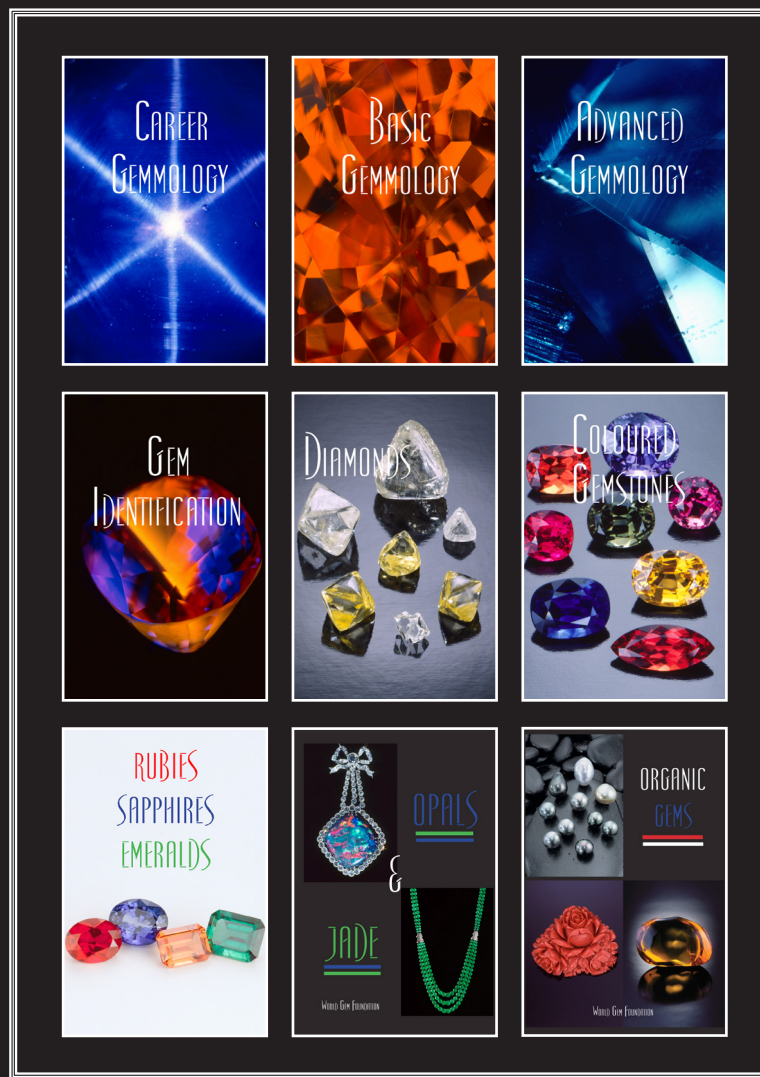


Gemmology Today

June 2020
Quarterly Publication



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March 2020 Issue



Editor

— at Work

Geoffrey M. Dominy is the author and creator of the 'The Handbook of Gemmology' and 'Gemología Para Todos', founder of the World Gem Foundation and editor of Gemmology Today.

At the start of the year, I mentioned to all my friends and colleagues that 2020 would be a year of clarity (playing on the saying 20/20 vision). I wish I had been wrong.

The COVID-19 crisis has highlighted two very important things. Firstly how fragile this world is, an interconnected 'House of Cards' that can tumble at any time and secondly how woefully unprepared and inadequate all world leaders are when dealing with a crisis of this nature and magnitude.

I shudder to think what would happen in the case of a nuclear attack. From all the corners of the world (with perhaps the exception of New Zealand, South Korea, Singapore and Hong Kong if the figures are correct), the handling of this pandemic has been questionable to say the least.

Looking at the list of countries, the number of people infected and the thousands who have died, this is not a 'League Table' anyone wants to win. In fact, it is the 'Relegation Zones' that everyone should be aiming for.

At the time of writing (June 9th) according to the Coronavirus Worldometer, there are 7,248,350 cases of COVID-19 and 410,025 deaths worldwide. The USA has 2,030,790 cases and 113,267 deaths, followed by the United Kingdom (289,140 / 40,883), Brazil (711,696 / 37,359), Italy (235,278 / 33,964), France (154,188 / 29,209) and Spain (288,797 / 27,136). However in terms of deaths per million, Belgium ranks Number One with 830 with the United Kingdom second with 602. Sweden, who adopted a different approach, sits currently at 45,924 infected, 4,717 deaths and 407 per million.

When we were young, our parents told us not to touch something that was hot. Some of us believed them while others did not. Those who tested the theory soon learned that it hurt like hell. Here in Mallorca, Spain, 48 days of confinement has taught us little. One would think that being confined to our homes for 48 days would teach us a very valuable lesson and one that we would do anything to avoid again. It appears not. As we enter 'Phase Three', few wear masks (although now it is compulsory in most stores), few practice social distancing and few show any respect for their fellow man. I remember reading an article that said if one person wears a mask and the other does not, the person wearing the mask still has a 70% chance of getting COVID-19. If both people are wearing masks, the risk of infection drops to below 5%. Now I have no idea whether these figures are accurate but I do know that if a virus that is transmitted via the mouth has to go through two barriers, the chances will be greatly reduced. I have heard people say that wearing a mask is uncomfortable and it makes it hard to breathe. The father of a friend of mine died in Barcelona from COVID-19. She had to say goodbye to him via WhatsApp. He died because he could not breathe.

One of the biggest challenges during the lock down (in addition to seeing businesses and livelihoods destroyed) was being isolated. We are social beings (especially here in Spain) and being confined to our homes had a serious emotional and psychological impact on many people. Seemingly we live in a world where the welfare of four-legged creatures matters more than their two-legged friends. During lock down people were allowed out to exercise their dog but not to follow their daily exercise regime. Strange.....

In 2018, there was an estimated 228 million cases of malaria worldwide and 405,000 reported deaths, five thousand less than the deaths caused by COVID-19. In the winter of 2014-2015, a severe flu epidemic in Germany killed an estimated 21,000 people. During the COVID-19 pandemic, there have been 186,317 cases in Germany and 8,802 deaths. Annually in Germany between two and ten million are afflicted with influenza. In the last two years in Spain, 15,000 people have died from 'La Gripe' (the flu) so I am curious why the goal posts have changed with COVID-19.

Don't get me wrong, even one death is one death too many but in my humble opinion, I believe this whole pandemic has been handled badly.

To me, there was no need to shutdown the world. Here in Spain there should have been a complete lock down for two weeks during which time the government should have commissioned all clothing manufacturers to make face masks. These should have then been issued to every household. The government should then have passed legislation decreeing the mandatory use of face masks when outside. No exceptions to the rule and a hefty fine if you were caught without one.

It is interesting here that when going into a grocery store during Phase One and Two, you had to use a hand sanitizer and gloves but no face mask was required. In Phase Three, a face mask is required. Now I don't know about you but other than the air I breathe, the food I consume is second on my list of priorities yet there were no precautions here in Mallorca to protect the fresh fruits and vegetables, the meat and the fish. Oh sure, we were asked to keep our distance but how do you buy fruit and vegetables without inspecting them close up? If everyone had been mandated to wear a standard issue face mask, the stores could have stayed open, the business owners and employees would not have suffered financially and the government would have saved money, a win/win outcome for everyone.

Now of course there are exceptions to the rule. If you have a concession at the beach and it pours with rain, you are not going to have many customers. At the same token, if it pours with rain during the summer, the sun worshippers will head to the shops and department stores and they will benefit. This is how the world works. It is the 'Ying' and the 'Yang'. You take the good with the bad. Some businesses are more weatherproof than others. Tea consumption in the UK during the lock down increased dramatically with an extra 111,972,000 cups of tea consumed a day. Supermarkets in the UK in March reported an increase in sales of 23% compared to March 2019.

This is a decision we all make when we choose to start a business. All businesses are susceptible in one way or another, so in the case of COVID-19, businesses that cannot ensure social distancing such as bars, discotheques and clubs, sporting events etc. are bound to be hit hard but why make everyone suffer?

My friend who lost her father runs a sewing and knitting shop. She would be thrilled if she had more than one customer in her shop at a time. In some cases it would have taken some innovative thinking but it could have been done. Instead, governments worldwide hit the 'Pandemic' panic button and shut everything down. The simple solution to a problem that was far more complex than anyone could have imagined. The financial losses from COVID-19 are staggering, on a scale of epic proportions with the losses felt from rich to poor, regardless of gender, race or religion. Of course some will have profited from devalued stocks but everyone is feeling the financial pinch right now.

We can see this as the shops and restaurants start to re-open. After three months of no income or a reduced income, people are in no mood to spend their money. Unlike a natural disaster where we know at some point life will normalize, COVID-19 is an unknown entity. There is no light at the end of this tunnel so everyone is playing their cards close to their chest. I am no different. Now is not the time to spend.

As we all saw with 9/11, the jewellery industry is particularly susceptible to any downturn in the economy. A luxury item that many crave but an unnecessary luxury that is often the first to be affected. That's not being pessimistic, that's being realistic. We are all privileged to work in an industry surrounded by such beautiful things but do we seriously think that when there is financial uncertainty, we will not feel the affects?

So where do we go from here?

Well the reality is that many businesses will not survive. Not just in the jewellery sector but businesses in general. Unfortunately most people do not save for a rainy day, living instead from day to day; building a fragile business that could tumble at any time. It just takes a slight breeze to cause chaos.

Personally it upsets me to see certain businesses using COVID-19 as an excuse to go under. Yes I know it can happen especially with a lengthy lock down but some threw in the towel within days of the pandemic. Here in Mallorca the hotels announced even before COVID-19 that they would not open until May citing the fact that it was not worth opening for a few days over Easter. They made this decision because here in Spain, most service industry

employees' work on short-term contracts so if they had opened in March their expenses would have been greater than their projected revenues. Selfishly, they opted not to open. When the Spanish government announced the lock down on March 14th, who were the first to cry foul, the hotels. These very same hotels have expanded over the last five years (since I moved to Mallorca), charging more and more every year. Fueled by greed, ready and willing to squeeze the 'golden goose' for every last euro. When Thomas Cook went bankrupt, they were first in line, hands outstretched, wanting government bailouts. If you are going to put all your eggs in one basket, guess what? Because when the 'you know what' hits the fan, you are going to get splattered. It's a no-brainer.

Obviously with such uncertainty, we have to adapt to the 'new normal', whatever that is. I think we all realise that life, as we knew it, will never be quite the same again and I am sure as the years go by, pandemics will become part of the fabric of life and death, the 'new norm'. This is the world we have created and we must all hold our hands up and take some responsibility. We are destroying the very entity that gives us life, through greed and the insatiable desire to have our cake and eat it too.

In the newspaper the other day, they announced that one cruise ship docked in Palma consumes the same amount of water in one day as 5,034 citizens. One of the biggest issues facing the Island of Mallorca is a shortage of water. During a normal summer cruise ship season, we can have up to seven mega cruise ships a day.

In the blue corner, we have the environmentalists trying to save the planet, while in the other corner the capitalists who really don't care. As ABBA once sang.....'Money, Money, Money' and we all know who wins. In 2018, the Spanish government contemplated cancelling an order from Saudi Arabia for 400 laser-guided bombs amid concerns over the Saudi role in the war in Yemen that the United Nations claims has killed more than 10,000 people and left 8.4 million on the brink of famine. They didn't, partly because they needed the money and partly because they feared the job loses if the deal did not go through. You see there are always two sides to a story. Manufacturing bombs creates jobs but it also results in collateral damage. You do what you have to do to put food on the table.

While part of the solution can be found in online retailing, consumers need money and if a pandemic robs them of their livelihoods, this will be in short supply. However, we need to plan ahead. Now is a time of contemplation, a time to evaluate what we are doing right, what we are doing wrong and how we can weatherproof ourselves, as much as possible, against the future storms that will surely arrive.

Unfortunately, for many people working in the jewellery and gem industry, we work with a 'touchy feely' product that is not always easy to sell online. Reproducing, for example, the exact colour of a gemstone is no easy task and this can easily lead to sellers misrepresenting their goods. Diamonds can be purchased online from reputable dealers if they come with reliable certificates and reports but as we move to the 'new norm', more and more people will find ways to defraud unsuspecting consumers. Online fraud has always been a major concern. Desperate times call for desperate measures and if you are suffering financially, the inclination to 'step over the line' will increase dramatically.

We work in an industry built on trust but how do we give these assurances when we are dealing in a virtual market place? Established companies offer online buyers a certain level of comfort but what about the smaller and mid-sized businesses that now need to invest money to create an 'online presence'? Credibility does not happen overnight, it takes years to nurture but for many, the clock has already started ticking and it may simply be a case of too little too late.

I hope I am wrong but I suspect the worst is yet to come. Now is the time to be proactive. You simply cannot afford to be complacent, to adopt the approach that if we are all in the same boat, everything will be fine in the end. It won't and I hate to be the bearer of bad news but your economic survival relies on you 'captaining' your own ship, analyzing who you are and what you need to change to come out of this economic meltdown with a shirt still on your back.

Sadly we live in a 'Me' society, a world where our own personal needs are paramount and to hell with everyone else. There are no shining white knights riding to our rescue, just the grim reality that being 'spit out' the other end is infinitely better than not being 'spit out' at all.

The strong will survive that is the law of the jungle. We now all live in this jungle.

This has been a difficult issue to put together. We are blessed to work in this industry but bearing in mind what has transpired over the last couple of months, I feel a sense of guilt.

Perhaps for just a couple of hours you can forget about COVID-19, look at some beautiful photos, read some interesting articles and imagine what life used to be like.

We will all get through this. The human spirit is truly amazing. We do need however to work together and show some compassion and understanding.

Please stay safe.....



A specialized photographer of gems and jewelry, Orasa Weldon has sharpened her craft from a foundation in graphic design and publications. Her jewelry manufacturing and gemology help round out her experience in all facets of the jewelry industry.

Family Matters - Meet Orasa Weldon



Orasa Weldon

GT: Who is Orasa Weldon? Tell us about your background?

OW: I was born in Bangkok, Thailand. As a teenager I dreamed of becoming a jewelry designer, so I eventually enrolled at AIGS. Wimon Hughes was my gemology teacher. I think of her with sweet memories due to her patience and teaching ability, which led me to a jewelry manufacturing job. After a while, I decided it was time to continue my education at GIA, then located in Santa Monica, California. That is where I got to know Robert Weldon. We got married a few years later when he was working as Colored Gemstone editor for JCK magazine. During that time, in the 1990s, I took a part-time job as a jewelry designer while operating our gem photography business. By the 2000s, I had started my education towards earning a Bachelor of Arts in Graphic Design from Temple University, Tyler School of Art. Because of my attachment to the industry, I decided to focus all of my graphic design efforts toward gemstones and jewelry.

GT: Is it a blessing or a curse to have a second well-known and respected gemstone photographer in the family?

OW: It is a blessing to have Robert as my teacher and I am very lucky. He is a kind and patient teacher, and our photography studio is set up with all the tools we need to continue successfully. But even with the right tools there is a big learning curve. From the beginning I set a high standard to achieve, and I am still trying to reach it.

GT: Did your interest in gems and gem photography develop naturally or did you feel compelled to follow in Robert's footsteps?

OW: My chosen profession is graphic design, but I have long been exposed to gemology and photography. I have come to appreciate these disciplines and love them. By the time Robert became busy with his job as Director of the Library at GIA, I was working on special projects as a contract photographer and designer for the GIA Museum. I was able to apply my graphic arts education, helping GIA develop and publish the book *Splendour and Science of Pearls* (2013) and *Selecting the Rough: A Guide for Artisanal Miners*, which I worked on for Dona Dirlam when she was still director. Since I understand both professions, while I photograph, I am able to visualize what it will look like designed for print or digital layout.

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

OW: There are so many challenges! Each project presents a new one. For example, I was once asked to create an image that shows the front and back of the object. I did so by using a mirror, while also suggesting a narrative or story in the image. Much can be done in post processing, too, and front and back images can now be created easily. My advice for new photographers would be to give yourselves extra time. Solutions are not always obvious. It's important to keep trying. Sometimes, you must walk away and come back to start a project all over again.

GT: What is the one most memorable gemstone you have photographed and why?

OW: I have many good memories with so many gems, but iris agates are still among my favorites. Lighting, especially back lighting, is critical. I get very excited before I turn on my studio lights, never knowing how the iris will be revealed in a studio environment. With the irises you might wonder: Is it going to be a rainbow? A sunset? Or a sea creature like a jellyfish?

GT: Is there still a place for analog film in the world of gem photography?

OW: No, I do not think so. Eventually even film gets scanned. Why not just start off with an original digital image?

GT: Are you a purist or do you use software, such as Photoshop, to bring out the best in your photographs?

OW: I do use Photoshop, but my aim is always to make the stone or jewelry look like what I see in reality. Some gems like ruby, Paraiba tourmaline or emerald are challenging to get the color exactly right, and Photoshop helps a photographer get there. However, the stone must be in front of you when you adjust for color. Human color memory does not work well.

GT: Guitarists are always asked about the equipment they use and the ones they most prefer. What is your camera of choice and why?

OW: I have always used Nikon cameras and lenses (D850, D810, Micro-Nikkor 105 mm). I am familiar with them and I like the optics. I believe that most of the time it is not about the camera; it is the photographer's skill developed over time and from making a lot of mistakes. Just like with cooking,

it is nice to have a fancy pot and pan and super fresh ingredients, but the art of cooking the whole thing together brings a successful outcome.

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

OW: Gemology is much more accessible to everyone now and that will continue. Consumers will also know more about gems, about the gemstone supply chain, and environmental issues. Education will be more readily available. There will be more relationships with the source of gems. I believe still imaging and video will play huge roles in that education.

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

OW: For me it is about the relationship I have with my clients. Often, I'm photographing for master cutters. My job is to represent that gem with as much love as was put into it by the cutter. It is the same with my jewelry design customers. Jewelry coming my way is treated as though it is part of a museum collection. A lot of lives have touched what goes into a finished piece, from the miner to the cutter, to the jewelry designer. I feel that their combined trust is placed in my ability to show it well. In a year we will be looking back at the Covid-19 pandemic. The jewelry business will have suffered greatly, but throughout the pandemic, in the darkest months, I was trusted to create images that will remain long after we've forgotten about the crisis.

