet light. This glow of color can be quite extraordinary. Gem and jewelry sellers who are unfamiliar with gem fluorescence miss many opportunities to point out the remarkable fluorescent qualities of their stones to prospective buyers. When identifying gems, we can also use fluorescence to distinguish gems that typically fluoresce from those that don't.



Spodumene in Daylight and Long Wave Ultraviolet Light

The right lighting also helps us distinguish gems with high brilliance from gems with lower brilliance, enabling us to estimate the relative refractive index of a gem without the use of a refractometer. Choosing the right lighting is also important for detecting unequal color distribution, pleochroism, inclusions and a host of other optical and physical features which can affect value and assist with gem identification.



A Variety of Portable Light Sources



So how do we select the best light for our needs? We can start by becoming familiar with the most common light sources and how they affect the appearance of gemstones. First, let's review some basic terminology.

**Brilliance:** the degree of internal reflection within a gem. In a well-cut gem, overhead light reflects off the pavilion facets and out through the crown. Brilliance is directly proportional to refractive index (R.I.). The higher the R.I., the higher the brilliance. Brilliance can be significantly reduced by dark gem color and poor clarity.

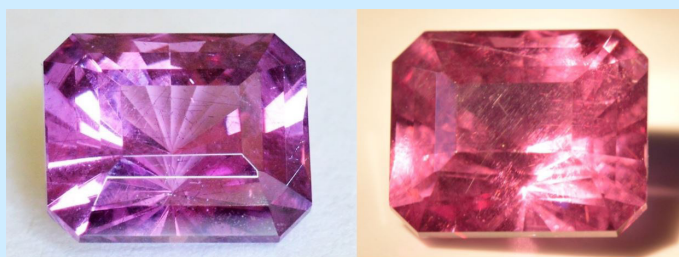
**Luster:** the degree of reflection off a gem's external surfaces. The most desirable luster in transparent gems is adamantine, which is diamond-like, indicating high reflectivity and high refractive index. Most colored gemstones have a vitreous luster, which is glassy, indicating lower reflectivity and lower refractive index than adamantine gems.

**Dispersion:** the degree to which light is broken up into spectral (rainbow) colors at the facet edges of a gem. Dispersion is often referred to as 'fire'. Gems with higher refractive indices usually have higher dispersion (but this is not always true).

**Reflected Light:** light that bounces off the surfaces of a gem. This includes light reflecting off external surfaces, and if the gem is transparent, off internal surfaces. Light that refracts or bends through the body of a transparent gem reflects off the back facets or interior surfaces. Reflected light accentuates brilliance and dispersion in a gem.

**Transmitted Light:** light that travels through a gem. When we backlight a transparent or translucent gem or mineral, we send transmitted light through the body of the stone without surface reflection. Transmitted light highlights body color and inclusions in a stone.

**Color Change:** the color of a gem in reflected light changes from one hue to another as the light changes. As examples, color might change from purple to pink, or from blue to red, or from green to red. A partial change between one hue and an adjacent hue, such as from pinkish purple to purplish pink, is often referred to as color shift.



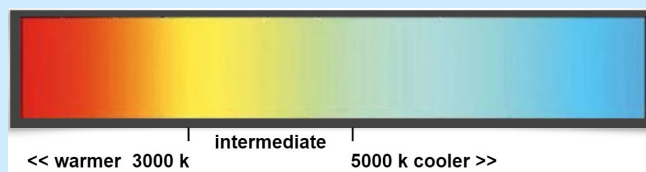
Purple Color Change Garnet in Daylight and Incandescent Light

**Fluorescence:** the emission or glow of light and color in the visible regions of the light spectrum after light has been absorbed by a gem at a shorter wavelength. Gem fluorescence occurs most often when ultraviolet (UV) light is applied.



Pink Zircon in Daylight and Long Wave UV Light

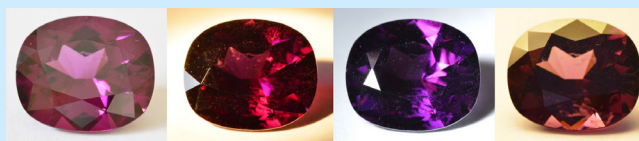
**Kelvin (k):** the color temperature of light. Low Kelvin light sources (less than 3000 k) emit 'warm' orangey to reddish light, intermediate Kelvin lights emit yellow and greenish yellow light, and high Kelvin lights (more than 5000 k) emit 'cool' bluish light.



Kelvin Color Temperature Scale

## Light Sources

Four key sources of visible light are used today for viewing gemstones: daylight, incandescent, LED and fluorescent light. We can add invisible ultraviolet (UV) light as an additional fifth light source. Each of these types of light affects gem color and optical features in unique ways.



Almandine Garnet in Daylight, Incandescent, LED and Fluorescent Light

As an example, a purplish red almandine garnet can vary in color and tone when viewed under each of the four different visible light sources. It's interesting to note that although some almandines show a distinct change in color from red in incandescent light to purple in LED light, or from purple in daylight to pink in incandescent light, almandine is not classified as a color change garnet.

It's an antiquated practice that gemologists still judge color change in gemstones solely by the yardstick of incandescent light. Of our 4 light sources, incandescent lights do emit the warmest light, but incandescent lights are rapidly disappearing from general use. Prior to the 20th century, daylight and 'warm' reddish flame light from candles or oil and gas lamps were the only two light sources available to gemologists, and these were the standard light sources for evaluating gem color and color change from daylight to a warmer color in flame light.

After the electric light bulb came into widespread use, gemologists switched from flame light to warm incandescent light as the standard. In the 1940's, a new light source in the form of fluorescent tube lights became popular for illuminating large indoor spaces. In the 21st century, energy-saving LED lights have already largely replaced incandescent lights for most uses, and LED tube lights are also replacing fluorescent tube lights.

Gem color can be changed or significantly modified not only by incandescent light, but also by LED light and fluorescent light. For example, a glass imitation of an alexandrite gem can change from purple in daylight to pink in incandescent light, to violet in LED light, and to blue in fluorescent light. Among all colored stones, color change is encountered more frequently when viewed under the extremes of cool LED light and warm incandescent light as opposed to the standard daylight and incandescent light.



Glass Imitation Alexandrite in Daylight, Incandescent, LED and Fluorescent Light

**Daylight:** Sunlight or daylight, particularly at noon when the sun is directly overhead, is considered the best light for viewing gemstones, and also for photographing them. Although slightly bluish at a Kelvin temperature of 5000 K, noonday sun is regarded as white light that is neutral or balanced, representing all colors of the light spectrum equally. Daylight at noon doesn't emphasize one color over another in gemstones.

Sunlight is true full-spectrum light, containing a continuous distribution of wavelengths from below ultraviolet, into visible light, and then to infrared and beyond. Artificial light sources often emphasize one section of the visible light spectrum over another, favoring either blue, yellow or red color. Sunlight can be excellent for viewing gem brilliance, luster and dispersion, and daylight is the only light source I use when photographing the natural appearance of gems.