To contact Orasa, go to www.orasaweldon.com

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Tahitian Pearl necklace with 18K white gold and diamond clasp, measuring 18 inches (total length), 12 to 14mm (in diameter). Pearls vary in colour from pistachio to aubergine (Photo by Orasa Weldon/GIA)



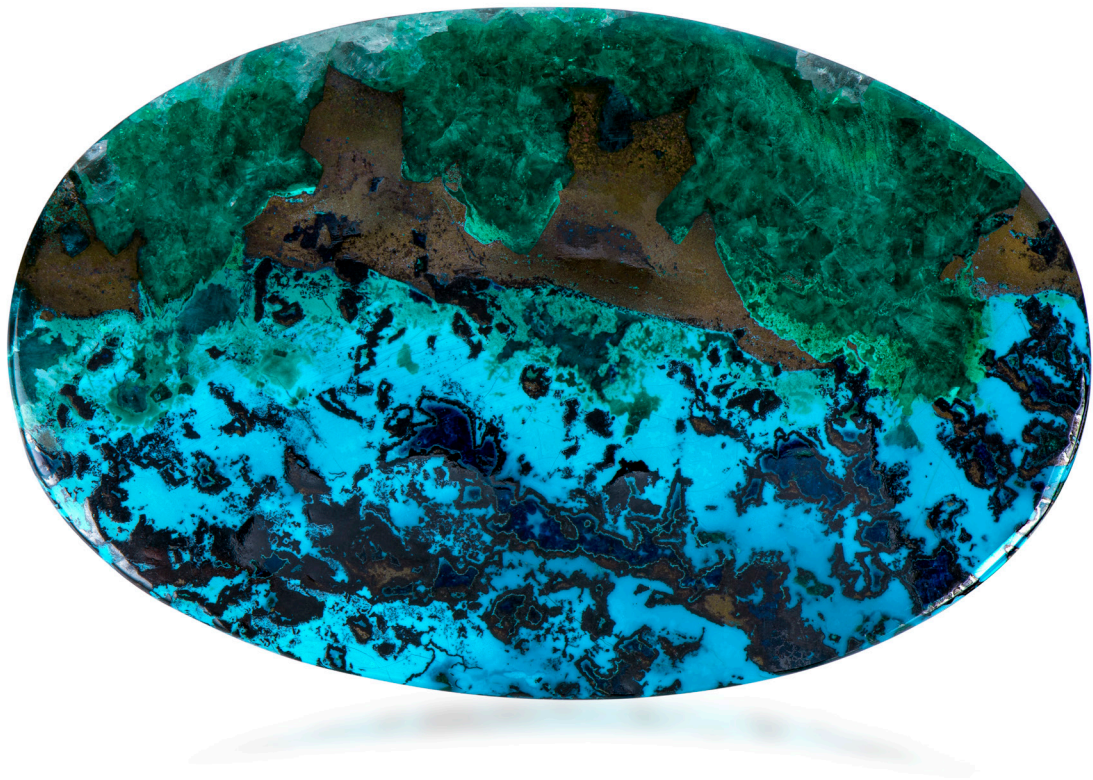
'Pond Scum' necklace featuring malachite, citrine quartz, emerald, and peridot set in 18K gold.
Courtesy of a Private Collector and Mona Lee Neseth (Photo by Orasa Weldon/GIA)



Natural Blue Sapphire weighing 3.48 carats. Cut by Mark Gronlund (Photo by Orasa Weldon)



Aquamarine weighing 30.53 carats. Courtesy of Tim Roark (Photo by Orasa Weldon)



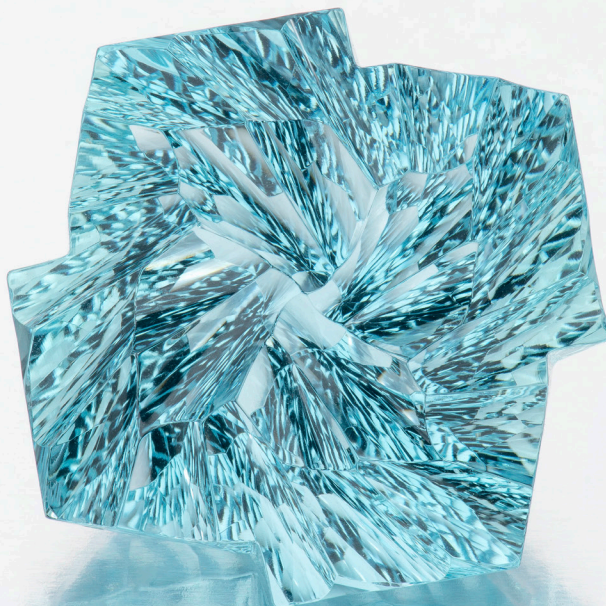
Diopside from Namibia. Courtesy of Rare Earth Mining Co. (Photo by Orasa Weldon)



AGTA 2013 Spectrum triple-award winner. 14K white gold earrings featuring Akoya Pearls, White South Sea Pearls and Tahitian Pearls.
Designer: Anil Maloo-Baggins (Photo by Orasa Weldon/GIA)



Diopside weighing 11.03 carats. Cut by Columbia Gem House (Photo by Orasa Weldon)



'Beyond' Aquamarine weighing 119.65 carats. 1st Place 2019 AGTA Cutting Edge Award Winner for Innovative Faceting. Cut by Mark Gronlund (Photo by Orasa Weldon)



Mozambique 'Paraíba-type' Tourmalines weighing from 11.10 to 43.51 carats. Courtesy of Robert Bentley Co. (Photo by Orasa Weldon)



Multi-coloured Tourmaline weighing 153 carats. Cut by Meg Berry (Photo by Orasa Weldon)



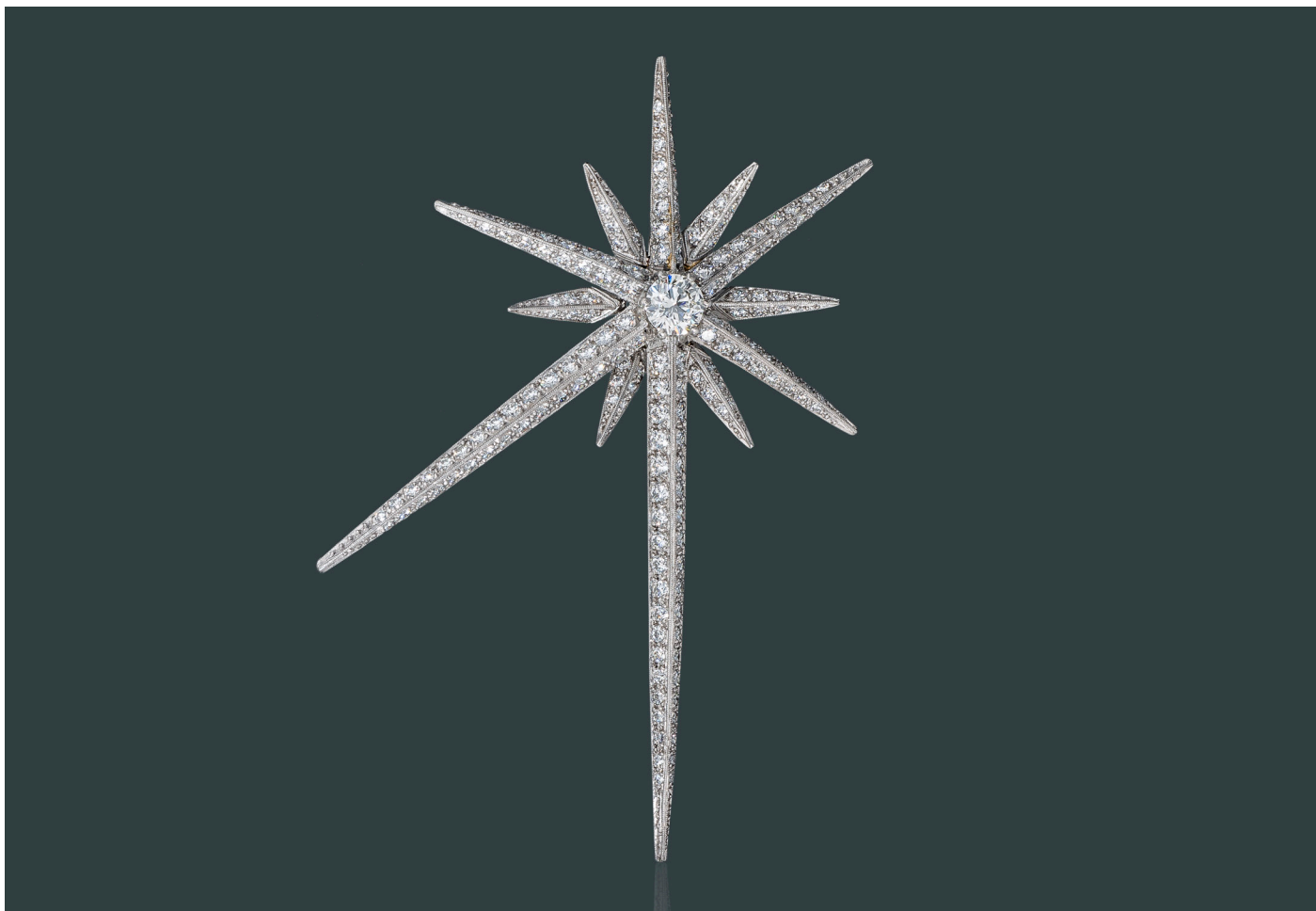
Newly discovered Ivory Creek Variscite from Kazakhstan. Courtesy of Rare Earth Mining Co. (Photo by Orasa Weldon)



'Russian Cross' 18K enamelled brooch set with Malachite and Cultured Pearls. Designed by Tony Duquette. Courtesy of the Anthony and Elizabeth Duquette Foundation for the Living Arts (Photo by Orasa Weldon/GIA)



Mahenge Garnet weighing 11.94 carats. Cut by Mark Gronlund. Courtesy of Roy Leggitt (Photo by Orasa Weldon)



'The Star of the 21st Century' De Beers Diamond International Award. Diamonds set in Platinum (3.78 carats T.W.).
A gift to the Gemological Institute of America by Fortunoff (Photo by Orasa Weldon/GIA)



'Neptune's Cross' 18K brooch/pendant set with Turquoise, Malachite and Cultured Pearls
Courtesy of the Anthony and Elizabeth Duquette Foundation for the Living Arts (Photo by Orasa Weldon/GIA)



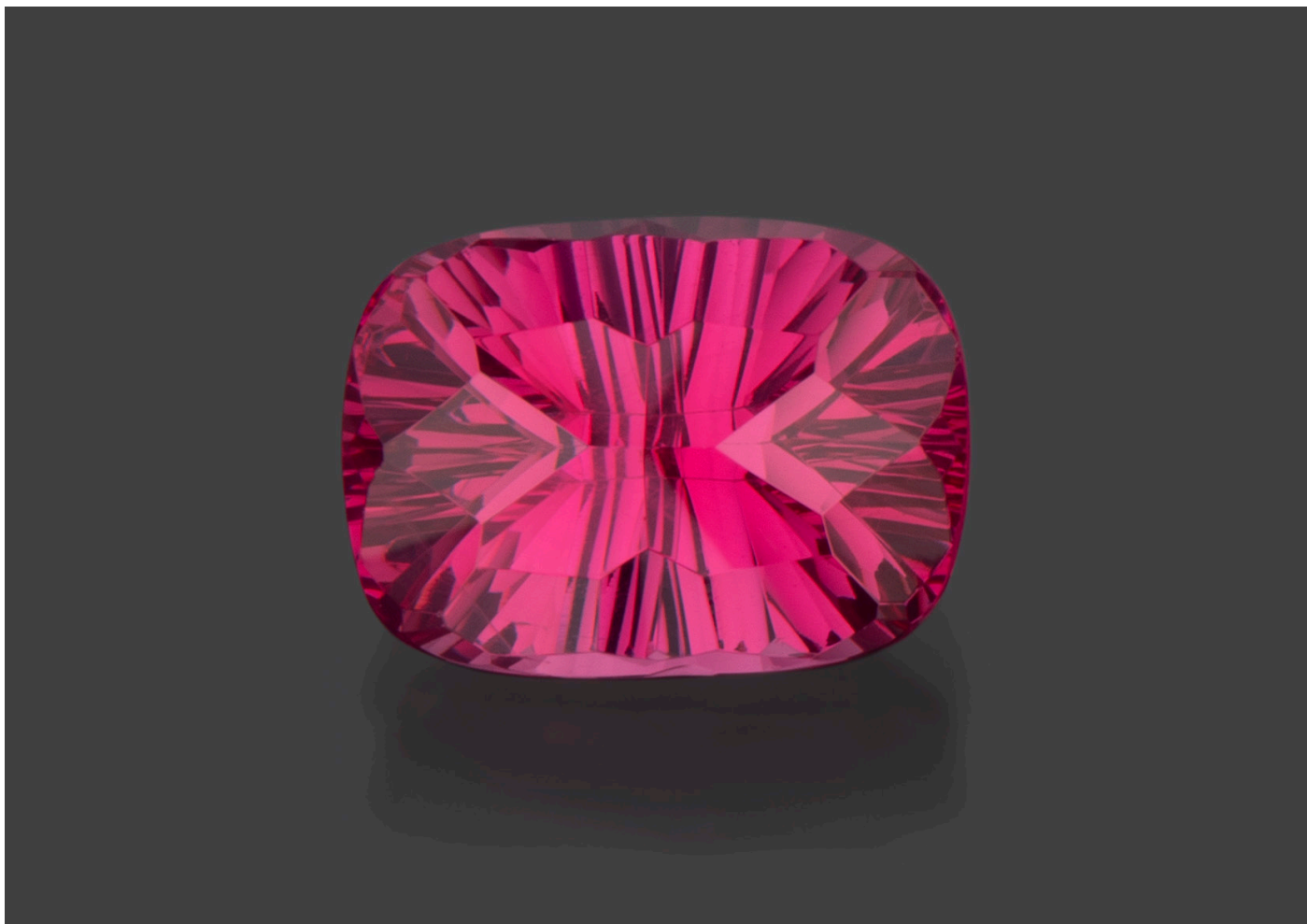
Synthetic ruby weighing 93.62 carats. A gift from Judith A. Osmer (Photo by Orasa Weldon/GIA)



Cubic Zirconia weighing 507.16 carats. A gift from Kim Dong-Keuk (Photo by Orasa Weldon/GIA)



'Firecracker Suite' Pearl necklace and earrings set in 18K and 22K. Designed by Rebecca Young (Photo by Orasa Weldon)



Pink Spinel weighing 3.35 carats. Cut by Mark Gronlund (Photo by Orasa Weldon)



14K 'Oxidized' white gold Pink Spinel and Diamond ring featuring a natural 'Vietnamese' spinel weighing 1.70 carats.
Cut by Roger Dery. Ring by Diana Widman Design (Photo by Orasa Weldon)



Natural Ruby weighing 3.80 carats. Cut by Mark Gronlund (Photo by Orasa Weldon)

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PHOTO BY JEFF SCOVIL

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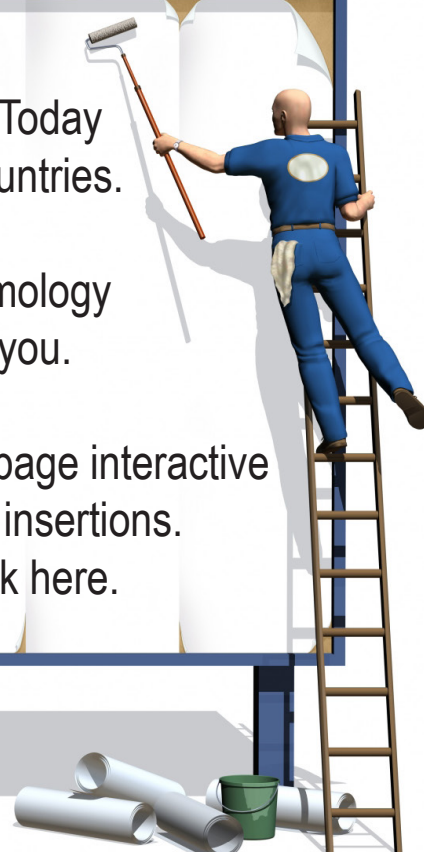
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Remembering Tino Hammid



Tino Hammid

It has been five years since Tino passed away from cancer. Faced with our own mortality, many of us develop a strong desire to leave a footprint in the sand, a desire that often becomes stronger and stronger as we grow older. While all are remembered, for some, the footprint is not only a reminder of who we were but what we achieved. A legacy that will endure for generations to come.

In Tino's case, his legacy is not only the remarkable quality of his photographic work but more importantly that much of his photographs were taken long before the advent of digital cameras and computer software capable of enhancing the imagery.

For those of us who have tried, the photography of gemstones and jewellery even today is challenging but in a world of analog film, it presented unique challenges that many photographers were unable to overcome.

Tino was self-taught, a pioneer, capable of piecing together the intricate pieces of an elaborate jig-saw puzzle, piece by piece, largely through experimentation.

Our paths crossed in 2012 when I was looking for the cover for the 1st Edition of the Handbook of Gemmology. I found an image of a Paraiba Tourmaline and contacted him to see if I could buy the rights.

He was curious about the project and it was not long before we decided to work together. I knew his photographs would add tremendous value to the book and he also felt they would translate well into the digital format we had chosen. It was a stunning success and over the years it has doubled in size and is now in its 4th Edition, purchased and downloaded in fifty-three countries including Canada, the U.S.A, Mexico, Brazil, Peru, Bolivia, Argentina, Australia (including Tasmania), New Zealand, Japan, Thailand, Indonesia, Singapore, Hong Kong, the Philippines, Malaysia, South Korea, South Africa, Ethiopia, Namibia, Madagascar, England, Spain, Germany, Portugal, France, Austria, Italy, Sweden, Norway, Finland, Switzerland, Turkey, Belgium, the Netherlands, Poland, Scotland, Ireland, Croatia, Romania, Hungary, the Ukraine, Israel, Russia, India, Sri Lanka, Iran, Lebanon, Saudi Arabia, Kuwait, United Arab Emirates, New Caledonia and the Kingdom of Bahrain.

I feel very privileged to work with his photographs and to ensure that they remain in the public domain. I have become intimately familiar with them all, forever amazed at how he was able to bring these wonderful 'Creations of Mother Nature' to life and able to reproduce their colours and their beauty for all of us to enjoy.

It is hard to pick my favourites because each one is unique and different.

The following 'Sweet Sixteen' photos, in my mind, not only illustrate his unique ability but also the complexity of photographing gemstones and jewellery. They are a testament to his enormous talent and I am sure have been inspirational over the years to many up and coming gemstone and jewellery photographers.

I hope you enjoy them as much as I do!

Copyright: Tino Hammid Family Trust



Photo One: Perhaps Tino's most iconic photograph. The Hope Diamond, weighs 45.52cts, measures 25.60mm x 21.78mm x 12.00mm and is the focal point of the Janet Annenberg Hooker Hall of Geology, Gems and Minerals at the Smithsonian Museum. With over six million visitors annually, it is considered, along with the Mona Lisa, one of the most viewed museum objects in the world.

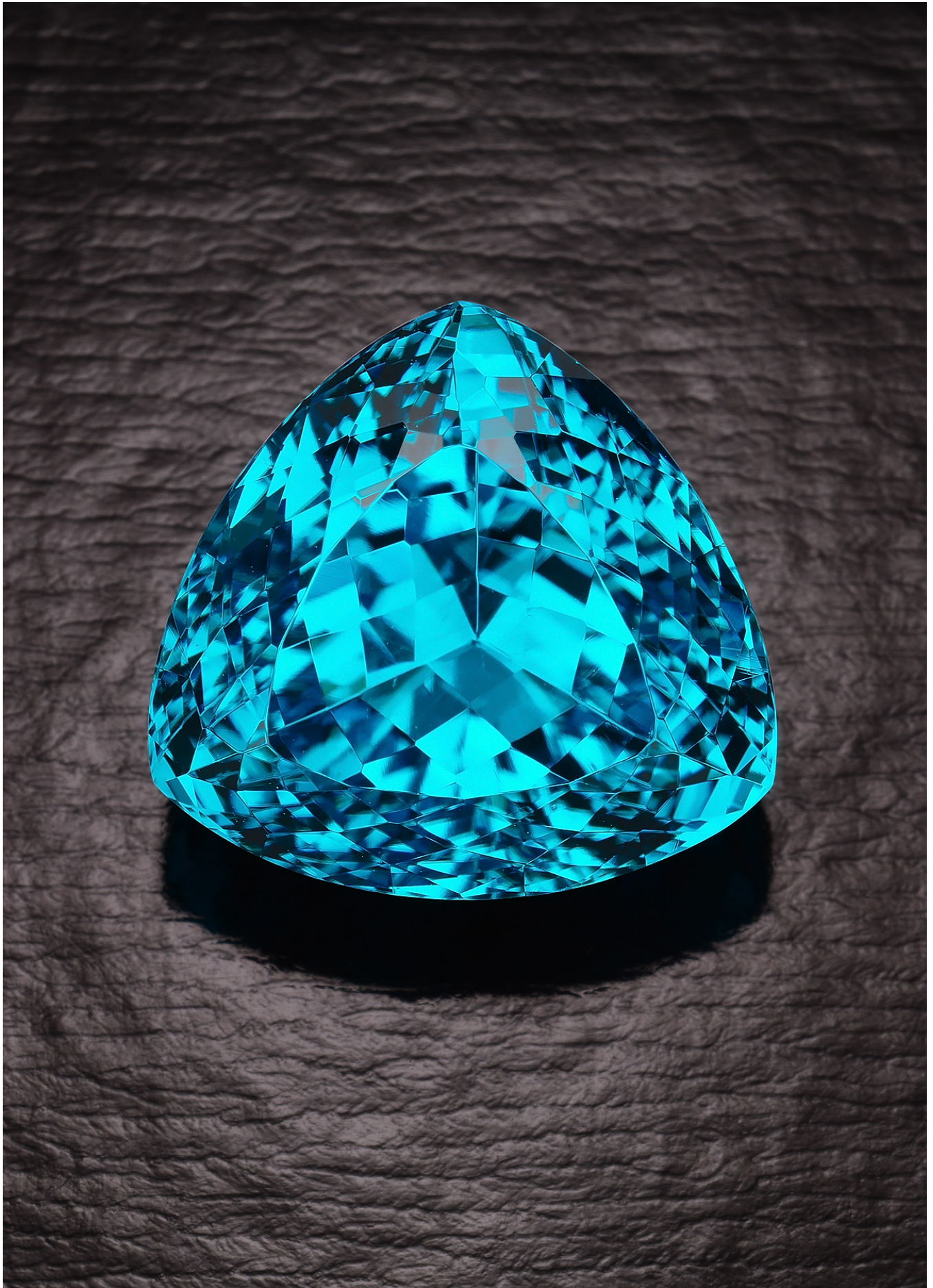


Photo Two: The photograph that started Tino's involvement in 'The Handbook of Gemmology' and the 'World Gem Foundation'. A stunning Paraiba Tourmaline weighing over 11 carats that became the cover shot for the 1st edition in 2013. It is still one of my favourite photographs. At the time Tino took this photograph it was worth a small fortune. Today, I am sure it would be worth a King's ransom.



Photo Three: When this image was first posted on social media back in 2013 to promote the Handbook of Gemmology it received an unprecedented number of 'likes'. To the untrained eye it might seem quite a simple shot but to the trained eye, it is a photographic accomplishment of immense proportions. A challenge that few could overcome. A photograph that would have required hours of study in order to get the 'perfect' shot.

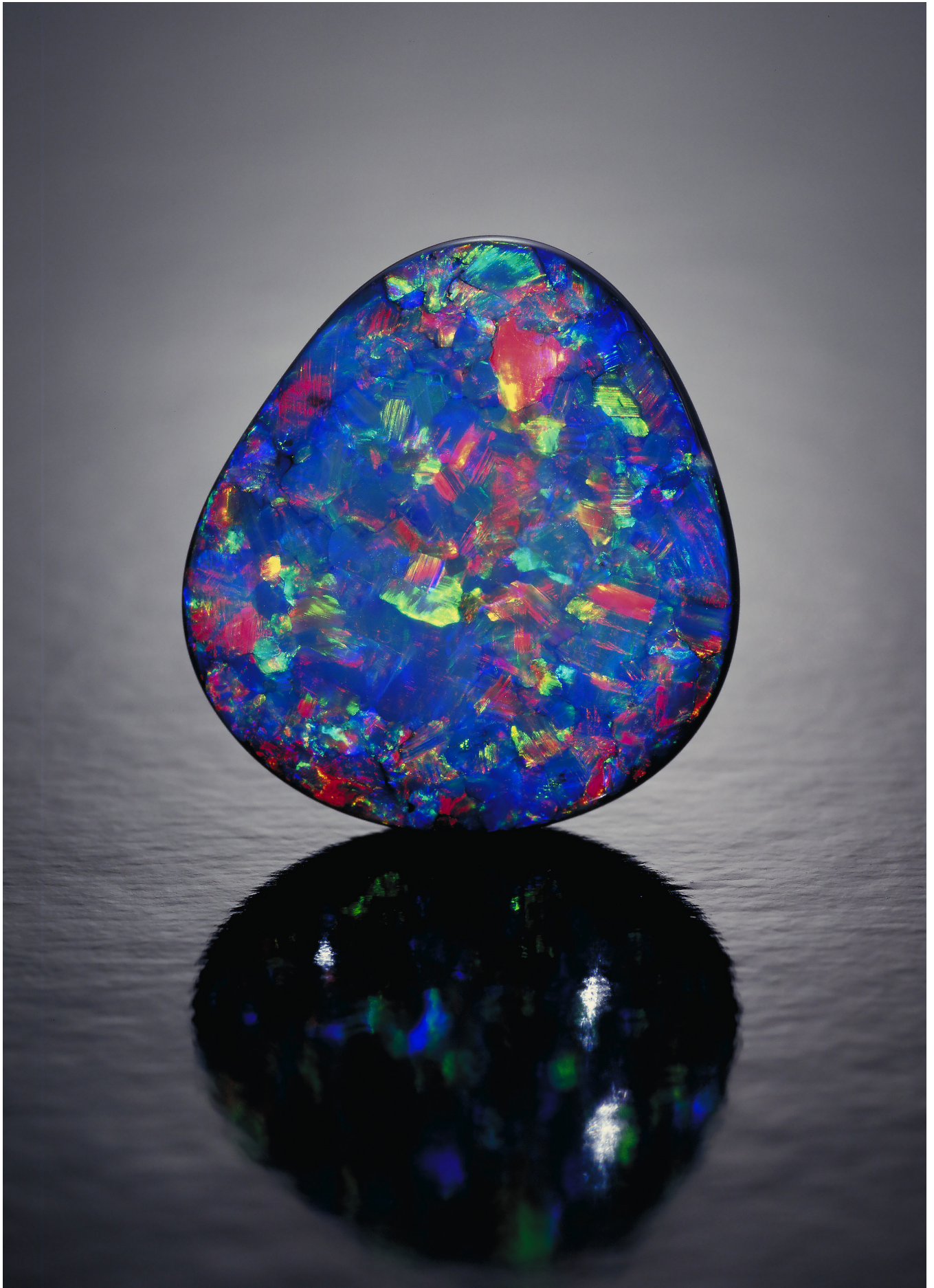


Photo Four: Truly one of the finest opals I have ever seen. What I love about this photo is the reflection. Seemingly an opal with two distinct personalities captured on film.



Photo Five: I sold this stone to a collector in the U.S on behalf of the cutter and I can assure you, Tino managed to capture the true beauty of this spectacular sphalerite in all of its glory. Due to its high dispersion, photographing sphalerite presents unique challenges, requiring many hours to set up the shot but what a result! Tino hit this one out of the ball park.

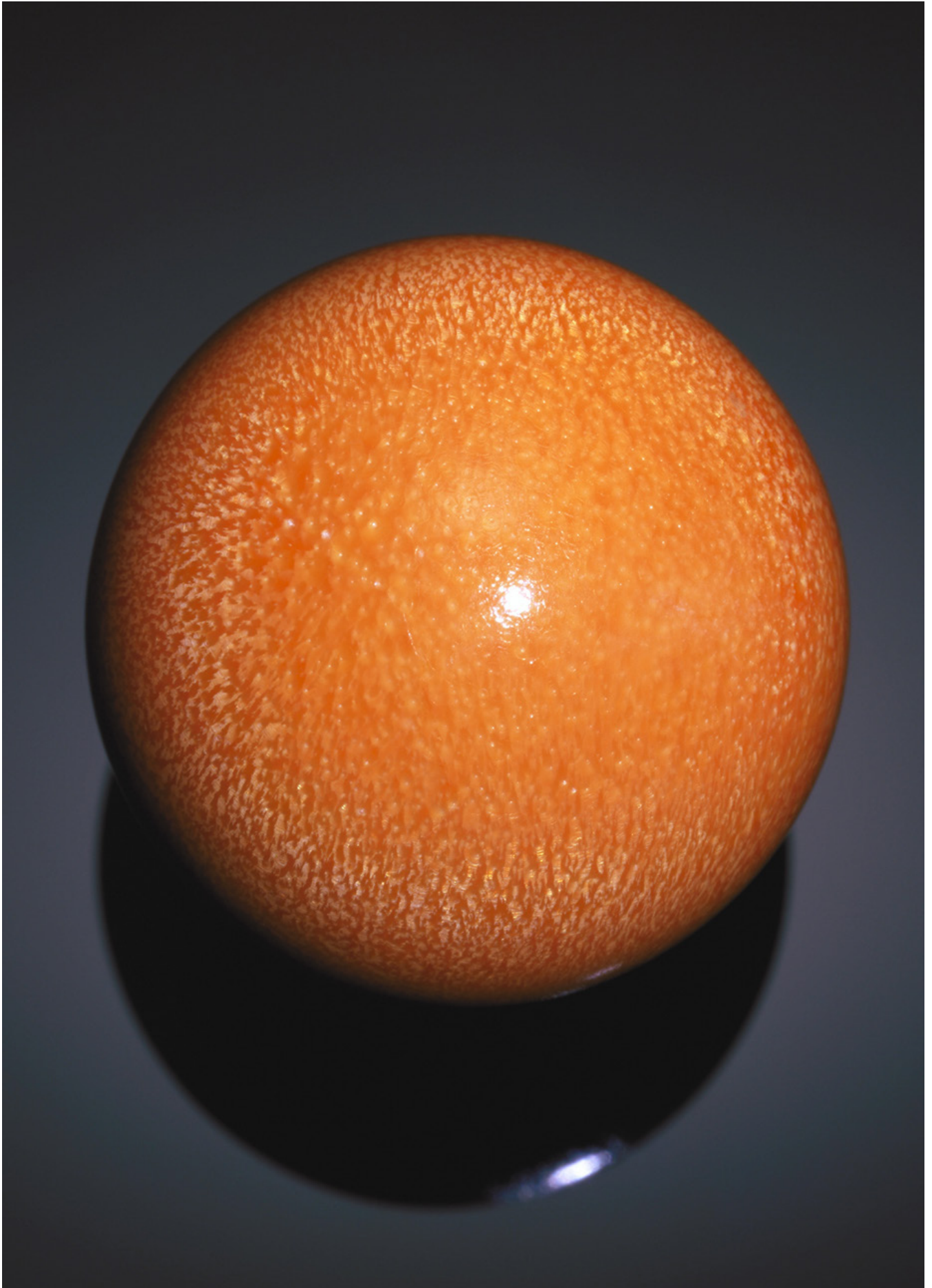


Photo Six: This was the cover shot for our December 2018 issue. A glorious Melo Pearl captured in all of its beauty. The colour and the attention to surface detail makes this one of Tino's top photos.

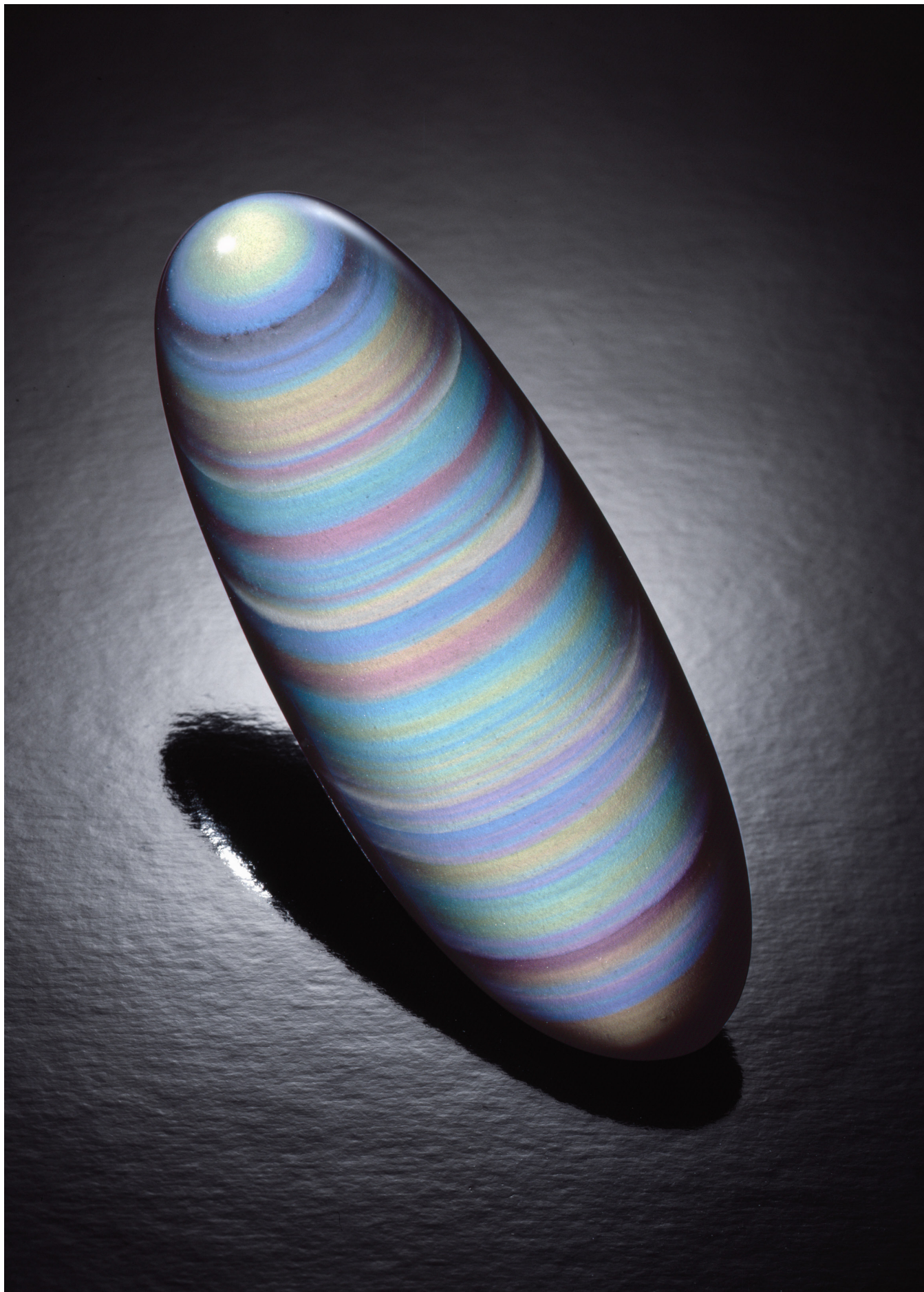


Photo Seven: This rainbow obsidian pushes the boundaries for any photographer. It looks almost surreal. Like a lollipop just waiting to tempt the inner child in all of us.



Photo Eight: I love this photograph but many might wonder why it is in my 'Top 16'. Well capturing the 'schiller' in one moonstone is hard but thirty-seven?



Photo Nine: A relatively simple ring but it is the mirrored background and the quality of the ruby that makes this photograph stand out. A departure from the typical backgrounds Tino used, this ring literally jumps off the page.