But daylight has its limitations. Overhead daylight is only available a few hours a day, and not at all on rainy or cloudy days, or at night. Filtered or shaded sunlight can result in light extinction that reduces brilliance and mutes gem color, but

direct sunlight can be so glaring that it 'blinds' the eye and 'washes out' gem color. Artificial light sources can provide illumination that is more consistent, manageable and flexible.

**Incandescent Light:** Bright overhead incandescent light sources are good for highlighting gem color, brilliance, luster and dispersion. Incandescent light is low Kelvin light that adds or enhances warm orange and red colors in gemstones rather than cool colors such as blue and violet. Red gems like rubies, red spinels and red garnets look best under incandescent light, as the red color is somewhat exaggerated or enhanced.

In order to examine conventional or standard color change in gems, the warm low Kelvin light of an incandescent light source such as a flashlight, fiber optic light or incandescent lamp is required. Conventional color change nearly always moves toward a warmer color. Incandescent light is also best for detecting the red glow of Chelsea filter reactions.



Blue Color Change Garnet in Daylight and Incandescent Light

Incandescent light sources include the old screw-in type tungsten bulbs and also high-intensity halogen, xenon and krypton bulbs, all of which radiate substantial heat. With the advent of more energy-efficient LED lights, incandescent light sources are hard to come by today. Most flashlights are now manufactured using LED technology. Fortunately, portable incandescent lights such as some of the Maglite brand flashlights are still commercially available for detecting color change reactions and red Chelsea filter reactions in gems.



Blue Synthetic Spinel in Daylight and under a Chelsea Filter in Incandescent Light

Fiber optic light is another versatile light source for gemological use. Fiber optics focus bright light through a long flexible plastic fiber, and the light intensity can be modulated with a rheostat. Unlike a flashlight, fiber optic light can be positioned in any direction while leaving the hands free. This maneuverability is useful for backlighting gems mounted in





Incandescent Fiber Optic Light

jewelry, as well as for sidelighting gems when viewing internal features with a loupe or microscope.

Older model fiber optic lights are incandescent, but most manufactured today use warm LED light. Fiber optic lights emit light that is brighter and more concentrated than light from household flashlights and lamps. Fiber optic lights are an excellent light source for examining brilliance, dispersion, color and other optical properties.

An incandescent fiber optic light can also be used as the light source for viewing gem absorption spectra with a spectroscope, and for detecting color change and Chelsea filter reactions. The bright light of fiber optics is also handy for backlighting over-dark gems in order to reveal color and internal features that may not be evident under overhead reflected light.

**LED Light:** Light emitting diodes (LED's) can achieve a level of brightness equivalent to incandescent lights while radiating much less heat. Because of their energy-saving qualities, LED light sources are rapidly replacing incandescent lighting for most purposes, including gemological use. LED lights are manufactured in different color temperatures from cool to warm.

Many types of portable LED light sources of varying brightness (lumens) are available, from moderately bright household flashlights to intensely bright tactical flashlights that project light over long distances. Cool high Kelvin LED light as we find in most household LED flashlights emits bluer light than either incandescent or fluorescent light, and adds or enhances blue color in gemstones.



Household LED Flashlight with Multiple Diodes



Blue Color Change Garnet in Daylight and Cool LED Light

Blue gems look best under cool LED light because the blue color is exaggerated. As examples, a blue color change garnet from Madagascar with moderate grayish blue color in daylight appears 'electric' blue under cool LED light. The blue color of a sapphire can be temporarily enhanced by cool LED light as effectively as a permanent gem treatment such as heat treatment.

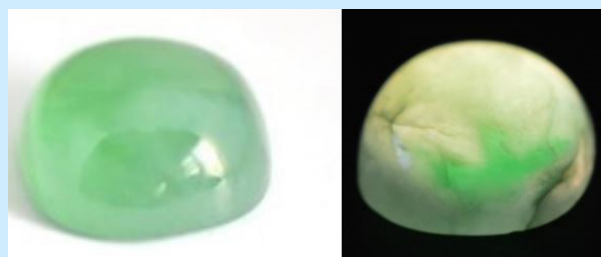
LED flashlights, LED fiber optics and overhead LED lamps with multiple diodes emit bright light, and these are some of the best light sources for viewing gemstones. Bright overhead reflected LED light is excellent for viewing gem color, brilliance, luster, and dispersion, as well as for examining surface features such as abrasion, pitting, chipping and facet wear. But bright overhead light, whether LED or incandescent, can come at the cost of a lot of glare.

A battery-powered puck light is a disk-shaped light source made for overhead use within closets and kitchen cabinets. LED puck lights produce bright light that can be used as overhead lighting for gems and minerals within a glass display cabinet. But a puck light manufactured with a single LED diode set within a central reflector also makes a versatile light source that has many other uses in gemology.



LED Puck Light

When resting on a desktop and facing upward, a puck light is an excellent tool for backlighting gems and minerals with transmitted light. Placing any bright light source (sunlight, incandescent or LED) behind a gem is an effective method for examining unequal color distribution, dyes and inclusions in translucent and transparent gems and minerals.



Jadeite Cabochon in Reflected Daylight and Transmitted LED Light

Transmitted light from a puck light or other light source can also elucidate body color that may not be obvious in reflected light. For instance, almandine garnets and red spessartine garnets can both appear red in reflected light, but transmitted light distinguishes these two species by revealing the secondary purple hue of almandine and the secondary orange hue of red spessartine.



Almandine Garnet and Red Spessartine Garnet in Transmitted Daylight

Backlighting with an LED puck light also reveals true body color in overly dark gems and minerals, as well as internal features such as inclusions. Puck lights are also a convenient light source that can provide transmitted light for dichroscopes and home-made immersion cells and polariscopes.



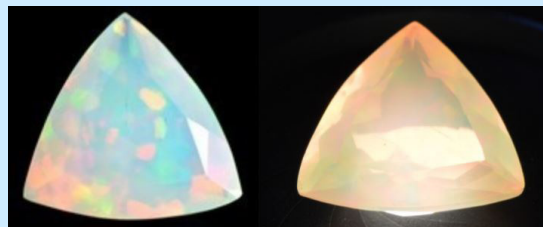
Overly Dark Pyrope Garnet in Reflected Daylight and Transmitted LED Light

For viewing gems under a spectroscope, an LED puck light is also an excellent light source. Some gemologists advise that only incandescent light sources such as bright flashlights or fiber optic lights should be used with a spectroscope. But my own comparisons show that gem absorption spectra generated with a warm 3000 K LED puck light are virtually indistinguishable from absorption spectra obtained with incandescent light sources.



Puck Light with Iris Diaphragm

A major advantage of using an LED puck light with the spectroscope is that there's no chance of overheating a gemstone when using the transmitted light method. An iris diaphragm can also be placed on top of a puck light to shield against extraneous bright light so that all light is transmitted through the body of the gem.



Opal in Reflected Light and Transmitted Light

Backlighting with a puck light, flashlight or fiber optic light is not suitable for viewing all gemstone features. Transmitted light obscures almost all gem brilliance, luster and dispersion in faceted transparent gems. Backlighting also obscures phenomena such as asterism, chatoyancy, and play of color.

LED light sources such as puck lights and flashlights are also poor light sources for detecting standard color change in gems. Color change toward a warmer color can be detected to some degree using warm LED light, but standard color change from daylight is always more definitive under an incandescent light source.

LED light is also generally insufficient for use with a Chelsea filter. The pink or red glow of Chelsea filter reactions may be visible under LED light if the reaction is strong, but weak Chelsea filter reactions are not visible under LED light, even when warm low Kelvin LED light is used.

**Fluorescent Light:** Fluorescent lights provide soft diffused lighting that generates less heat than incandescent light, but fluorescent lights are still not as energy efficient as LED lights. Because they reduce glare, fluorescent lights are the preferred light source for bench jewelers who work at close range with highly reflective materials such as polished metals and faceted gems.



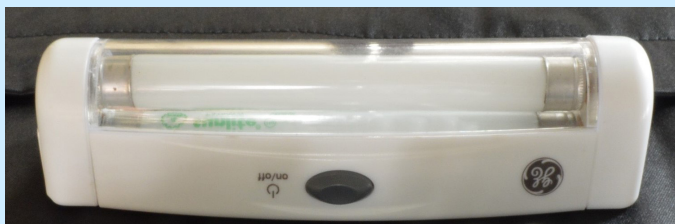
'Full-Spectrum' Fluorescent Lamp



When we want to closely examine natural gem color under artificial light, bright 'full-spectrum' fluorescent lamps are a good choice, as these provide a more balanced light that simulates natural sunlight. Full-spectrum fluorescent light renders the truest gem color possible without the distraction of surface reflections. This is light is the light source that professionals use for grading color in colored stones. But 'full-spectrum' is a marketing term that is used loosely. Even the best artificial lights that are labeled 'full-spectrum', whether fluorescent, incandescent or LED, do not duplicate the broad spectrum of natural sunlight.

Most fluorescent lights are not manufactured as 'full-spectrum'. Typical straight-tube fluorescent lights and coiled-tube compact fluorescent lights manufactured today are available in color temperatures ranging from cool to warm. The most common fluorescent lights, such as those used in offices or classrooms, emit light at intermediate Kelvin temperatures that add or enhance yellow color or greenish yellow color in gemstones. Portable battery-powered 6" fluorescent single tube lights that can be used to highlight yellow gem color are commercially available, but the brightness of these lights is low.

Although some fluorescent lights are good for viewing gem color, fluorescent lighting is overall the worst light source



Portable Battery-Powered Fluorescent Lamp

for viewing or displaying gemstones, as gem brilliance and dispersion are lost. A jeweler exhibiting at a sales event held in a room illuminated only by fluorescent ceiling lights is in for a slow day. Spot lighting with LED or incandescent bulbs provides brighter and more focused illumination than the diffused lighting of fluorescent bulbs.

Fluorescent lights are also useless for detecting certain gem phenomena such as stars and cat's eyes. And fluorescent lights are inadequate for viewing conventional color change in gems, although some level of color change can be detected under warm low kelvin fluorescent light.



Glass Imitation Star Ruby in Incandescent Light and Fluorescent Light

**Ultraviolet Light:** UV light exists within the invisible range of the light spectrum (200nm-400nm), below the blue/violet region of visible light. Most of the fluorescence that we encounter in transparent gemstones occurs under long wave UV light (315-400nm), which does not require eye protection. In contrast, most fluorescence seen in opaque rocks and minerals occurs under shortwave UV light (200-315nm), which is high-energy UV light that can cause retinal damage without eye protection.

Battery-powered LED UV flashlights that produce safe long wave UV illumination are the most convenient light sources for viewing fluorescence in gemstones. However, the strength of gem fluorescence is often a function of the quality of the UV light source.

Most UV flashlights are not designed for use with gemstones, and they emit a substantial amount of superfluous light that is above the desired 365-375nm wavelength range. Gems that show no fluorescence under a low-quality UV flashlight may show strong fluorescence under a good-quality UV flashlight. One of the best-quality long wave UV flashlights available for viewing gem fluorescence is the Nichia brand flashlight, which has a target UV light wavelength of 365nm.



Nichia Brand UV Flashlight

Gem fluorescence occurs as a soft glow of light that is transmitted from the surface of opaque gems and from within the body of transparent gems without the aid of backlighting. Brilliance and dispersion are obscured when a gem fluoresces. A black background is needed for viewing gem fluorescence, but moderate to strong fluorescence is clearly visible in a lighted room without the need for darkness or dim lighting.

Gems can fluoresce the same color as the gem's body color, or a different color. In my own work with gem fluorescence, I have so far encountered approximately 115 gemstone varieties that fluoresce to some degree (weakly, moderately or strongly) under long wave UV light.

Fluorescence is a phenomenon that is not only visually attractive, but also tremendously useful for gem identification. As an example, refractometers and other standard gem identification tools cannot help us distinguish reddish orange 'imperial' topaz, one of the most valuable color varieties of topaz, from the more common 'sherry' topaz, whose reddish brown color can appear similar to the untrained eye.

But a UV flashlight makes the job easy. Only genuine imperial topaz fluoresces pink or red under long wave UV light due to the presence of chromium. A lack of fluorescence indicates with 100% certainty that the gem is not imperial topaz.



'Imperial' Topaz in Daylight and Long Wave UV Light

### So What Light Source Should I Use?

Sunlight is generally the ideal light source for viewing gemstones, but more often we rely on artificial light. Choosing the right light source for every occasion can be tricky. To display gemstones of many different colors all under a single light source, bright LED lamp or track light bulbs with a 'daylight equivalent' Kelvin temperature of 5000 K are an excellent choice that closely approximates natural gem color and brilliance as they would appear in daylight at noon.

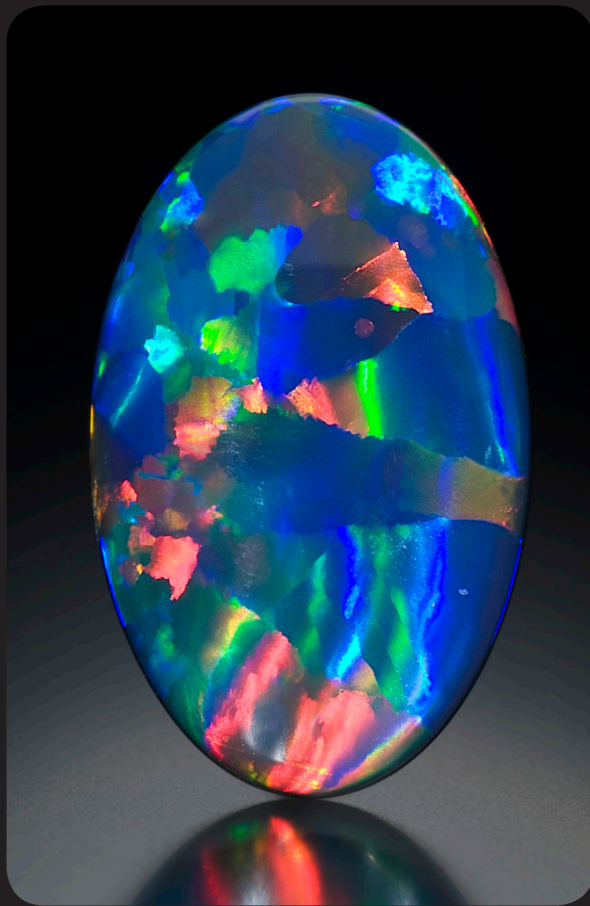
For careful inspection and identification of a gem, it's useful to have a variety of portable light sources on hand. The light source and light temperature we choose greatly affects our perception of gem color, brilliance, dispersion, phenomena and other optical and physical features.