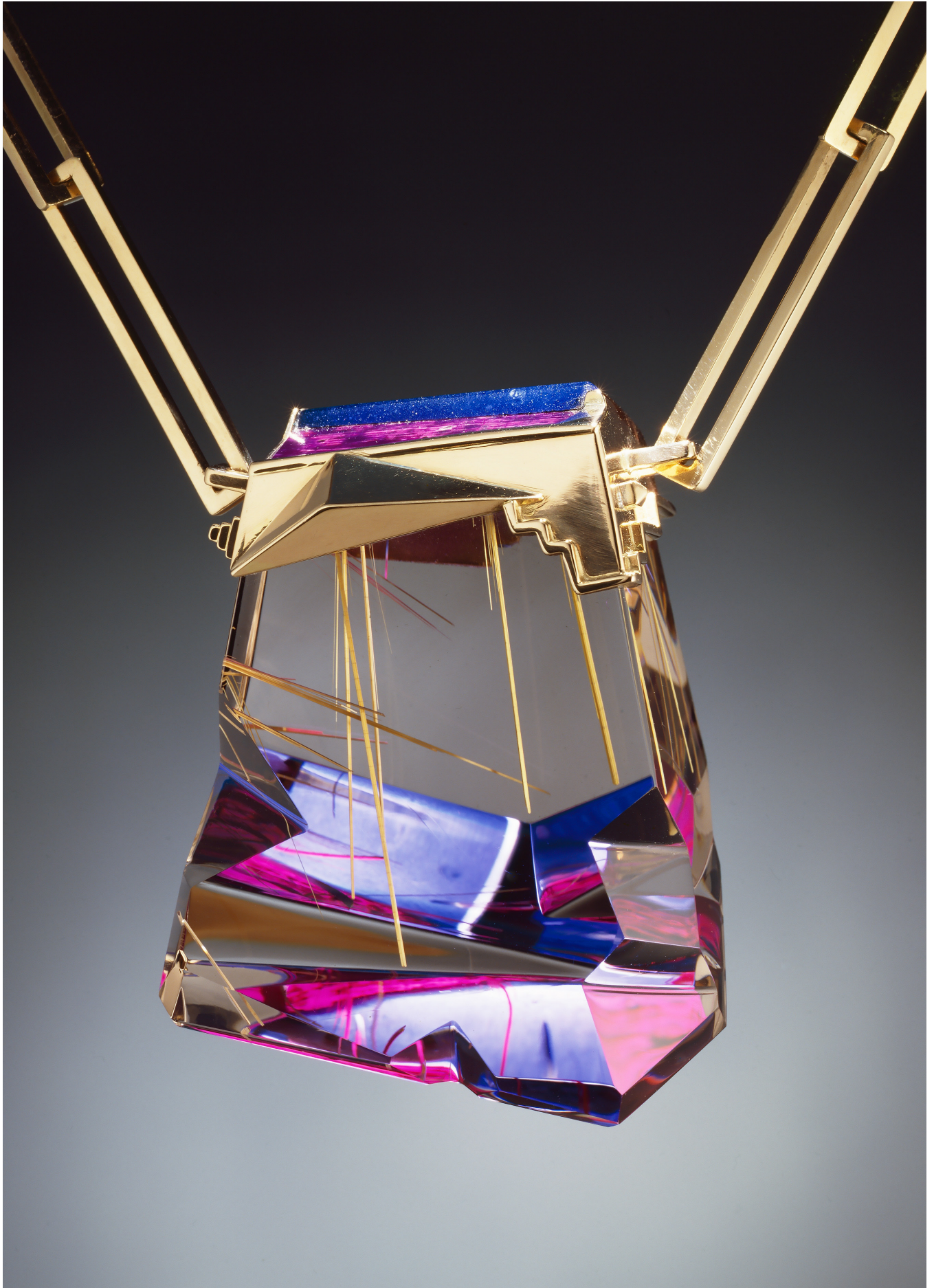


Photo Ten: What is stunning about this photograph is that Tino managed to capture the reflections of the lapis and sugilite giving the pendant an almost surreal quality.



Photo Eleven: Capturing the beauty of this rainbow calcite would not have been easy but Tino managed none the less. What an amazing result.



Photo Twelve: It may only be a lab-created rutile but wow.....the dispersion and the colours are mesmerizing. A tricky shot but Tino managed to pull it off.



Photo Thirteen: Trying to capture two optically phenomenal gemstones, in this case a Cat's Eye Chrysoberyl and a Cat's Eye Alexandrite, in one shot takes a unique ability. Tino had that unique ability.



Photo Fourteen: To coincide with the 24th World Diamond Congress in Singapore in 1989, Gabi Tolkowsky, the great nephew of Marcel Tolkowsky, created five new diamond cuts (Dahlia, Fire Rose, Marigold, Sunflower and Zinnia) that were designed to maximize yield from irregular, strongly coloured, small, or heavily included rough. The 'Fire Rose' was one of them. Representing a radical departure from conventional cuts in terms of angles and proportions, they were adaptable from small melee sized diamonds to ones of several carats, and, in many cases, improved the overall brilliance, clarity and colour. Sadly the idea did not catch on and few of them are found today.



Photo Fifteen: Nicknamed 'The Baby', this is one of the finest fire agates I have ever seen. Technically challenging but captured on film for ever. When you zoom in on this photograph it is as if you are on another planet.



Photo Sixteen: This was the cover of our August 2017 issue. While on the surface it might appear quite simple, I can assure you it is not. Photographing so many stones especially with the curvature of the brooch would have been quite a challenge. I also love the background. Again not a typical Tino background but it works!

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 introduced two new 'Diploma' programs (Diamond Professional and Coloured Gemstone Professional) in 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 (5 modules - 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 60 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, HPHT, CVD, Detonation, Ultrasonic Cavitation Skull Crucible, Zone Melt, Horizontally Oriented Crystallization, the Sublimation Method, and the Modified Stöber 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 module looks specifically at diamonds, their physical and optical properties, geology, localities, principle mines, crystal system, chemical composition and classification, causes of colour (fancy coloured diamonds), absorption spectra, inclusions, fluorescence, diamond cutting and mining 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, pricing 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 60 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 60 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 Coloured Gemstone Professional 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 60 hour online Coloured Gemstone Grading #2 course.

Residency Programs

We are delighted to announce that our Career Gemmologist Diploma Program is now available as a full-time residency program through the French-Swiss Gem Academy in Nice, France and the Gem Academy of Canada in Montreal, Canada.

Integrating the theoretical and practical components of the program, this offers students a great opportunity to achieve their Career Gemmologist Diploma in less than six-months.

Courses in Other Languages

All of our courses are now available in English and French. Currently Gemología Básica, Gemología Avanzada, Identificación de Gemas and Diamantes are available in Spanish with the remaining diploma and general interest courses available later this year.

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 five theoretical courses (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). Students taking any of the three 'General Interest' courses will receive a credit equal to the cost of the course if they upgrade to our Coloured Gemstones course.

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 world 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 in a classroom or 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 outlines the number of online tutoring hours that are included in our courses. If you require additional tutoring, you can talk to your tutor 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

Once a Student, Always a Student

We appreciate that the science of gemmology is constantly evolving. Every year new lab-created gemstones and treatments and enhancements are emerging in the market place along with new techniques and advanced technology to detect them. While your knowledge in certain areas may be relevant today, it may be obsolete tomorrow.

To meet this challenge, the World Gem Foundation has introduced our 'One a Student, Always a Student' policy, an innovative program that is unique to the World Gem Foundation and our affiliated gem academies.

Once you register for one of our courses or programs, we provide you with lifetime access to your student page so that every two years when we update our courses, you will receive the latest digital course notes free of charge.

Flexible Study Schedules

Benjamin Franklin once said 'An investment in knowledge pays the best interest' and this is as true today as it was back then. But how can we achieve this when we all lead such busy lives?

At the World Gem Foundation, we appreciate that we all have responsibilities and commitments that can make studying a challenge.

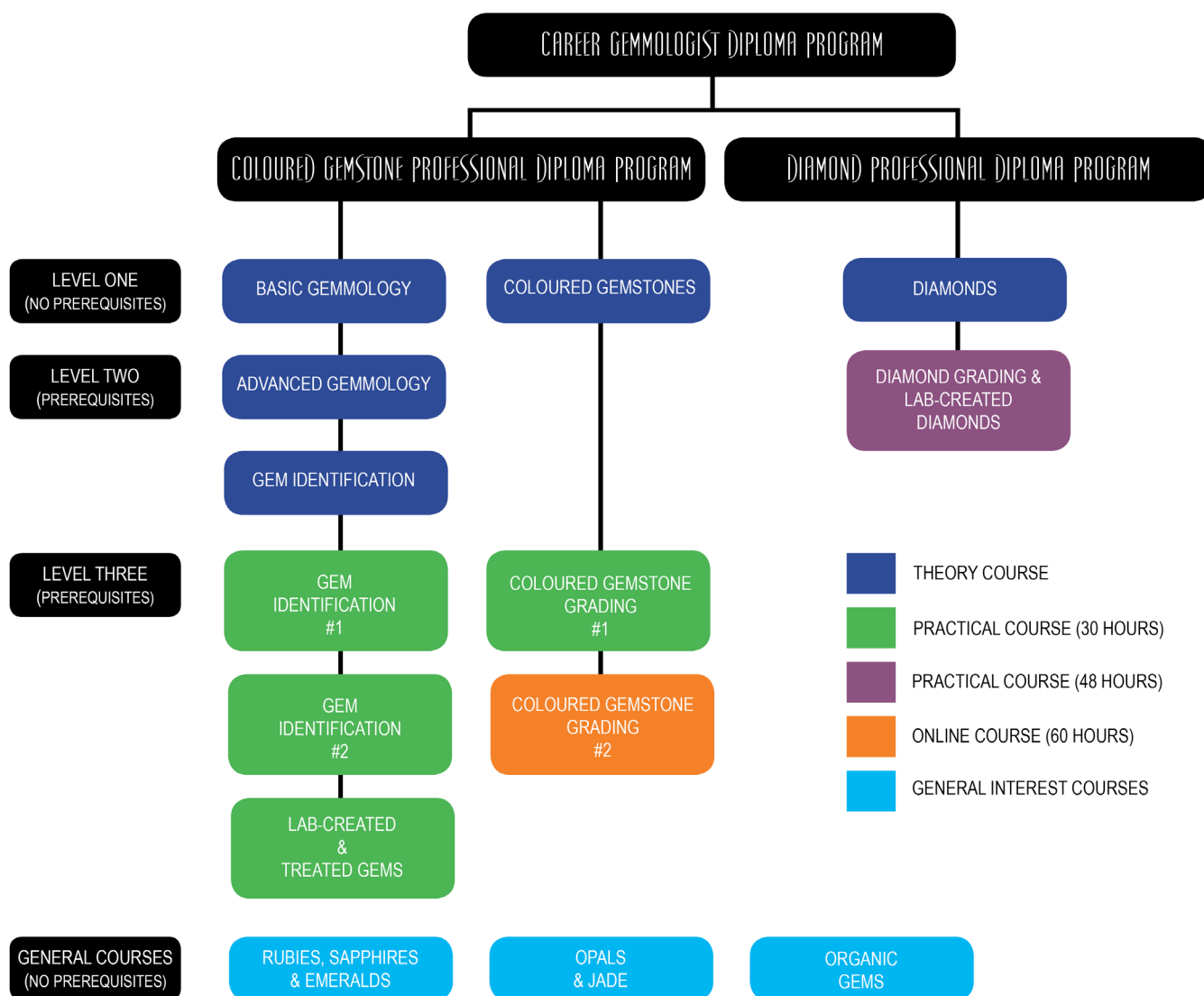
To meet this challenge, we offer a flexible study schedule that allows you to register at any time and study at your own pace.

Enrol in one of our three diploma programs, take the theory and practical diploma courses separately and receive course credits or take our general interest courses. The choice is yours! Our goal is to help you devise a study schedule that works for you!

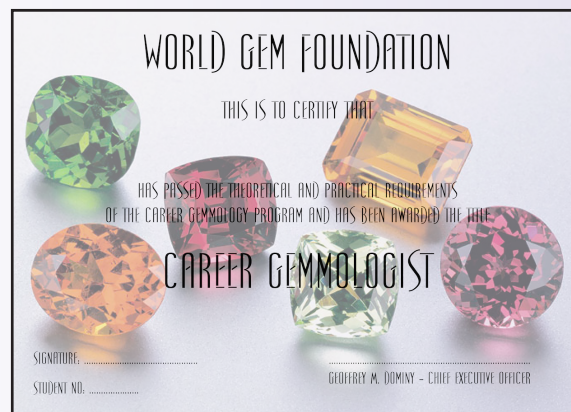
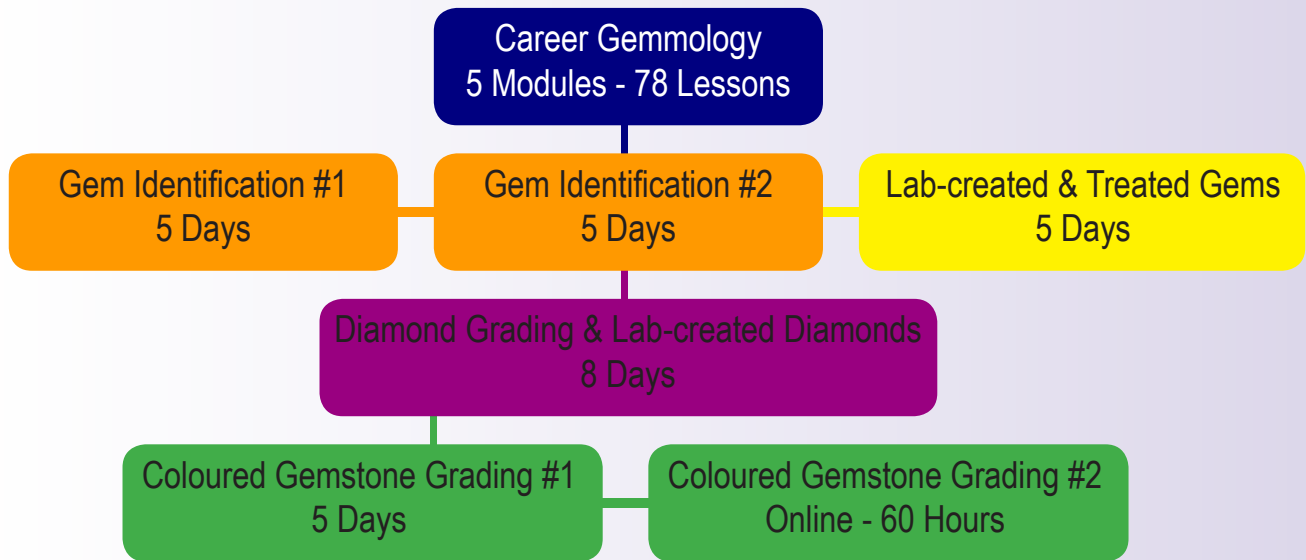
Whether you are taking our online tests, writing our final theoretical examinations or taking a practical test, we provide you with the flexibility to make it possible. Our students are our major stakeholders and we believe it is our responsibility to offer them every opportunity to achieve their educational goals.

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.

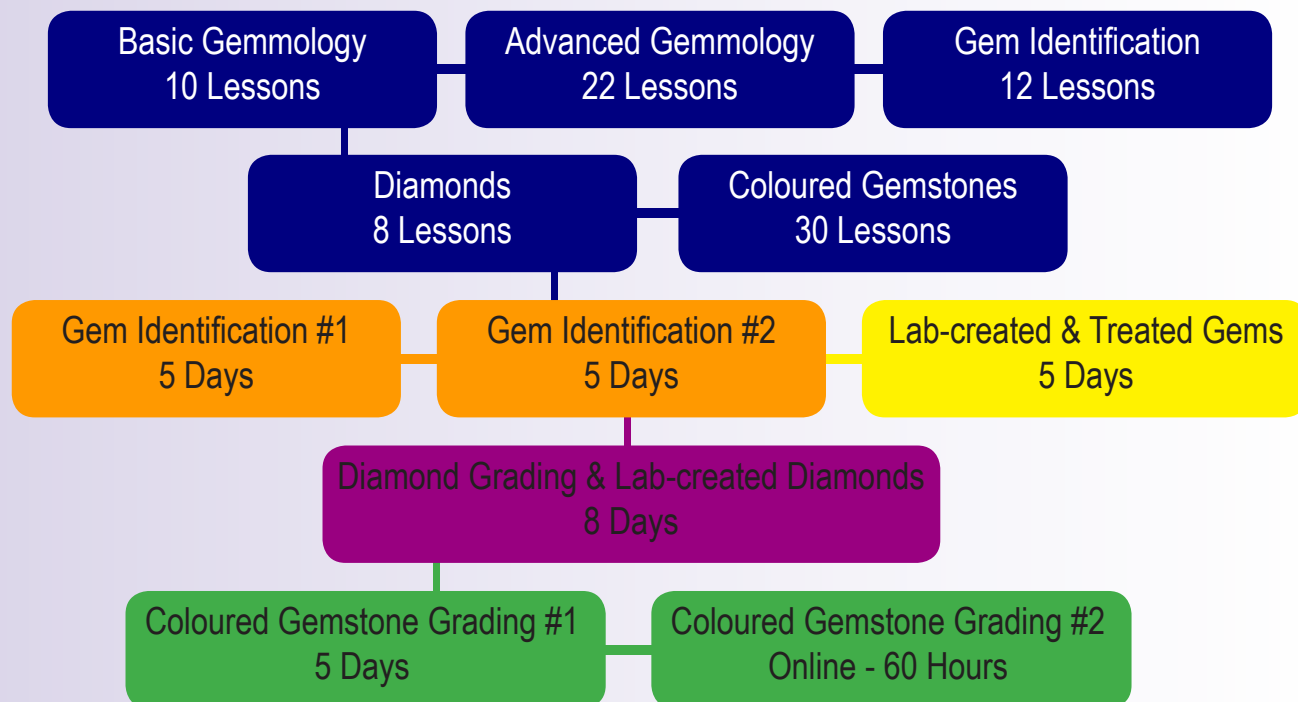


GEMMOLOGY SEVEN PROGRAM



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
Total Cost	6400	5100	7230	6570	5235	7425

GEMMOLOGY ELEVEN PROGRAM

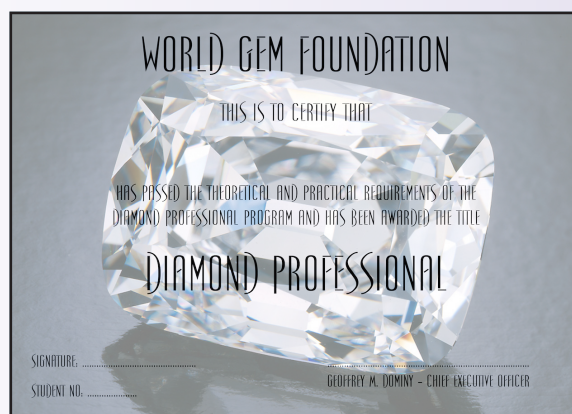


Career Gemmology Eleven				Digital Fees			Printed Fees		
Course Name	Euros	Pounds Sterling	USD	Euros	Pounds Sterling	USD	Euros	Pounds Sterling	USD
Basic Gemmology (Theory)	200	150	225	235	180	265			
Advanced Gemmology (Theory)	400	300	450	430	325	485			
Gem Identification (Theory)	225	175	250	255	200	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			
Total Cost	6550	5200	7355	6740	5355	7575			

DIAMOND PROFESSIONAL

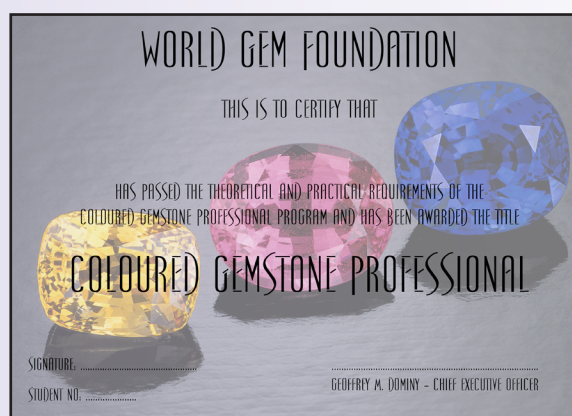
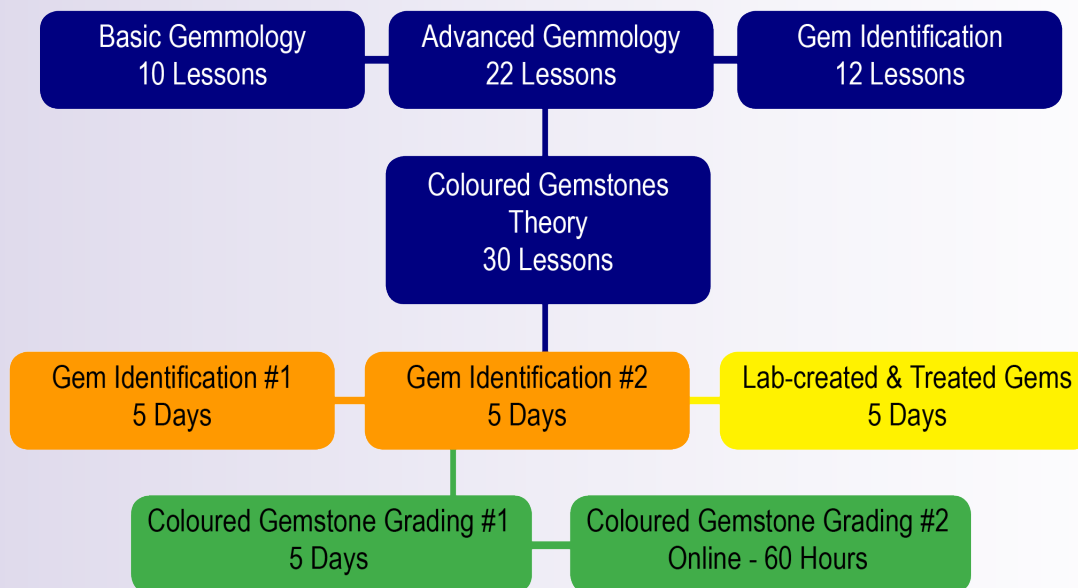
Diamonds
Theory
8 Lessons

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
Total Cost	2225	1775	2530	2255	1800	2565

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
Total Cost	4575	3625	5105	4735	3755	5290

Practical Workshops

Gem Identification #1



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 and Advanced Gemmology, Gem Identification (Theory) or Equivalent

Gem Identification #2



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.

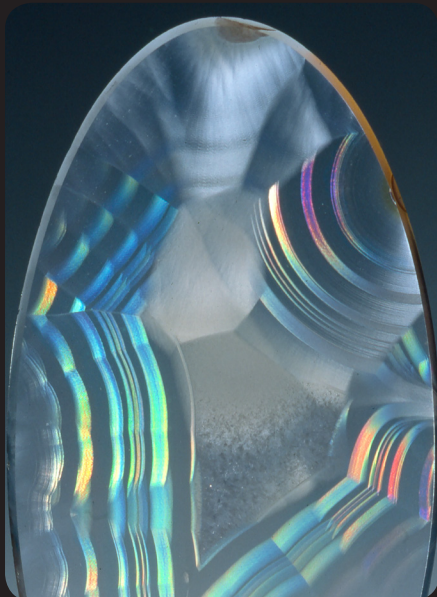
Prerequisites: Basic and Advanced Gemmology, Gem Identification (Theory), Gem Identification #1 (Practical) or Equivalent

Practical Workshops

Coloured Gemstone Grading #1

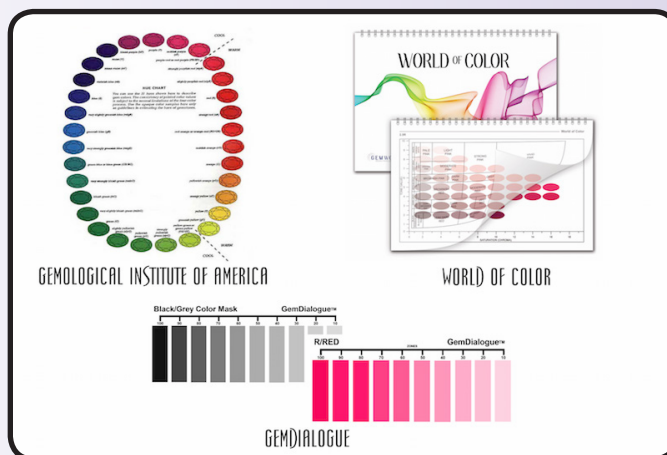
This five-day (30 hours) workshop includes practical instruction on how to access the hue, tone and saturation of coloured gemstones using three popular colour grading systems (Gemological Institute of America, GemDialogue and World of Color) and how to grade pearls, jadeite and opals.

Prerequisites: Coloured Gemstones (Theory) or equivalent



Course Cost € 500

Reserve Your
Place Now



Coloured Gemstone Grading #2

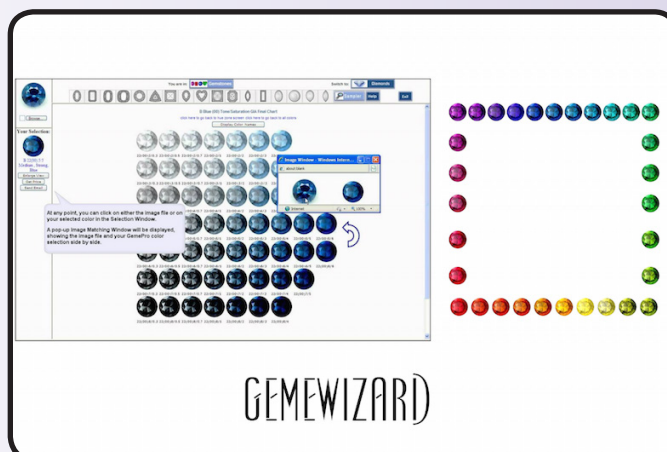
This 60 hour online course consists of a comprehensive overview of the GemWizzard Colour Grading System including colour theory (hue, tone and saturation), how they impact on the value of gemstones, practical exercises that are completed online, and a six month subscription to the Gemewizard program.

Prerequisites: None



Course Cost € 1000

Reserve Your
Place Now



Practical Workshops



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: Basic and Advanced Gemmology, Gem Identification (Theory), Gem Identification #1 and #2 (Practical) or Equivalent



Course Cost € 1750

Reserve Your
Place Now

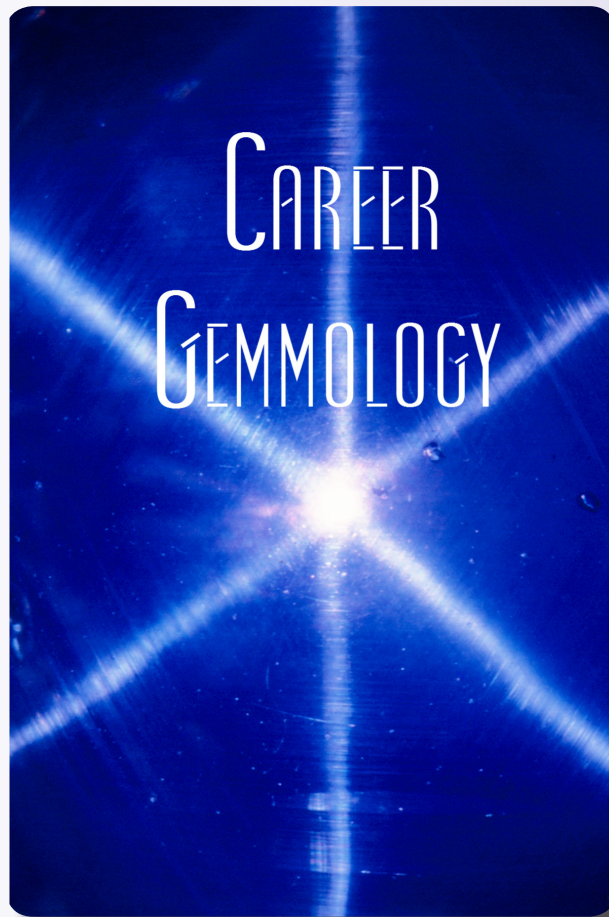
Diamond Grading & Lab-created Diamonds

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 (Theory) or Equivalent



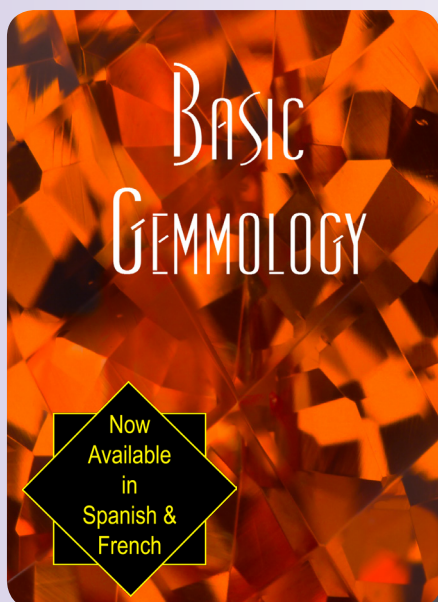
Course Content

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 Stöber 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

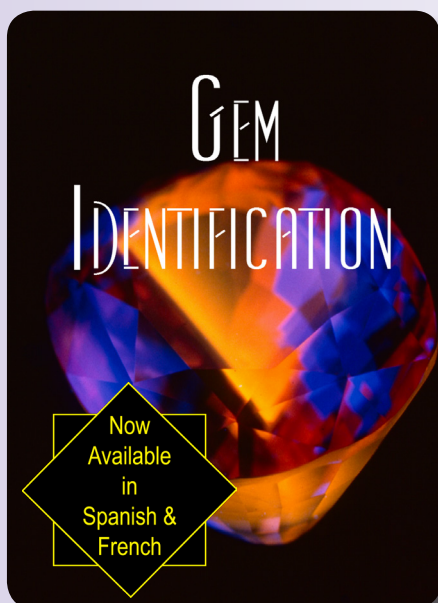


Course Content

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

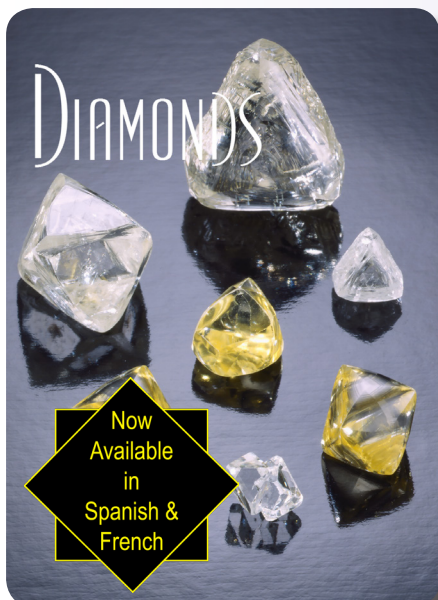


Course Content

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

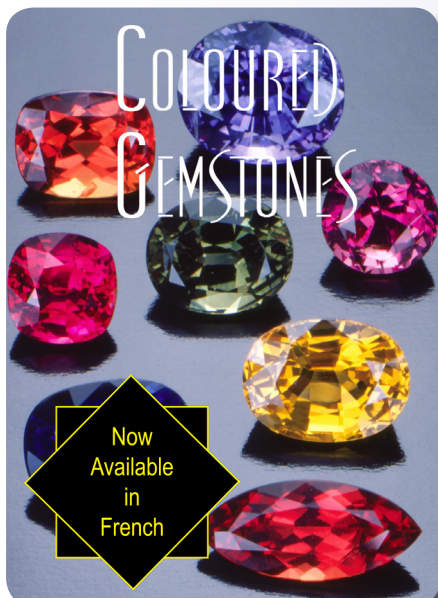


Course Content

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

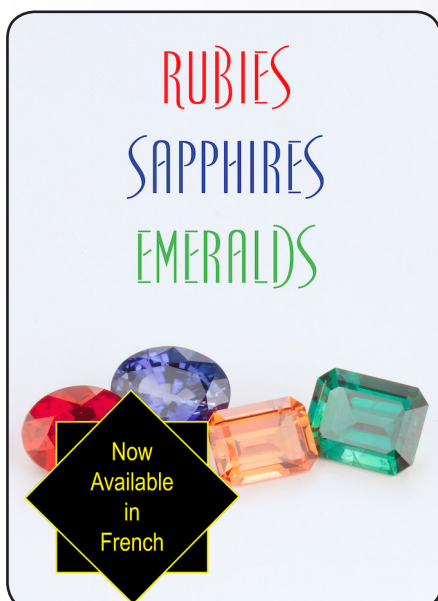


Course Content

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



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



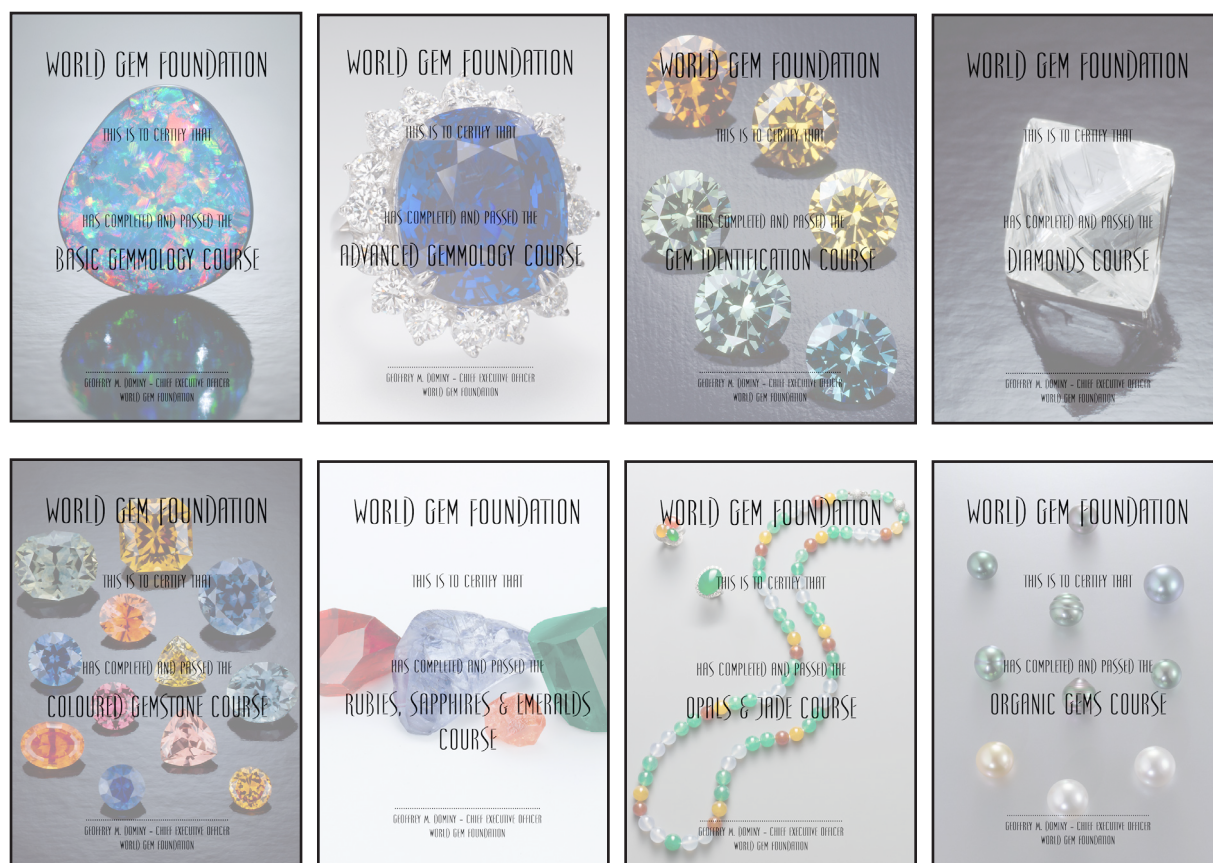
Course Content

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





Grade School

MICHAEL D. COWING is the author of *Objective Diamond Clarity Grading*, an educator, gemologist and appraiser operating an Accredited Gemologist Association (AGA) Certified Gem Laboratory. His career in the diamond, gem and jewelry business spans over 35 years.



Round Brilliant Cut Beauty and Light Performance Part 1

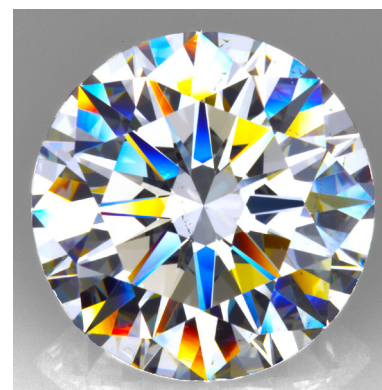


Figure 1: Ideal Round Brilliant Diamonds; photographed in a mixture of diffused/spot lighting to display their superior brilliance and fire.

Introduction

The classic 57/58 facet brilliant cut diamond has evolved to become the universally most popular way to cut and polish a diamond crystal for best 'light performance'; meaning greatest beauty. It was cut in the 1700's ¹ mostly in a square/cushion shape, and from the 1860's ² to today in the round brilliant style.

From the early 20th century, 'Ideal' ³ was the term used for the range of angles of the brilliant cut believed to maximize the attributes of diamond beauty (brilliance, fire and scintillation). Historically, writers and cutters defined the 'Ideal Cut' in terms of the pavilion and crown main facet angles. Of seven independent parameters defining the round brilliant cut, this pair of angles is most critical to round brilliant light performance. The remaining parameters, most importantly the angle of the pavilion halves, are cut in relation to this angle combination (for example, the pavilion halves are most often cut within 1.4° of the mains).

All seven parameters are measured and included in today's definitions of the best or 'Ideal' grades. Only a small range of main angle combinations may receive the 'Excellent' grade in the cut grading system of the Gemological Institute of America (GIA), and the AGS 0 Ideal grade in the system of the American Gem Society (AGS). 'Ideal', in this article, references the best crown and pavilion main

angle combinations. These most important angles, in proper combination with the other 5 parameters, result in the best round brilliant beauty/light performance.