'Daylight Equivalent' LED Bulbs

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## IDEX ONLINE DIAMOND TRADING NETWORK

# Meet the Team



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**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 fourth 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 has just announced that a 5th Anniversary Printed Edition (Two Volumes) will be available on May 15th, 2018

Geoff currently lives in Palma, Mallorca, Spain and in addition to lecturing and promoting his book, is the founder of the World Gem Foundation and Mi Isla También and also 1/2 of AVA MUSICA.



**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 lead 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.



**Deborah Mazza**  
British Gem Academy

**Deborah Mazza** is half Italian and half British, and started her journey through the world of gemstones in Germany in 1984, where she studied at the Deutsche Gemmologische Gesellschaft attaining her gemmology and diamond diploma; she subsequently gained her FGA in 1986.

Deborah then went to work for the trade in Idar-Oberstein, buying and selling wholesale gems and diamonds, working as a gemmologist and teaching gemmology at the DGemG, this lead on to carrying out jewellery valuations for an insurance company in Germany. She later got a Bachelor in Business in Germany, and returned to the UK in 2010, where she became a tutor for the Gem-A's online courses. Deborah, keen to add to her knowledge, started to study again and passed the NAJ/IRV's CAT jewellery valuation diploma, and is now studying History of Art at Goldsmiths University. Deborah has her own valuation business and works part-time for an online auction house. She contributed several written pieces for Yavorsky's new book, Terra Connoisseur: Gemstones. She is currently the Director of Education for the British Gem Academy.





**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 (Gemological 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**  
Gem Academy of Canada

**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.



**Gérard Raphaël Quintin**  
South American Gem Academy

**Gérard Raphaël Quintin** was born in Paris France where he studied Art and Design and graduated from Ecole Boulle. His taste for the diamond world may have been inherited from an uncle who worked in the diamond business.

In 1978 he took the gemology colored stone and diamond course with GIA

while he was mining diamonds in the Sewa River in Sierra Leone and where he started the first diamond cutting center in West Africa.

In Abidjan Côte d'Ivoire in 1992 Gérard founded the diamond cutting formation center with a gemmological laboratory 'Hardy's', followed by the installation of the colored stone and diamond cutting facilities in the jewelry school EIBMA.

Continuing his tour in the world of gemstones, Gérard went to Madagascar as an expert for a French Government project to develop the organization and skill of the gems sector.

Professor of Gemology in the Jean Guehenno Jewelry School in Saint-Amand-Montrond France, he then moved to Bolivia to fund and manage the 'Instituto Gemologico Boliviano' where students learn gemology and the art of gem cutting.

Since 1997 Gérard has been a member of the Organisation Internationale des Experts based in Geneva, Switzerland.



**Cristina Rzepka de Lombas**  
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 Central American and Caribbean Gem Academies.



**Kyalo Kiilu**  
Kenyan Gem Academy

**Kyalo Kiilu** is a fellow of the Gemmological Association of Great Britain (Gem-A) and an Alumnus of Birmingham City University where he obtained his BSc with honours in Gemmology and Jewellery Studies in 2017.

His passion for gemstones can be traced back forty years to his late grandmother's village in rural Kenya and the prospecting trench dug by the first British gemstone explorers in the early part of the 20th Century.

While pursuing his pharmaceutical studies, his interest in gemstones never diminished. Unfortunately in 2003 there were no colleges in Kenya offering gemmological courses so he decided to relocate to England and enrolled in Gem-A's Diamond Diploma program in 2004; the start of his gemmological journey.

Kyalo is a licenced gemstone prospector in Kenya and in 2015 made a discovery of a very unique sapphire, resembling another Kenyan sapphire marketed as 'Goldsheen Sapphire' that he will hopefully share with the gemmological community very soon.

He comes to the World Gem Foundation and specifically the Kenyan Gem Academy with a strong desire and ambition to share his knowledge of gemstones with his fellow Kenyans, particularly those involved in the production of gemstones, gemstone lovers and aspiring gemmologists, to provide support and encouragement that was so lacking in the industry when he was growing up in Kenya.



**Salomon Lutumba**  
Gem Academy of DR Congo

**Salomon Lutumba** is an alumnus of Birmingham City University where he graduated with a Bachelor in Science with honours in Gemmology and Jewellery studies in 2016. He also holds a Diamond Diploma and Gemmology certificate from Gem-A. He is originally from the Democratic Republic of Congo.

In 2002 he relocated to England where, ten years later, he found the opportunity to fulfil his dream of studying gemmology at the Birmingham City University. In 2012, he started his High National Diploma in Gemmology combined with Gem-A's Diamond and Gemmology program which led to a degree program, introduced for the first time in 2015, at the BCU.

Today, by embracing the World Gem Foundation's concept and philosophy of gemmological education, and through the Gem Academy of DR Congo, he would like to share his passion and knowledge of gems with his fellow Congolese; particularly jewellers, aspiring gemmologist and gemstone lovers.

His personal goal is to promote the science of gemmology in his country, by providing information and support to empower people in the jewellery business and those trading in stones.



**Jack Ghazalian**  
American Gem Academy  
Director of Corporate & Career  
Development

**Jack Ghazalian** has thirty-eight years of experience in the jewelry industry. He is a graduate gemologist through the Gemological Institute of America (1992), was an instructor for GIA (1993) and was officially Certified-by-the-State of California Education Code 94311(a) to teach Gemology & Jewelry Manufacturing-Arts (1993).

In October 2015, he was honored by the International Distinguished Scholars – Academic Honor Society as an 'International Distinguished Scholar' and in 2017 was granted membership in Kappa Delta Pi. He is currently the owner of Isometric Gemological Appraisal Services in Southern California: IsometricGems.com, speaks five languages and is passionate about education.





**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.



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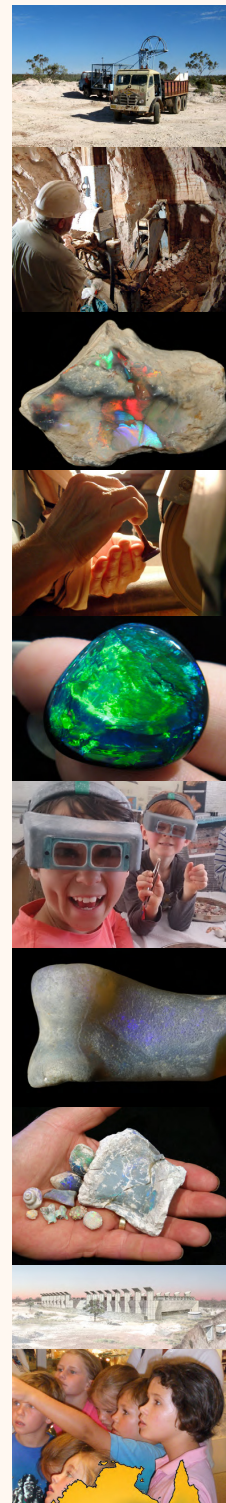
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## News from Down Under

JENNI BRAMMALL is a Vertebrate Palaeontologist and the manager of the Australian Opal Centre planned for Lightning Ridge in Australia



# The Australian Opal Centre: An Update And Opportunity

### Editor's Note:

We would really like to ask our readers to support this wonderful initiative. There is no better place in the world for this to be than Lightning Ridge.