From the early 1900's, the angles called 'Ideal' were the 41° pavilion and 35° crown attributed to the Boston cutter, Henry Morse ⁴. From 1916 and his publication of 'Diamond Design' ⁵, Marcel Tolkowsky's theoretical 40.75° pavilion and 34.5° crown main angles were adopted as 'Ideal'. These exact theoretical angles were thought by many to be a peak in performance and were promoted as such by diamond industry educators. However, rather than a precise angle combination, industry grading practice acknowledges a small range of angle combinations around those of Tolkowsky and Morse as equally best or 'Ideal'. Tolkowsky implied a range of best angles around 40.75° and 34.5° when he offered five diamonds as empirical proof of his calculations. They had a range of angles and proportions that Tolkowsky described in 'Diamond Design' as 'all cut regardless of loss of weight, the only aim being to obtain the liveliest fire and the greatest brilliancy'.

Going back over 100 years, numerous efforts have been made to analytically prove the superiority of the small range of angles called 'Ideal'. Several metrics and methods have been developed in attempts to provide this proof. Ray tracing was employed by many (e.g. Marcel Tolkowsky in 'Diamond Design'). Others developed measures of aspects of diamond

beauty, such as brilliance and fire, including, in the United States, the grading laboratories of the GIA, and the AGS.

It is problematic that metrics most often fail to point to why this small range of key angle combinations is best. Instead, most metrics of brilliance and fire show peaks or maxima well away from the narrow range graded 'Ideal' and 'Excellent'.

Presented in this article are answers to why the 'Ideal' Cut's small range of angles is best. Analytical lighting and photography, and reverse ray tracing through the brilliant cut's crown facets are used to analyze and gain an understanding of its light performance. An important element of this analysis, introduced in this article, is the concept of the 'diamond's eye'. Together, these analysis techniques are employed to explore the range of angles found to be the best or ideal by GIA Laboratories (the Excellent grade); by AGS Laboratories (the AGS 0 Ideal); and by diamond cutting schools and institutions and the author. Negative light performance effects ensue when a diamond is cut outside of this range of best angles. These are explored and analyzed.

Virtual Facets; The Fundamental Elements of Diamond Light Performance

A brilliant cut diamond's appearance is a kaleidoscopic pattern of internal reflections of surrounding light sources that are mirrored to the viewer after reflecting from the diamond's pavilion facets.

Outlined in Figure 2a are the 57 crown and pavilion facets making up the round brilliant cut diamond. The 'Ideal' Cut photo, Figure 2c, reveals many more reflections than there are facets. (For example, each of the eight arrow reflections from the pavilion main facets outlined in Figure 2a, splits into three facet reflections as outlined in Figure 2b.)

These reflections are due to the breakup and division of light reaching the observer after twice reflecting from the diamond's pavilion. Because these many reflections give the appearance of more facets than are actually present, they are called 'virtual facets'. Each is a potential point of light, sparkle or fire, as seen in Figures 1 and 2c. These virtual facet reflections are the fundamental elements of diamond beauty and light performance.

A full accounting of the diamond's light performance can be obtained through examination of the individual and combined properties of these basic components of diamond beauty. As seen in Figures 1 and 2c, each virtual facet location exhibits sparkle or spectral fire depending on its orientation to surrounding sources of light, and the properties of those light sources.

The pattern of virtual facet reflections changes with each movement of the diamond or the observer. At any moment in time the arrangement of diamond and viewer results in a unique reflection pattern such as the ones seen in Figures 1 and 2c, where the views are looking at the diamond face-up perpendicular to the table.

This study explores the critical narrow range of best main angle combinations using the analysis technique from the field of optics called reverse ray tracing. Reverse ray trace analysis of the round brilliant pattern of virtual facets is employed to gain understanding of the Ideal's superior beauty/light performance.

Reverse Ray Trace Analysis

Reverse ray trace analysis is an important tool and a key to understanding diamond beauty and light performance.

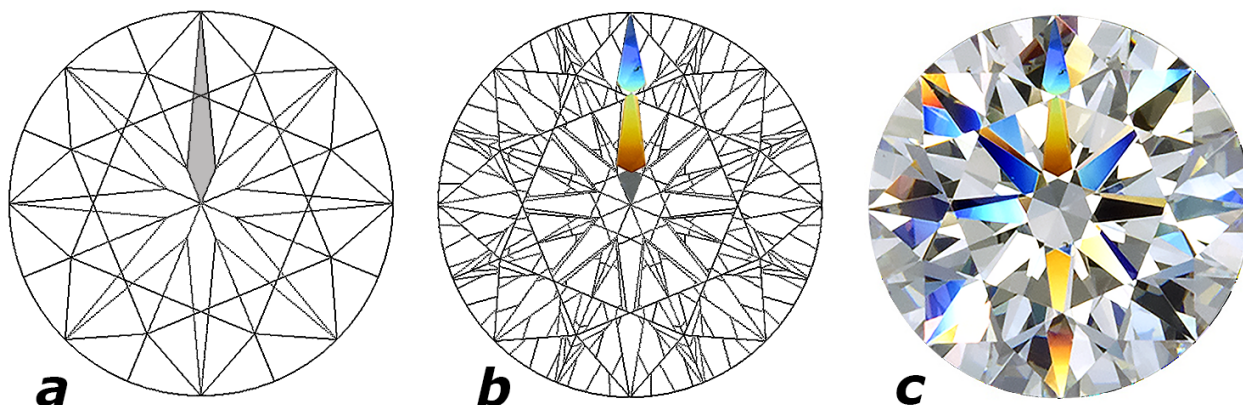


Figure 2: Face-up view of round brilliant. a. Wire frame outline of the diamond's 57 facets. b. Outline of 'virtual facets' resulting from light's interaction in doubly reflecting from the pavilion facets out through the crown. c. Photo of Ideal round brilliant displaying brilliance and fire emanating from these virtual facets.

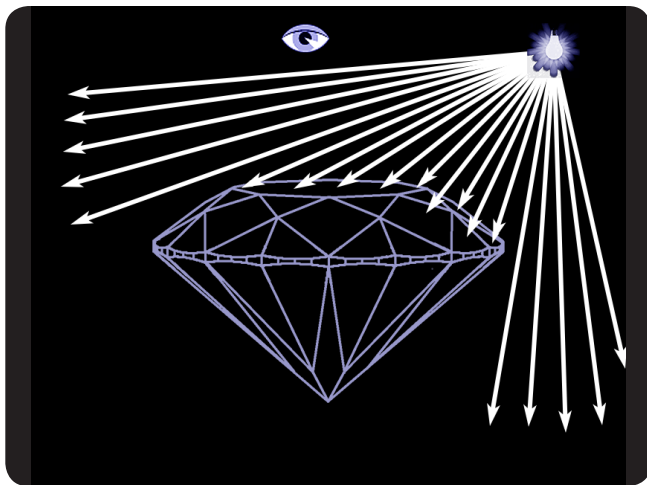


Figure 3: Light radiating from a source 45° away from the overhead observer. Rays enter the diamond all over through the crown facets. Which of these countless rays emerge from the diamond's crown, and is seen by the overhead observer? The answer is found with reverse ray tracing.

Rays of light radiate from sources of illumination around a diamond, and enter all over through the facets of the diamond exposed to these sources, (See example Figure 3). After refracting into and reflecting through the diamond, the rays exit in many directions, most never reaching a particular observer's eyes. From among the innumerable paths of all these rays how does one discover which if any of them is the path from a light source through the diamond to the viewer's eye? Reverse ray tracing provides the answers. This technique directly discovers the paths of rays that actually reach a specific viewer's eye reflected to him/her from each facet location in the crown.

With reverse ray tracing, rather than tracing the innumerable light rays that radiate from each light source, each analytical ray is drawn starting in reverse from the eye. In face-up viewing, that ray enters perpendicularly through a facet location in the crown, (see the Figure 4 example). By following that ray into, through and out of the diamond, reverse ray tracing discovers the direction it takes upon exiting. That exiting direction must be a source of light for the analyzed facet location to be bright. In other words, for a particular configuration of diamond and observer that facet location is 'looking for light' in the direction of that exiting ray. Because each wavelength of light travels the same path through the diamond in either direction, reverse ray tracing discovers what the eye is seeing mirrored to the viewer from each analyzed point in the crown.

Today's Range of Angles Graded Both Excellent and Ideal

Both the cut grading systems of the GIA, and the AGS define their top grades, GIA Excellent and AGS 0 Ideal, to be in a narrow range of angle combinations and proportions. The best main angle ranges of each differ in some respects,

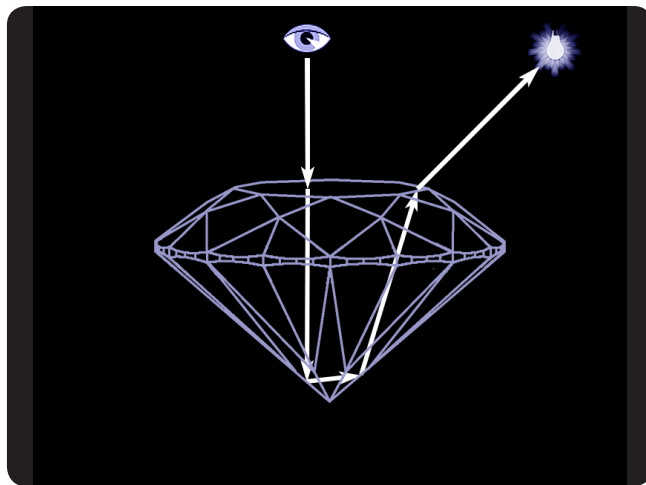


Figure 4: By reverse ray tracing from the observer's eye through the table reflection area we find that this center area in the Ideal Cut is looking for light in the 45° direction. In this case that is the location of the light source. Reverse ray tracing shows that the diamond reflects the light present at 45° to the overhead observer's eye, lighting up the virtual facet location inside the table reflection area. If there were no light in that direction the table reflection would be dark.

but significantly are found to have a common geometric center (For example, the central pavilion main angle of both is within two tenths degree of 41°). For reference purposes this common geometric center is called the 'Central Ideal'.

The Central Ideal

The geometric center of best angle combinations was reported in the research study, 'The Accord in Round Brilliant Diamond Cutting' ⁶, and the summary article, 'The Central Ideal' ⁷.

Unlike Tolkowsky's single theoretical peak in light performance at 40.75° pavilion, 34.5° crown and 53% table, the 'Central Ideal' is simply the center of the narrow ranges of angle combinations that today are graded 'Ideal' and 'Excellent'.

The center of the range of AGS 0 Ideal and GIA Excellent angle combinations for the round brilliant cut is 41° for pavilion angle (first attributed to Henry Morse), and close to Marcel Tolkowsky's theoretical crown angle of 34.5° at 34° ⁷. The central ideal main angles of 41° and 34° are very close to both the angles of Morse and Tolkowsky. In proper combination with the other five parameters defining the round brilliant cut, this central ideal combination of 41° and 34°, along with the angle combinations of Morse and Tolkowsky, are all in the narrow range having best/ideal light performance and beauty.

The central combination of 41° and 34° is in accord with the teaching of diamond cutters and diamond cutting institutions, and the author's study findings. From the 1970s, the Institute for Technical Training in Antwerp, Belgium,

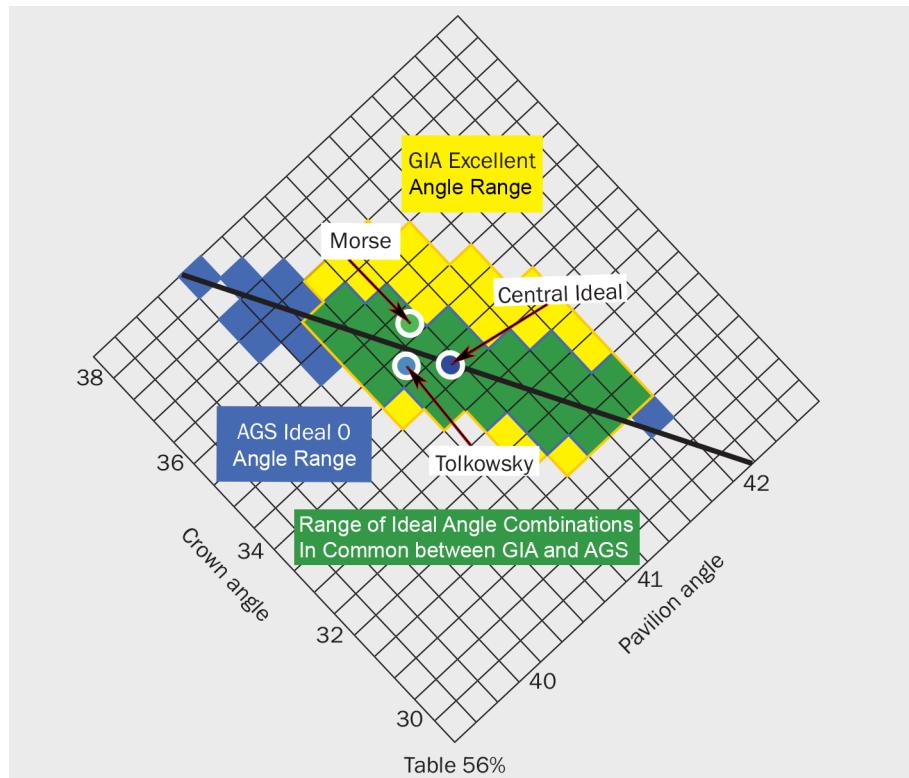


Figure 5: This Graph for a table size of 56% illustrates the range of pavilion and crown angle combinations that today comprise the Ideal 0 of AGS (blue + green), and the Excellent grade of GIA (yellow + green). The angle combinations in common (green) are the narrow range graded both Ideal and Excellent. Their common geometric center, the central ideal, is the combination of Morse's 41° pavilion angle, a 34° crown angle and a 56% table ⁷

taught Ideal angle combinations of 41° and 34° - 34.2° (pers. comm., D. Verbiest). In the same time frame, but a continent away in Johannesburg, South Africa, the Katz Diamond Cutting Factory was teaching its apprentices to cut the Ideal round brilliant to a 41° pavilion main angle and 33° to 35° crown main angle (pers. comm., P. Van Emmenis). Basil Watermeyer, the renowned South African diamantaire, and the author of 'Diamond Cutting', the 'only one of its kind' guide to diamond processing, gives the angles for 'the fully-proportioned Modern Ideal Cut [as] 32 - 34° crown, 41° base' ⁸.

Diamond Light Performance Sensitivity to the Pavilion Main Angle

A key finding in the study of the round brilliant is the high sensitivity of diamond light performance to small changes in the pavilion main angle. The 16 lower girdle facets (pavilion halves) that make up the remainder of the pavilion are most often cut between 0.9° and 1.4° of the 8 main facets. This results in the entire pavilion being very sensitive to variations from the central ideal main angle of 41°. To obtain the Ideal or Excellent grade this main angle must be cut very close to the original 41° first attributed to Morse.

Brilliant Cut Facet Pattern and the 'Eye of the Diamond'

A key aid to this analysis is the observation that the pattern of virtual facet reflections seen in the face-up view of the diamond naturally separates into three concentric rings with properties that resemble an eye, 'the eye of the diamond'.

The Eye of the Diamond

The significance of this analogy to an eye is that the center ring, which is the table's reflection (TR), dilates like the human eye's pupil when the diamond is cut with a pavilion that is steeper than ideal. When a diamond's pavilion is Ideal cut, close to 41°, its pupil, or table reflection will be about a third the size of the table (ranging from about 28% to 38%). A steeper pavilion results in a dilation of the table reflection. The table reflection expands and begins to dominate the table area diminishing the important iris (blue ring) area. It will be shown that the properties of light return from the table reflection are inferior to those of the middle ring (iris). Consequently, as greater than 'Ideal' pavilion main angles cause the table reflection to dilate, the diamond's beauty/light performance diminishes.

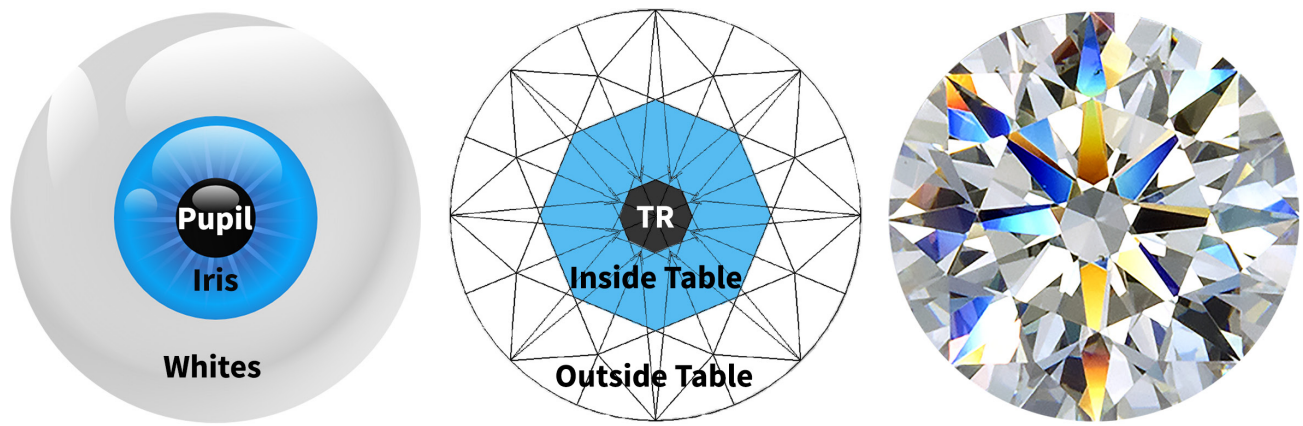


Figure 6: From the center to its girdle, the round brilliant reflection pattern has three identifiable rings of light reflection that have properties resembling an eye. In the center of the brilliant cut is an octagonal, grouping of 8 pie-shaped reflections (colored black.) This octagonal grouping is a reflection from the pavilion main facets of the octagonal table. This center table reflection (TR) is the pupil of the diamond's eye. The remainder of the reflection pattern that is seen inside the table's edge is the middle ring and is colored blue. It corresponds to the iris. The third or outer ring is all the facet reflections seen outside the table. This is the 'white of the eye'.

Analysis of Light Performance in the Table Reflection

Fundamental to an understanding of brilliant cut light performance is an analysis of the table reflection (TR), the pupil of the diamond's eye.

Figure 7 summarizes an analysis of effects on diamond light performance due to a pavilion that is cut steeper than the narrow range graded 'Excellent' and 'Ideal'. The reverse ray tracing in Figure 7 (Row C) analyzes the portion of the pavilion mains within the table reflection. This single reverse ray trace is sufficient to tell the story, because this analysis

repeats 8 times around the pavilion due to the round brilliant's 8-fold symmetry. Figure 8 shows 3D reverse ray tracing of the 'Ideal' with a beam entering within the table reflection. After two internal reflections from the 8 mains, the separated light emerges at 45° in eight directions. There must be light in those directions for the virtual facets in the table reflection to appear bright in the face up view.