Since featuring in the November 2016 inaugural edition of *Gemmology Today*, the Australian Opal Centre (AOC) has continued to develop the world's premier public collection of opalised fossils, Australian opal and related materials, and to foster opal-related research, education and training. It has also made significant progress towards construction of a world-class not-for-profit facility to house its collections and activities. We are pleased to present an update for readers of *Gemmology Today*.

Highlights of recent activities include:

The AOC is set to run its fifth annual Lightning Ridge Fossil Dig in partnership with the Australian Geographic Society. Each Fossil Dig sees 40 people travel to Lightning Ridge from across Australia and the world, to search for and learn about opalised fossils, contributing to the AOC's exceptional research collection.

AOC opal courses continue to impress, particularly the popular Fundamentals of Opal Carving class developed by the AOC as the first in a suite of courses in partnership with the Gemmological Association of Australia.

The AOC is participating in ongoing work to develop an international nomenclature for opal.

Significant donations to the AOC's 'treasure trove' of opal-related items mean the AOC now has the world's largest and most scientifically significant public collection of opalised fossils and one of its most complete collections of opal-related books and publications. Donated items range from opal gemstones, jewellery, fossils, geological specimens, artworks and cultural artifacts, to historical items such as a scientific instrument used at Australia's CSIRO in the 1960s and 1970s to reveal the secrets of precious opal's microstructure.

Scientific research partnerships are producing exciting results. 2017 announcements included the world's first opalised ankylosaur dinosaur fossil (discovered on the 2016 Lightning Ridge Fossil Dig) and the first scientific publication of pterosaur fossils from New South Wales. Upcoming refereed scientific publications will include the first zircon crystal dating of the opal-bearing Griman Creek Formation at Lightning Ridge, and the first new dinosaur to be named in New South Wales since 1932.

Visitation in the hundreds by school groups, bus groups and groups of university students, including from the University of New England in Armidale and the University of NSW in Sydney. Students are immersed in the science, history, culture and beauty of opal.

Involvement in and support of the 9th National Opal Symposium, to be held in Lightning Ridge on 22-24 July 2018.

Numerous national and international VIP visitors including Valerie Fowler, US Consulate General in Australia.

Support for tourism, research, media, arts and economic development projects including participation in destination management planning for inland New South Wales; support for Discovery Channel's series 'Outback Opal Hunters'; cast and crew screening of the movie 'Strange Colours', commissioned by the Venice Film Festival and shot in Lightning Ridge; contribution of images for an installation by artist Linda Persson at the 2017 Momentum9 Biennale in Moss, Norway; and images and data provided for numerous publications including *Geology Today* and *Scholastic Math*.

Importantly, the AOC is on the cusp of realising its grand vision to build a magnificent new facility – the world's leading destination for opal-related education, training and certification. A key opal industry asset and education facility, the new AOC will also be a signature destination for domestic and international travelers.

An exclusive group of benefactors called AOC Founders are gathering to act as patrons of the new AOC building. AOC Founders will collectively contribute A\$10 million towards the



building's construction and spearhead a campaign for matching New South Wales and Australian Government funding.

Located on Lightning Ridge's historic Three Mile opal field and scheduled for completion in 2020, the A\$34 million state-of-the-art new AOC will be a 21st century icon of Australian sustainable architecture, purpose-built to house, protect, celebrate and promote the AOC's impressive collection of natural and cultural treasures and programs. The building has been designed by revered Australian architects Glenn Murcutt and Wendy Lewin.

The new AOC will be an outstanding resource for gemstone scientists, laboratories, educators, students, merchants and enthusiasts worldwide, providing infrastructure, facilities and programs to address unmet demand for opal-related education, knowledge services and certification. It will benefit opal producing centres across Australia and be a hub for creativity, research, education, and economic and cultural development in one of Australia's most economically disadvantaged, yet vibrant, regions.

The high-profile institution will also facilitate coordinated promotion of opal, grow awareness of and desire for opal, and increase public awareness of and access to rare opalised fossils. It is conservatively expected to add an extra \$3.5 million in value to the local opal industry, with greater benefits to the opal industry nationally and globally and even larger impacts on the visitor economy.

Of the new AOC building, Glenn Murcutt – Australia's most famous architect and sole Australian winner of the prestigious Pritzker Prize – said: 'This is a bold and exciting project for all of us. We have worked with the remarkable community in Lightning Ridge for over 13 years, and now, to be able to realise the new Australian Opal Centre in this iconic Australian landscape is just wonderful.'

Co-architect Wendy Lewin said: 'It's a 'tough' building that will be 'in and of' the historic opal mining site, which is off the grid

and without town services. We have designed the building to generate its own power, with provision for the collection, storage and recycling of water, on-site management of waste systems and passive heating and cooling systems. Embedding the building in the ground allows us to take advantage of the earth's thermal mass'.

'Our ambition, and that of our client and their community, is for this to be an exemplar of site appropriate, autonomous architecture. We believe it will be unique and culturally significant globally.'

AOC Founders come from all walks of life. The AOC Founders campaign offers a once-in-a-lifetime opportunity for up to 150 visionary individuals to become proud patrons of this internationally significant facility. AOC Founders will be recognised in perpetuity inside the new building and receive a range of other exclusive benefits.

Terry Coldham, AOC Founder and Federal Patron of the Gemmological Association of Australia, said: 'The AOC is a bold initiative and I'm very impressed by its achievements. The concept of an Australian centre dedicated to opal and the many benefits it will bring is exciting - it's an absolute game changer'.

'There are very few times in life when you can affect really big change, but this is one of them. The opportunity to join such a fine group of people and do something magnificent that will be seen by millions of people for lifetimes to come is really remarkable'.

'I encourage everyone in the gem and opal industry to join me in supporting this internationally significant project by becoming an AOC Founder. It's a truly wonderful legacy to leave.'

To find out more about the Australian Opal Centre, upcoming programs and courses, and the opportunity to become an AOC Founder, please visit [www.australianopalcentre.com](http://www.australianopalcentre.com)



The planned new A\$34 million, largely underground Australian Opal Centre building. Architects Murcutt & Lewin. Rendering Candalepas Associates.



Student Franka Freidrichs-Borkovic



Sherri Donaldson



Geologist Federico Fanti



Palaeontologist Dr Phil Bell



Glenn Murcutt, Wendy Lewin & AOC Members



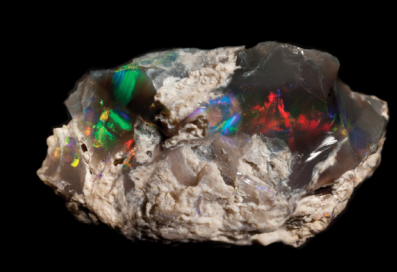
Architects Glenn Murcutt & Wendy Lewi



Cybele Sousa de Lemos



Nicola Williams



Rough Black Opal Specimen



Vicki Bokros & Valerie Fowler



Andrew and Damien Cody



Terry Coldham, Peter Sherman, Linda Jackson





Opalised fossils donated to the collection of the Australian Opal Centre under the Australian Government's Cultural Gifts Program.



Fundamentals of Opal Carving: 2017 class and student works.

March 2018

## Headline: Official European seal between England and Spain, highlighting the importance of Jet working in Culture and Heritage

Sub: 2018, the European Year of Cultural Heritage - Where the past meets the future for Jet

Sarah Steele, a professional gemmologist and leading authority in the Jet group of gemstones is working closely with Spanish jet manufacturers and archaeologists to promote intercultural dialogue around the jet working tradition.

Keen to protect the material and historic jet culture, the project, called 'Jurassic Jet - A look to the past to preserve the future', intends to raise awareness both with heritage professionals and the general public. Such is the importance of the project that it has been given permission to use the European Heritage Seal, which provides visibility, quality and demonstrates the importance of jet as a common and cultural heritage.

Co-ordinators of the project are Andrea Menéndez Menéndez (Archaeologist-Asturias, Spain), María Pérez González (Jet Manufacturer and president of Asociación Azabache Jurásico de Villaviciosa (Asturias, Spain) and Sarah Steele (Geologist, gemmologist. Whitby, England).

Talking about the initiative, Sarah Steele said, 'We have launched this exciting project with both a scientific and information vocation in mind. Alongside the historical, archaeological and geological research carried out by our collaborators, we will have other activities, both informative and formative for adults and children. These include exhibitions, workshops, talks and conferences. Cultural heritage has a universal value for us all and it is important that this is preserved and passed onto future generations'.

The underlying importance of the project is to achieve effective official protection by the relevant authorities in matters of heritage and to guarantee the maintenance of a tradition which forms a fundamental part of our historical and cultural heritage. This is in danger of disappearance, due to the lack of adequate protection, supply of raw material for artisans and the illicit commercialisation of other materials which are sometimes sold as authentic jet. Determining the characteristics and origin of jet in a scientific way, will help to create a seal of quality.

### Editors Notes:

Sarah Steele graduated from University College, Durham with a Degree in Geology in 1992.

A qualified professional gemmologist, she was awarded Fellowship of the Gemmological Association of Great Britain in 2013, and the Diamond Fellowship in 2015.

Sarah is a member of the Canadian Gemmological Society, The Scottish Gemmological Society and a Senior Accredited Gemologist of the International Accredited Gemologists Association.

Specialising in the use of natural, semi-synthetic and synthetic polymers in jewellery, Sarah is considered a leading authority on the Jet Group of gemstones. She is regularly asked to speak and deliver workshops at conferences around the world, sharing her knowledge and expertise with many different audiences. Sarah has also worked with TV production companies to highlight the importance and relevance of Jet in culture and society.

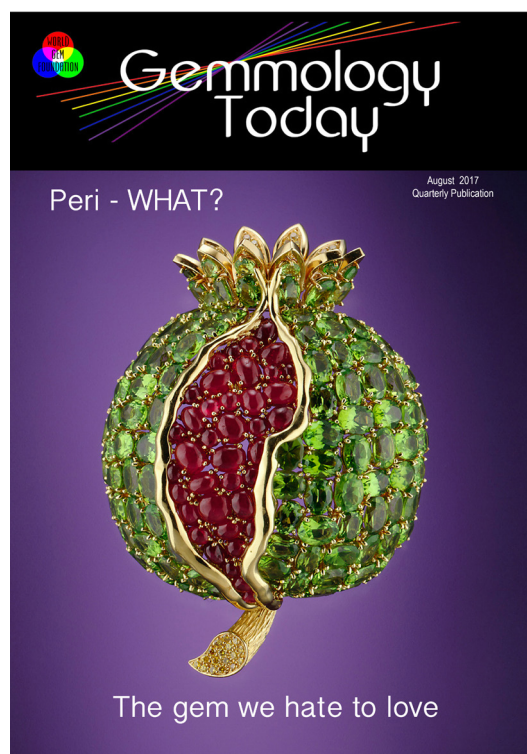
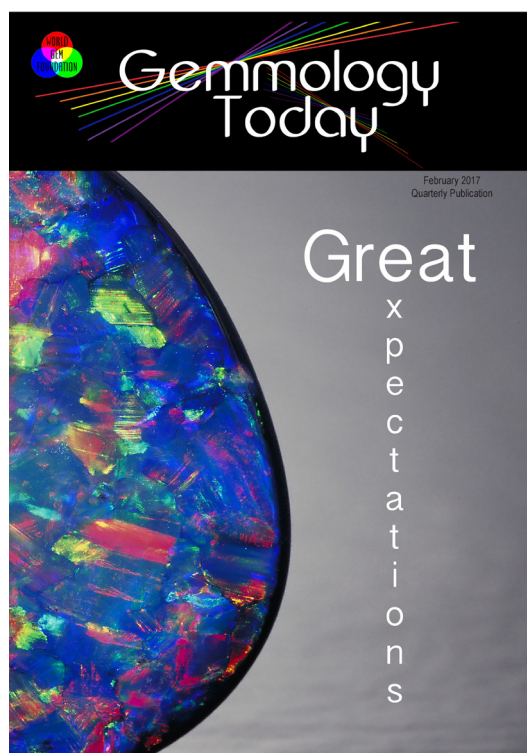
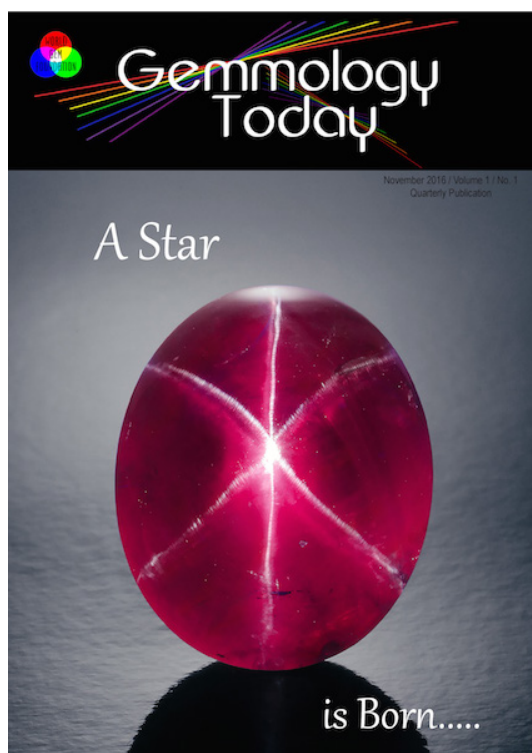
Sarah has collaborated in recent times with The National Museum of Scotland and is involved in ongoing research with the University of Yale, to challenge our previous perception of Jet.