Dilation of the table reflection (TR) is seen in Figure 7 - row b as the pavilion angle increases from an ideal 40.75° to 42.75° and 44.75°. By the time the pavilion angle reaches 44.75°, Figure 7 (Column 3), the table reflection has dilated to fill the table. The important middle ring iris is gone.

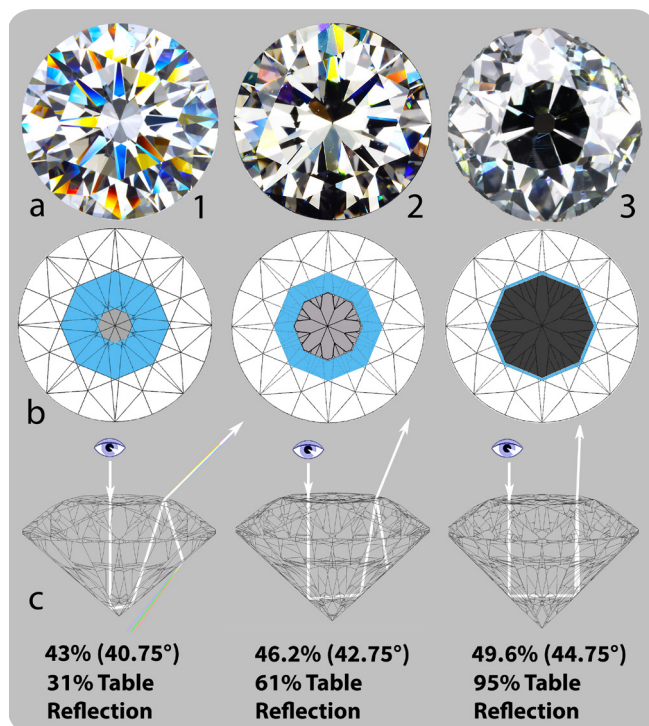


Figure 7: Summary analysis with photographs of effects on diamond light performance due to a pavilion that is cut steeper than the narrow range graded Excellent and Ideal.

As the table reflection fills the table, instead of the light seen in it reflecting from the 45° direction, as in the 'Ideal', Figure 7 (Row C/Column 1), it instead comes from high angles approaching 90° and the viewer's head, Figure 7 (Row C/Column 3). The viewer's head obstructs illumination from high angles. The result is a darkening of the whole table due to retroreflection from the observer's head. This is seen in the 1.88 carat old European Cut diamond, Figure 7 (Row A/Column 3), which was cut with an average pavilion angle near 45°. (Prior to 1860 and the cutting innovations of Henry Morse, a 45° main angle was believed to be 'perfect' as reported by Jeffries in 1750⁹ and Mawe in 1823¹⁰.)

Well before a pavilion angle of 45°, and above 41.75°, the table reflection has dilated to a degree that reduces the important iris-like middle ring diminishing its contribution to diamond beauty. This results in diminished light performance and beauty. The expanding table reflection with its poorer light return properties and the resulting iris reduction is a principal reason a pavilion angle greater than 41.75° is graded neither an AGS Ideal 0 nor a GIA Excellent. By 42.75° the table reflection has dilated filling 61% of the table diameter. An example of the consequent reduced light

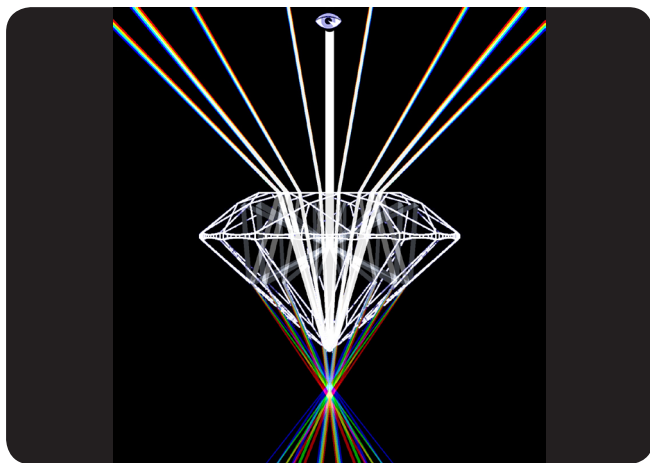


Figure 8: Reverse ray tracing the Ideal Cut using a light beam entering through the table reflection area. After two internal reflections from the 8 mains, the separated light emerges at 45° in eight directions.

performance can be observed in the diamond in Figure 7 (Row A/Column 2), which has roughly a 2/3 table reflection.

Reverse ray tracing of the table reflection, and the diamond eye analogy have established why the small range around the pavilion main angle of 41° is the best and 'Ideal'. It will be apparent in Part 2 that overall diamond light performance depends upon the interaction of crown and pavilion angles. However, as reverse ray tracing reveals, light from the table reflection enters the diamond within the table, and is thus independent of the crown angle. This has enabled the pavilion angle analysis essentially independent of crown angle consideration.

Having covered the light performance properties of the table reflection, and due to the length of this article, now is a good time to pause and review what has been revealed so far.

Part 1 Summary

The purpose of this two part study article is to provide answers to why the 'Ideal' Cut's small range of pavilion and crown angles is best. Many cutters like the renowned diamantaire Basil Watermeyer ¹¹ likely would point out that this ideal range was found by members of the diamond cutting profession by 'cut and try' over more than a century. No proof needed. However, efforts to analytically prove the Ideal's superiority using measures of brilliance and fire have largely fallen short. These metrics possess peaks or maxima well away from the 'Ideal' combinations of Marcel Tolkowsky and Henry Morse. Consequently, the effort to provide these answers remains interesting and worthwhile.

It is rightly said that there are diamond cut deviations from the 'Ideal' that are beautiful, especially in favorable lighting circumstances. However, it is also true that significant deviations outside the small range graded 'Ideal' and 'Excellent' are seen in comparative testing to have light

performance inferior to Ideal. And the poor light performance of the fish-eye or the nailhead is encountered within just three degrees deviation from the central ideal angle combination of (41°, 34°).

Part 1 has covered a big part of the story by analyzing the main 'virtual facets' within the round brilliant diamond's table reflection (TR). This was accomplished using the optics method of 'reverse ray tracing' and the concept of the 'eye of the diamond'. The analysis demonstrates why the 'Ideal' range of the pavilion main angle is centered close to 41°. As the pavilion angle is increased above the central main angle of 41°, two negative influences on round brilliant light performance occur.

First is the dilation of the table reflection with a steeper than ideal pavilion. This occurrence is independent of the crown angle. The table reflection expands and diminishes the important 'iris' (blue ring) area, Figure 6. Part 2 will demonstrate why the properties of light return from the table reflection are inferior to those of the middle ring, iris. As greater than ideal pavilion main angles cause the table reflection to dilate and dominate the table area, the diamond's beauty is diminished. Effectively, the table reflection area must be kept small, so the beauty inherent in the middle ring iris of the round brilliant is maximized. However, cutting much below 41° soon (within a degree) leads to dark appearing main reflections and ultimately to the fish-eye effect.

Second, as the table reflection dominates the table area, reverse ray tracing shows that the main's virtual facets reflect light from too high an angle close to obstruction by the viewer's head. This leads to the table darkening appearance called the nailhead, Figure 7 (Column 3).

What are the light performance properties of the important middle ring iris of the diamond's eye that make it essential to the diamond's light performance?

In Part 2 this question and much more about ideal light performance is answered. Part 2 includes a detailed reverse ray trace analysis of the entire crown, including the table reflection area analyzed in Part 1.

Footnotes

¹ Jeffries, D. (1750), 'A Treatise on Diamonds and Pearls', 2nd Edition, C. and J. Ackers, London, PP. 13, 21-25.

² Wade, F. (1916), 'Diamonds - A Study of the Factors that Govern their Value', G.P. Putnam's Sons, New York and The Knickerbocker Press, London.

³ Whitlock, H. (1917a), 'The Evolution of the Brilliant Cut Diamond', The Jewelers' Circular-Weekly, Vol. 74, No. 1, pp. 115-121.

⁴ Wade, F. (1916), 'Diamonds - A Study of the Factors that Govern their Value', G.P. Putnam's Sons, New York and The Knickerbocker Press, London.

⁵ Tolowsky, M. (1919), 'Diamond Design', E. F. N. Spon, Ltd., London, PP. 6, 23-25, 94-95, 97-104.

⁶ Cowing, M. (2007), 'Accordance in Round Brilliant Diamond Cutting', The Journal of Gemmology, Volume 30 No. 5/6.

⁷ Cowing, M. (2009), 'The Central Ideal', Gems & Jewellery / April / Volume 18 / No. 2

⁸ Watermeyer, B. (1982), 'Diamond Cutting, A complete Guide to Diamond Processing', Centaur Publishers, Johannesburg, p. 166.

⁹ Jeffries, D. (1750), 'A Treatise on Diamonds and Pearls', 2nd Edition, C. and J. Ackers, London, PP. 13, 21-25.

¹⁰ Mawe, J. (1823), 'A Treatise on Diamonds and Precious Stones', Longman, Hurst, Rees, Orme, and Brown, Paternoster Row, London, pp. 47-48, 60.

¹¹ Watermeyer, B. (1982), 'Diamond Cutting, A complete Guide to Diamond Processing', Centaur Publishers, Johannesburg, p. 166.

References

Cowing, M. (2007), 'Accordance in Round Brilliant Diamond Cutting', The Journal of Gemmology, Volume 30 No. 5/6.

Cowing, M. (2009), 'The Central Ideal', Gems & Jewellery / April / Volume 18 / No. 2

Cowing, M. (2018), 'Let There Be Light', Gems & Jewellery / Spring / Volume 27 / No. 1

DiamCalc, Octonus Software, [Http://www.octonus.com/oct/products/3dcalc/standard](http://www.octonus.com/oct/products/3dcalc/standard)

Gilbertson, A. (2007), 'American Cut - The First 100 Years', The Gemological Institute of America, Carlsbad, California.

Jeffries, D. (1750), 'A Treatise on Diamonds and Pearls', 2nd Edition, C. and J. Ackers, London, PP. 13, 21-25.

Mawe, J. (1823), 'A Treatise on Diamonds and Precious Stones', Longman, Hurst, Rees, Orme, and Brown, Paternoster Row, London, pp. 47-48, 60.

Tolowsky, M. (1919), 'Diamond Design', E. F. N. Spon, Ltd., London, PP. 6, 23-25, 94-95, 97-104.

Wade, F. (1916), 'Diamonds - A Study of the Factors that Govern their Value', G.P. Putnam's Sons, New York and The Knickerbocker Press, London.

Wade, F. (1928), 'Some Interesting Notes on Zircon', The Jewelers' Circular, Vol. 97, No. 7, pp. 54-55.

Watermeyer, B. (1982), 'Diamond Cutting, A Complete Guide to Diamond Processing', Centaur Publishers, Johannesburg, p. 166.

Whitlock, H. (1917a), 'The Evolution of the Brilliant Cut Diamond', The Jewelers' Circular-Weekly, Vol. 74, No. 1, pp. 115-121.

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Article Submissions

The deadline for the next issue is

August 15th, 2020

Guidelines:

- We do not accept highly scientific articles. These are better suited for either the Journal of Gemmology or Gems & Gemology
- All articles should be a minimum of one page.
- All accompanying photographs must be high resolution.
- All photographs must be accompanied by written permission from the copyright holder unless the author owns the rights.
- Wherever possible please try to supply images from the same photographic source or one that are at least 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:

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Objective Diamond Clarity Grading

Michael D. Cowing

Edited by Geoffrey M. Dominy
Author of The Handbook of Gemmology

What People are Saying:

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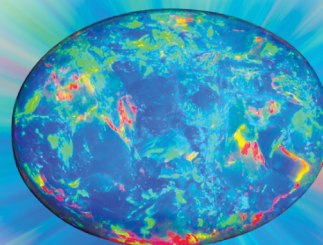
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Canton Fair - A Bond for Friendship, A Bridge for Trade



One of the biggest casualties of COVID-19 has been the trade shows that are held throughout the year. While Tucson managed to squeak in under the wire, others were not so fortunate.

I have to confess that I have mixed feelings about trade shows. I have watched over the years as the organizers have made the pie larger and larger while making the portions smaller and smaller and far more costly. I know few exhibitors who are enamoured by the trade show organizers. The general feeling being that they are the only ones making money. The shows have become unwieldy, unmanageable and impossible for exhibitors to cover their costs, let alone make money. Most pray that during the course of the show they will be able to make some valuable contacts that will result in sales further down the road but that road has become longer and longer.

COVID-19 put an abrupt stop to the trade show madness. The organizers are hurting and scrambling to find ways to keep the cash cow fed. This will not be easy.

In 2015 the World Gem Foundation held the inaugural Mallorca GemQuest Gemmological Conference in Palma, Mallorca, Spain, at the Hotel THB El Cid. For those who could not attend in person, the conference was accessible via free online streaming and a five-day 'video on demand' access pass that was underwritten by the sponsors. In reality it was a logistical nightmare, fraught with potential complications and perhaps slightly unnerving for the speakers. However, no one can deny that it was a very effective way for the speakers to reach a much larger audience. At one point, we had over 800 people watching online.

The major downside to streaming live is dealing with time zones. Wherever you are streaming from, it will be convenient for some and inconvenient for others. In our case, it meant we were nine hours ahead of the West Coast of the U.S. and Canada, six hours ahead of New York and six hours behind Beijing. This meant that when a speaker started his presentation at 9am (Mallorca Time), it was midnight in Los Angeles, 3am in New York and 3pm in Beijing. Now we have all experienced this with major sporting events and it often involves making 'sleep' sacrifices, staying up late or getting up early. However, on the plus side, it costs you nothing but your time and the inconvenience of changing your daily routine.

There has been talk about 'Virtual Trade Shows' and while I do not believe this is a feasible option, I thought it would be an interesting exercise to attend the Canton Fair (China Import and Export Fair) from June 15th to 24th. The organizers promoted the fair by saying 'Experience the innovative platform and incredible convenience of our 1st digital trade fair!' I was intrigued. Could this be the future?

While it was not a jewellery trade show (although they did sell watches), it was the 'platform' I was interested in more so than the products they were selling. I really wanted to 'test' it out and see if such a format could be used to hold a 'Virtual' Gem and Jewellery Show.

Registering

For first time buyers at Tucson, JCK or any of the other major trade shows, it can be a nightmare to register. All the organizers have different requirements that often involve sending them copies of a business license, previous invoices, everything it seems except the proverbial kitchen sink. One wonders with the new data protection guidelines (General Data Protection Regulation or GDPR) here in Europe if some of these requirements are even legal.

Registering for the Canton Fair was relatively painless although I purposely inserted data that was incorrect to see if the 'system' picked them up. They did not. Only title, full name, country/region, e-mail address, verification code, interested product category and password were compulsory. Document type and number were not.

The second screen required more company information however only company name, country/region and business scope were required. All other informational fields were optional.

The show boasted 16 categories and 50 exhibition sections.

Interface

I have to confess that I did not know what to expect. Because the exhibition originated in China, a part of me believed that it would be a combination of a 'Video Game' interlaced with live components, a 'Virtual' experience that had me walking down the aisles as if I were using the little yellow man from Google Maps. Not so.

Selecting watches, I was presented with a screen that looked no different to any online website. In the overall 'Gift' section, it stated that there were 117 exhibitors and 8981 exhibits. In the 'filter' section on the left hand toolbar, I was given the option of exhibitors from China Mainland or International. Selecting 'International' produced a screen stating 'No Results found for Related Exhibits'.

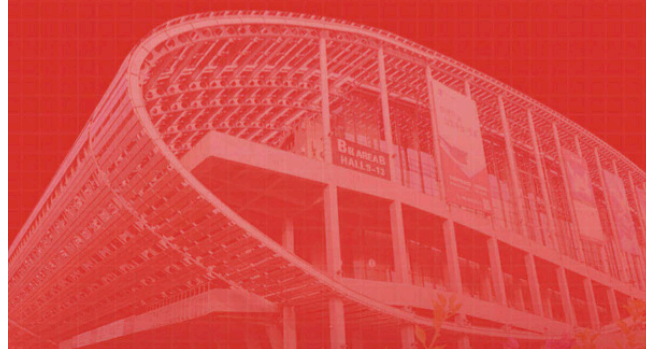
Selecting an Item

Selecting an item brought me to a screen that gave me essentially a company profile with four options (Home, Exhibits, Live, Profile) plus 'Submit Sourcing Request', 'Instant Messaging' and 'Schedule an Appointment'.

In order to 'Submit Sourcing Request', I was met with a pop-up window stating 'You need to complete your information before submitting a sourcing request'. I already had so why was I being asked again? Frustrating.

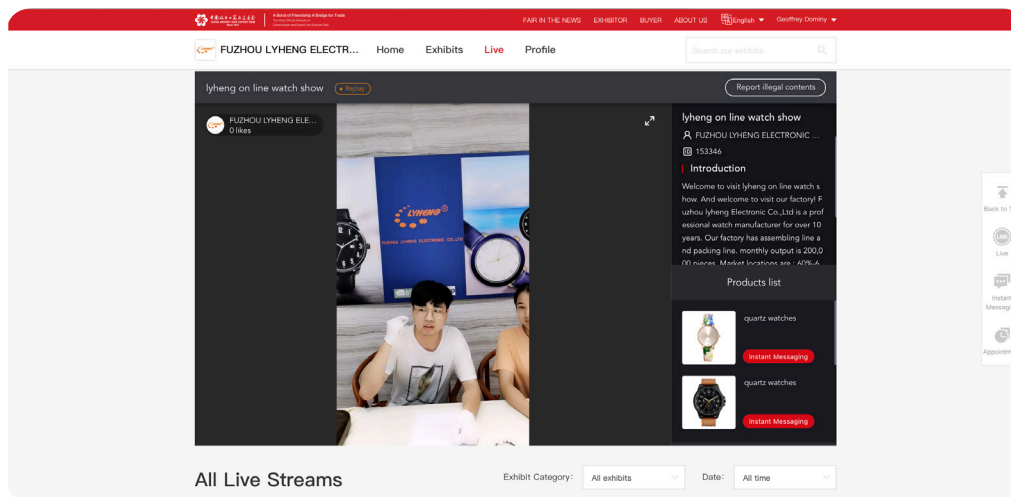
A Bond of Friendship A Bridge for Trade

The Official Website of China Import and
Export Fair (Canton Fair)



Selecting 'Instant Messaging' produced a message saying that the 'Pop-Up' window was blocked. Frustrating again.