Sarah is an honorary research partner of the Asociación Azabache Jurásica de Villaviciosa in Spain and has been appointed Consultant Gemmologist at Whitby Museum in England, which is home to the most important collection of Victorian Whitby Jet in the world. In addition to this, Sarah is one of only a handful of manufacturers still handcrafting Whitby Jet jewellery in the traditional way in her shop, The Ebor Jetworks, which is also based in Whitby.

Press Contact for Sarah Steele and The Ebor Jetworks is Carrie Mulligan at True Owl Marketing. Please call 07538784657 or email [carrie@trueowlmarketing.co.uk](mailto:carrie@trueowlmarketing.co.uk).



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# The Spice of Life

## Coloured Gemstones



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



## Iolite : The Blue Wonder!

Iolite is the beautiful transparent gem variety of the mineral cordierite and nowadays is getting more and more popular due to its similarity in appearance to blue sapphire and tanzanite and its very reasonable cost.

Iolite is 'trichroic' and will show different colours when viewed in different directions. This phenomenon not only makes it somewhat challenging to cut but is also one of the main characteristic features when it comes to identification. Due to its similarity in appearance to blue sapphire, it was and still is often incorrectly sold as 'Water Sapphire'.

### History

The French geologist, Pierre Louis Antoine Cordier in 1813, first discovered this relative young gemstone but the mineral cordierite has a history that dates back hundreds of years. According to a Norse legend, the Vikings used iolite as a polarizing filter to help them find the sun on cloudy days and it was also called the Viking stone. It is believed that the Vikings discovered iolite deposits throughout Norway and Greenland.

### Deposits

The first significant and exciting discovery of large transparent, gem-quality deposits of iolite was made in 1996 in Palmer Creek, Wyoming (USA) by the American geologist, W. Dan Hausal. Nowadays the main source of iolite comes from India with other significant sources including Australia, Brazil, Canada, Madagascar, Zimbabwe, Myanmar (Burma), Sri Lanka, Tanzania and the United States.

### Characteristics

Iolite is a complex silicate of magnesium and aluminium, with a chemical formula of  $Mg_2Al_3[AlSi_5O_{18}]$ , where often part of the magnesium is replaced by ferrous iron and manganese, while some the aluminium can be replaced by ferric iron. Due to the presence of iron, iolite does not show any fluorescence. The crystal structure is orthorhombic, and iolite has a hardness of 7 to 7.5, which allows iolite to be used for all kinds of jewelry.

The refractive index of iolite is 1.542 - 1.567 and the stone can show a birefringence of .008 -.012 with an S.G. of 2.58 to 2.66. The absorption spectra will vary based on the direction of viewing with the bands at 645nm and 426nm often masked by a general absorption when viewed in the violet blue direction.

### Colour

The name iolite is derived from the Greek word 'ios' meaning 'violet'. Its pleochroic colours differ with its body colour. The body colour of iolite is caused by the iron component in the chemical composition and can differ from light to deep blue, to even intense violet blue. This intense violet to blue colour can rival tanzanite but iolite can also occur in various shades of yellow, gray, green or brown. The deeper blue the saturation of the stones, the more valuable they are.

### Special Property Pleochroism

Iolite is trichroic meaning it will show three different colours when viewed in three different directions. In one direction it may appear an intense blue, similar to a sapphire, be as clear as water in another and appear golden yellow to soft brown in a vertical direction.

This pronounced pleochroism does make it a difficult gemstone for cutters because when it is not cut in the right orientation, the intense blue colour is lost.

### Clarity/Inclusions

Iolite is commonly transparent but can have inclusions, consisting of liquid feathers and typical hexagonal platelets of hematite or goethite. These platelets give the gemstone a reddish sparkling effect, which is known as 'aventurescence'. These stones are called 'bloodshot iolite'. In some other rarer cases, iolite may be found with long, parallel, tubular inclusions which will exhibit asterism (star) or chatoyancy (cat's eye) when cut in cabochon is oriented properly.





Iolite (Photo by Tino Hammid)

## Cut

Because iolite is commonly transparent with relatively few inclusions, it is most often faceted, but cabochons or carvings are available as well. Lower quality iolites are frequently cut as beads.

The largest faceted iolite can be found at Smithsonian and was purchased with funds from the Tiffany & Co. Foundation in 2012. The 63.83ct iolite is the largest cordierite gem in the National Gem Collection of the Smithsonian and comes from Orissa, India.

## Treatment and Lookalikes

Iolite can easily be mistaken for other gems such as kyanite, sapphire and tanzanite. But if you use standard gemmological testing methods, identification is relatively straightforward especially if the refractive index is correctly measured. Other gems that can be confused with iolite include spinel and garnet, however both of these are singly refractive.

No treatments of iolite are known, nor is it produced synthetically. So you can be quite sure that if the gemstone you have purchased is iolite that it is a natural gemstone. Iolite should not be exposed to heat or exposed to acids.

## Conclusion

Overall iolite is a surprisingly appealing gemstone with its range of pleochroic colours from blue to violet to brown and even colourless. The fact that iolite isn't treated nor made synthetically also makes it appealing in a world where so many gemstones have been treated, enhanced or produced in a laboratory.

## References:

Handbook of Gemmology  
Gemselect.com  
Mineral.net  
Gems & Gemmology

| Gemstone           | R.I. Range    | D.R.        | D    | O/S | S.G.        | H       |
|--------------------|---------------|-------------|------|-----|-------------|---------|
| Sapphire           | 1.762 – 1.778 | .008        | .018 | U-  | 4.00        | 9       |
| 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       |
| Tanzanite          | 1.691 – 1.700 | .009        | .030 | B+  | 3.35        | 6 ½ – 7 |
| Tourmaline         | 1.614 – 1.666 | .014 – .032 | .017 | U-  | 3.01 – 3.11 | 7 – 7 ½ |
| Iolite             | 1.542 – 1.578 | .008 – .012 | .017 | B-  | 2.58 – 2.66 | 7 – 7 ½ |



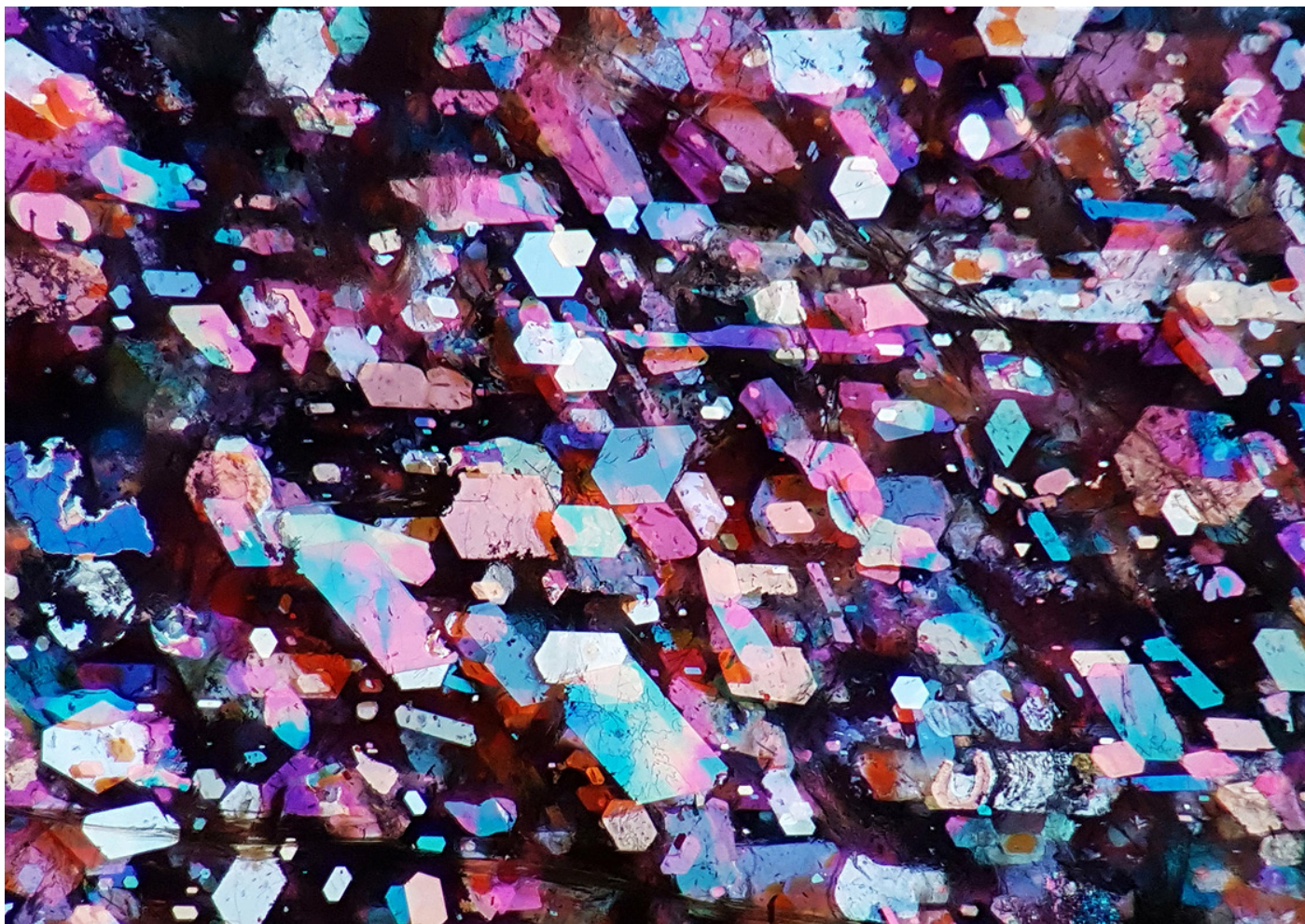
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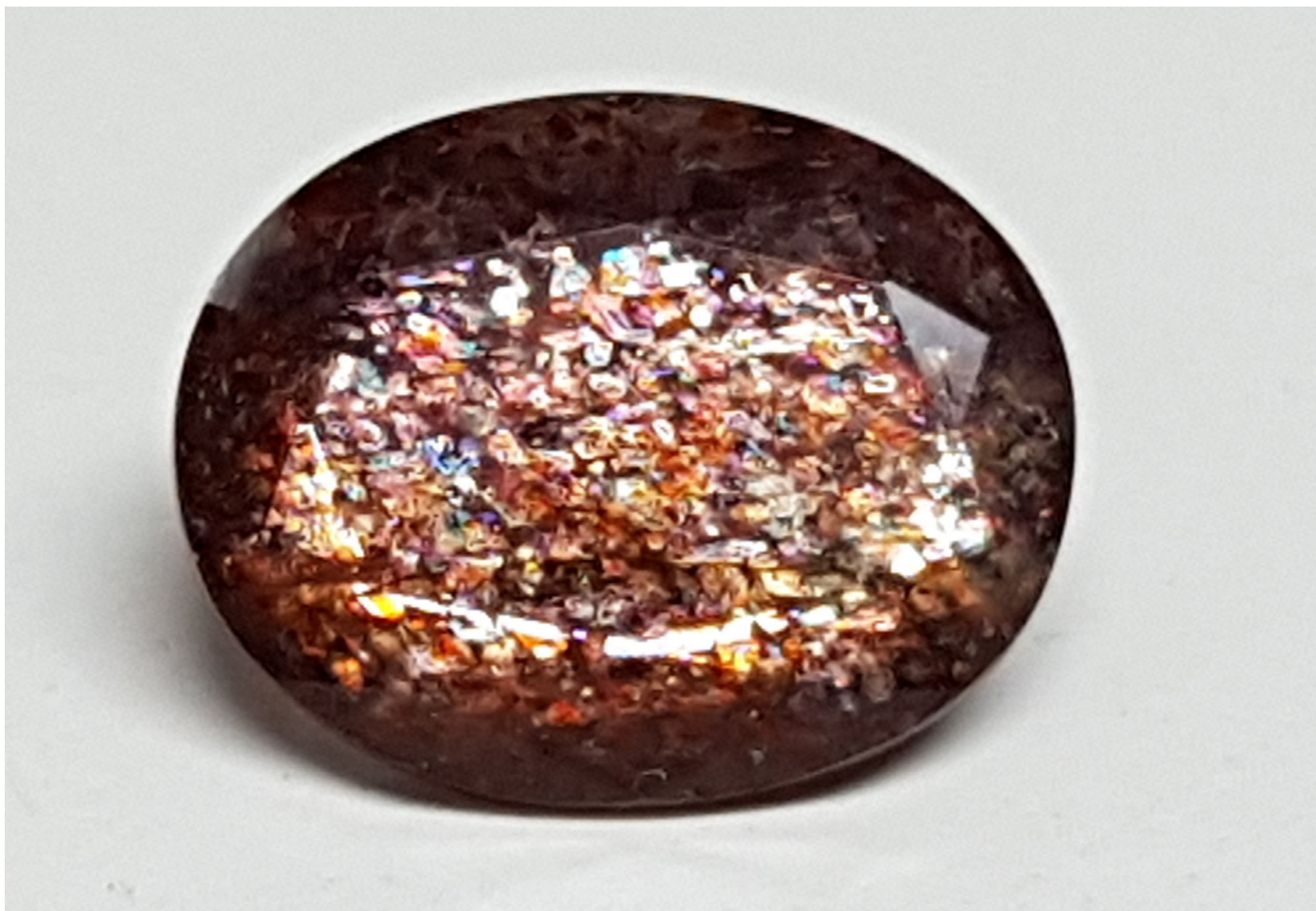
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Platelets in lolite (Photo by Egor Gavrilenko)



lolite (Photo by Egor Gavrilenko)



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"Education inflames our intellect and makes us grow. It widens our horizons, adds value to our name and instills in our clients, staff, management and industry colleagues, a confidence in our ability that can only be gained from being assessed to the highest of standards by our peers."

Kym Hughes  
President NCJV

So become enlightened  
and  
Stand out from the crowd

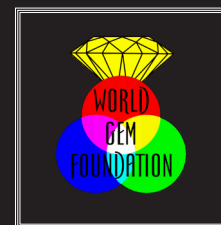


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