Selecting 'Schedule an Appointment' produced a screen that gave me several date options under the heading 'Initiation Time' and also a field entitled 'Negotiation Topic'. Personally it is never a good idea to introduce the word 'negotiation' before you have even started but then again, I remember the sign on my hotel door in Beijing that stated 'Please Clean the Room' and 'Don't Trouble Please'. Perhaps this is just a language thing, using a word that is meant with the best intentions but not exactly what they mean.



Online sales pitch by representative of Fuzhou Lyheng Electronic Company

Live

Clicking on the 'Live' option, I was met with two people who spent the first few seconds trying to fix a technical issue, one was in plain view; the other was not. Clearly it was being filmed on a cell phone. If you plan to have two people giving a presentation, perhaps it would be better to use a wide angle. Selecting full screen did not resolve the problem. Essentially I got a sales pitch.

Clicking on another product gave me two people, seemingly in a small shop or it could have been a trade exhibit, one showing me a product while the other was filming it with a mobile attached to a selfie stick. I know this because I could see the reflection in the mirror. There was no communication between us, just a sales pitch.

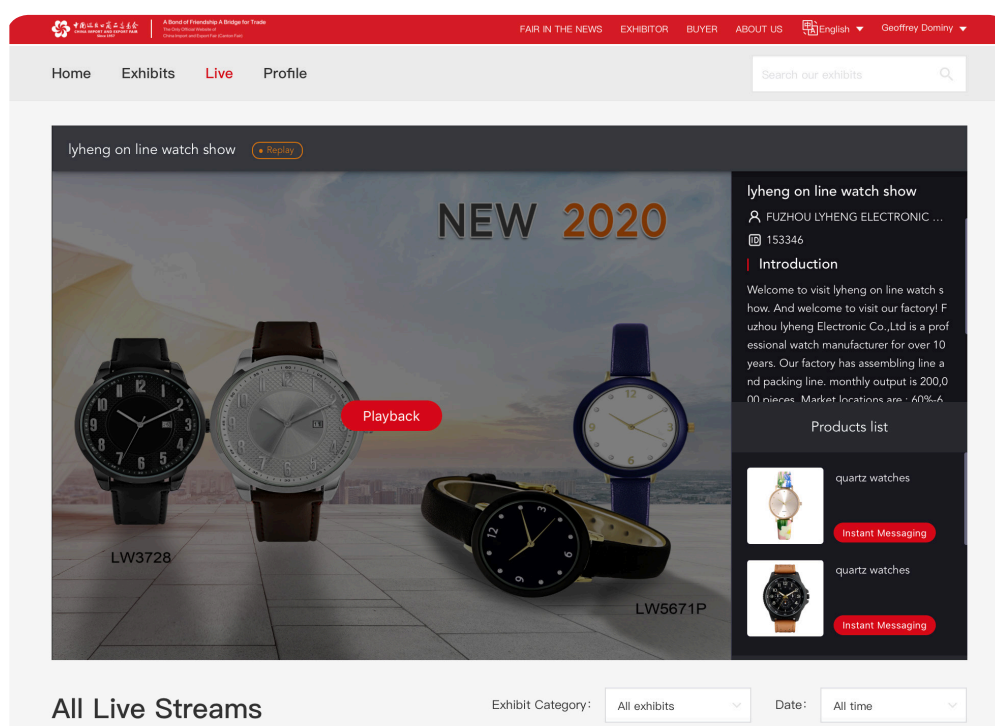
A third attempt at viewing a product gave me a prompt saying 'The live stream has ended'.

Closing Thoughts

It was certainly not what I expected. With modern technology, one would think that if you were going to offer a 'virtual trade show', you would make it user-friendlier. In certain situations this might work but for jewellery and gemstones? I cannot see how it would be possible.

With a traditional trade show, regardless of where we are from, we all find ourselves in the same place at the same time. We may be jet-lagged but we are there in person. Time zones do not factor into the equation. As we found with the Mallorca GemQuest, based on where the event is being streamed, this can be problematic.

From an exhibitor perspective, there is no 'bridge for trade'. Selling requires human interaction and while this might happen during the 'Negotiation' meeting, I am not sure people will want to make an appointment. It is one of the



reasons I prefer to shop in a department store. I would love to support the small independent boutique shops but I find the whole experience somewhat intimidating. Usually I am the only one in the shop, putting myself under the spotlight. I know, especially now, that these store owners are facing desperate times but I hate to see the look of disappointment on their faces when I leave empty handed. I always feel obligated to stay in the shop for a certain period of time and will sometimes buy something just to lessen my feelings of guilt. As buyers, we like to float in and out of buying situations so arranging a face-to-face meeting with a complete stranger would be intimidating.

The entire interface was disappointing. I had no sensation of being at a 'trade show'. I might as well have been on Amazon or eBay. I really thought I would be walking 'virtually' through the exhibition but that was not the case and I understand why. The technology, even in China, does not exist at the moment to create this sensation.

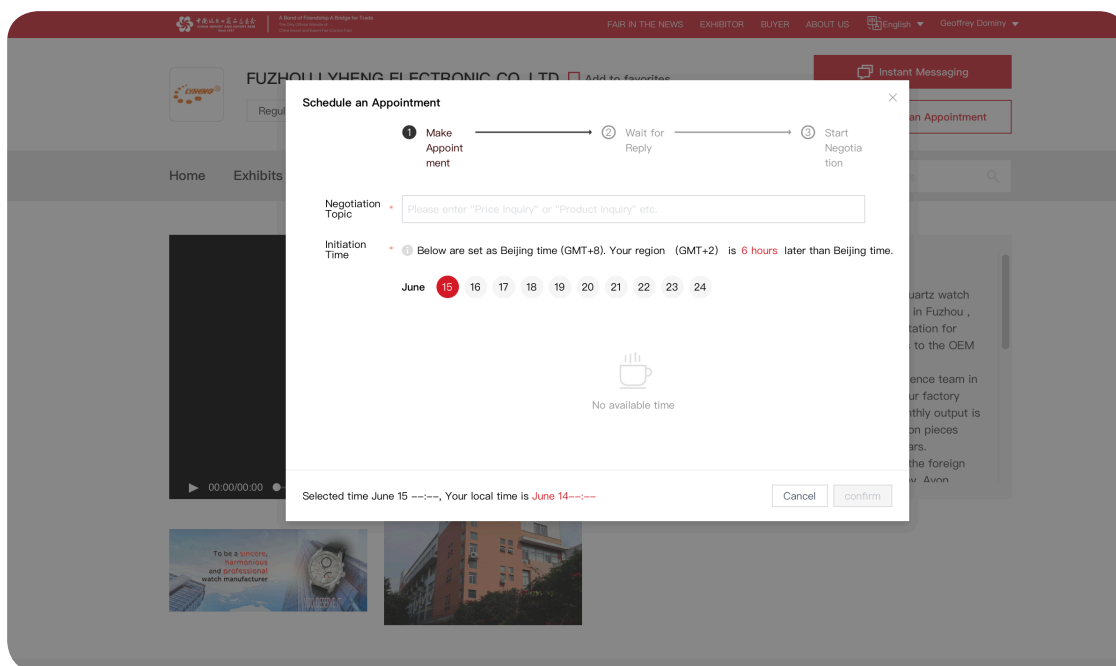
Would an exhibitor pay money to be a part of a 'virtual' trade show? If so, compared to traditional trade shows, what would be a reasonable cost? Certainly you could not charge by 'virtual' square meter so it would have to be by the number of items you uploaded and displayed. To make these items available however would require an awful lot of time and effort. Far more work than a traditional trade show where you show up, set up your booth and then hope and pray someone comes. Selling 'virtually' is a completely different animal because the buyer no longer has the benefit of

touching and feeling the items being sold. Bridging that gap is hard and requires copious amounts of time, energy and 3-D technology to bring the products to life.

To call it a 'Virtual Trade Show' is misleading. It is not. An online platform, similar to Amazon perhaps but it is definitely not a trade show. It reminds me of an experience I once had at a Wendy's Restaurant in Bellingham, Washington. After placing my order, the cashier asked me if it was for take out or if I would be eating it in their dining room. To which I replied 'what dining room?' She pointed to the restaurant. My face obviously betrayed my amusement and she said 'we are supposed to say that'. I thought of the Wendy's corporate executive who came up with that idea and the idiots who thought it was a good idea.

The Canton Fair started in 1957 and this exhibition was their 127th show. I suspect the organizers, faced with the distinct possibility of having to cancel the show, decided to go with this format to avoid the high cost of cancelling the event (including reimbursing all the exhibitors). I wonder what the reaction will be after the event closes. This is China after all, so perhaps no one will complain. I was certainly disappointed by the whole experience and would ardently refute their claims that it was an innovative platform. It was not. Simply the merging of an online platform with webinars and that is anything but innovative.

COVID-19 is certainly forcing us all to reinvent ourselves. What the future holds is anyone's guess.....only time will tell.



Scheduling an appointment



Tickled Pink



Pink, Blue and Yellow Diamonds (Photo by Tino Hammid)

Historically pink diamonds have been extremely rare but since around 1985 pink diamonds have become more readily available. The reason for this was the opening of the Argyle mine in Australia that quickly became the largest producer of pink diamonds in the world. As a result pink diamonds started to show up more often at gemmological laboratories and eventually also in jewellery with prices suitable for larger markets. The large supply of Argyle pink diamonds created a new demand for coloured diamonds in general while pink stones became available for almost any jeweller. Pink diamonds are still very popular today and high quality stones fetch high prices. However, pink diamonds are predicted to become much rarer when the Argyle mine ceases operation within the next two years.

Argyle has been the largest producer of pink diamonds the world have ever seen and long after the mine closes the vast majority of pink diamonds in the market will still have originated from Argyle. While being the largest, Argyle is far from the only mine producing pink diamonds in the world. Long before the discovery of diamonds at Argyle, pink diamonds were known from several areas including India, Russia, Brazil and parts of Africa. In recent years pink diamonds have also been found in small amounts at two of the Canadian mines.

The largest and highest quality pink diamonds however do not come from Argyle. The much talked about 59.60 carat fancy vivid 'Pink Star' for instance was found in South Africa in 1999. Another famous pink diamond that made the headlines in the last decade is the 24.78 carat fancy intense 'Graff Pink' whose origin is unclear but as the diamond was known since long before the Argyle mine opened it obviously originates from some other mine.

Among the most known historical pink diamonds are 'Daria-i-Noor' and 'Noor-ul-Ain'. The first known owner of Daria-i-Noor was the Kakatiya dynasty in southern India. After being looted and transferred to several families in India the diamond later turned up in Persia and was included in the Iranian crown jewels. 'Noor-un-Ain' belonged to Babor, the first Mughal emperor in the 16th century and also ended up in the Iranian Crown Jewels. It has been suggested the two diamonds come from the same rough but further investigations have to be carried out to confirm this claim.

'Le Grand Mazarin' is a 19 carat diamond that was a part of Cardinal Mazarins collection that he donated to Louis XIV. As expected for any stone appearing before the 18th century Le Grand Mazarin originates from a mine associated to the Golconda region in India.

Before diamonds were found in Brazil in the early 18th century, the absolute majority came from India but there was also a small production of diamonds in Borneo that had been going on for several hundred years before the discovery in Brazil. Borneo does produce pink diamonds but they tend to have a brownish tint making them less attractive.



A Selection of Natural Pink Diamonds from the Argyle Diamond Mine (Australia)
(Photo by Tino Hammid)



The 2.82 carat pear-shaped DeYoung Pink Diamond comes from the Williamson mine in Tanzania (Photo by Tino Hammid)

Pink diamonds are found in several parts of Africa and since the late 19th century South Africa have produced several exceptional pink stones including the earlier mentioned 'Pink Star'.

Williamson Pink Diamond was found in Tanzania 1947 and given to Princess Elizabeth as a wedding gift by Dr John Williamson who established the Williamson diamond mine in Tanzania. In the Katanga province in Congo alluvial pink diamonds are found. The Mir mine in Siberia is known for rare purple diamonds but also produce a small amount of pink diamonds.

The latest mines to have produced a few pink diamonds is the Diavik and Victor mines in Canada but as with most other mines, the production of pink diamonds is sporadic. Pink diamonds are often found together with brown diamonds and the extremely rare red diamonds are also found at the same sites as pink. Argyle, apart from being the most important source of pink diamonds, is also the largest producer of gem quality brown diamonds as well as most of the world's red diamonds. There is no sharp line between the colours brown-pink-red and the causes of colour are to a large extent the same. It was the pink diamonds that made Argyle famous but clever marketing of brown diamonds from Argyle increased the overall interest in coloured diamonds, something that affects the diamond industry still today.

The pink diamonds found at Argyle are Type I and are usually less than 1 carat in size. Type II pink diamonds tend to come in larger sizes but usually with a pale pink colour. Larger pink diamonds with strong colour such as the Type IIa 'Pink Star' are extremely rare explaining the high prices achieved at various auctions the last decades. Another famous large pink Type II diamond is the fancy intense 34.65 carat 'Princie Diamond' originating from India and owned by the Nizam (Ruling family) of Hyderabad until 1960 when it was bought by Van Cleef & Arpels. The fancy light pinkish-brown 128.48 carat 'The Star of the South' found in Brazil in 1853 is another famous type II diamond.

Compared to the largest known Type I diamonds there is quite a significant difference in size. The largest pink diamond from the Argyle mine is the light pink 'Argyle Pink Jubilee' weighting 8.01 carats.

Strong coloured pink type II diamonds are extremely rare, in comparison pale pink Type IIa diamonds with similar colour as 'Le Grand Mazarin' are a lot more common. Instead, strong colours are relatively common in smaller pink Type I diamonds.

The pink colour is caused in different ways in Type I and Type II diamonds. In Type Ia diamonds it is often possible to see how the pink colour is concentrated to glide or slip planes resulting in a lamellae pattern. The slip planes are a result of stress and plastic deformation during the diamonds extended residency at high temperature either in the mantle or during the eruption of the kimberlite pipe that brought the diamond to the surface of the earth. There is also a difference in how the colour appears between Type Ia diamonds depending on if A or B aggregates (Type IaA / Type IaB) are dominating and there are still unanswered questions concerning the exact causes of pink colour in diamonds.

The color concentrations to thin lines in an otherwise colourless diamond forces the cutter to adjust the stone in certain directions to achieve a diamond with an apparently even distribution of colour when polished.

Pink Type II diamonds have a more uniform colour throughout the stone. They seem to get their pink colour due to a NV center, a nitrogen atom located next to a vacancy in the crystal structure.

A geological difference between Argyle and other diamond mines is that the diamonds at Argyle are found in lamproite and not kimberlite, like most other diamond mines. If and how the mother rock affected the diamonds colour or if it was different conditions in the mantle and/or heat and pressure relations during the eruption that affected the colour of some diamonds is still not clearly explained or understood.

Pink diamonds will probably be less commonly available after the closure of the Argyle mine but there will still be production of pink diamonds at other mines. The question is if the production of pink diamonds will be large enough to keep up with the demand or if natural pink diamonds will be a curiosity mainly appreciated by scientists and not something available apart from in the most exclusive pieces of jewellery.

Stand out from the crowd

"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



ncjv.com.au | edu@ncjv.com.au



For most people, buying gemstones and jewellery is a 'blind' purchase, often made on impulse and from sellers who do not always have the best interests of their clients at heart. Kim Rix would like to change that!



Digging in the Dirt - Fossicking

Finding your own

What could be more memorable than finding your own gemstone and having it made into a piece of jewellery? Australia is one of the few places in the world where you can wander around freely and find yourself a beautiful gemstone, so if you find the idea of playing prospector exciting, this excerpt from my book 'Buying Gemstones and Jewellery in Australia' will give you the lowdown on how to go about unearthing your own precious gem.

Let's start with the different terms for gem finding that you'll come across in Australia:

- Fossicking and prospecting are general terms that are used interchangeably to cover a variety of gem-hunting activities, but there is an important legal difference between the two. Fossicking means mineral hunting for personal use and excludes diamonds and gold, whereas prospecting encompasses searching for all minerals and includes the use of a metal detector.
- Specking is when you walk around and look on the surface of the ground, searching on old mullock heaps (piles of waste rock) for opal missed by the miner.
- Noodling is often used to refer to opal fossicking.
- Digging covers digging and sieving. You can either dry or wet sieve, though wet sieving (screening) is more efficient.



Permits, Licences and Miner's Rights

The Australian government has established, signposted and publicised many designated fossicking areas in a bid to give a boost to the tourist industry, but whether you need to buy a permit depends on the individual state. If you simply stick to the tourist mines or sites charging an entrance fee, you will not need to purchase a separate fossicking licence. Note: fossicking is not allowed in national parks, nature reserves, Aboriginal land or heritage sites.

Queensland

Purchase your fossicking licence from the Queensland Government online, or from an authorised agent. They are very cheap, starting at around \$8 for an individual or \$12 for a family. If you want to camp in a designated fossicking area, you will also need to buy a fossicker's camping permit.

Contact: www.Queensland.gov.au/recreation/activities/areas-facilities/fossicking/licences-permits/purchase

New South Wales

No fossicking licence or permit is needed, but you will need to seek permission from the relevant landowner.

South Australia

Again, no fossicking licence or permit is needed, but you will need to seek permission from the relevant landowner.

Victoria

You will need to obtain a licence called a 'miner's right' for anyone over 18 years old. This can be obtained online from the Department of Primary Industries (DPI), or from designated tourist information centres and prospecting supply stores in popular fossicking areas.

Contact: <https://checkout.payments.com.au/minersRight/>

Western Australia

You will need to purchase a \$25 miner's right from the Department of Mines, Industry Regulation and Safety (DMIRS), or from any mining registrar's office. Make sure you take proof of identity.

Contact: <http://www.dmp.wa.gov.au/Utilities/Offices-and-locations-8323.aspx>

Northern Territory

No permit is needed, but you will need to seek permission from landowners.

Tasmania

You will need to purchase a fossicking licence if you want to fossick outside designated fossicking areas.

Contact: <http://www.mrt.tas.gov.au/portal/prospecting-and-fossicking>

Fossicking Rules

The rules vary slightly from state to state, but generally you can collect from the surface or by digging with hand tools as long as you don't dig deeper than 2 metres (0.5 metres in streams) or disturb more than 1 cubic metre of soil in a 48 hour period.

You are not allowed to remove items of particular archaeological, cultural or scientific significance from any site, including vertebrate fossils, Aboriginal or heritage artefacts and meteorite fragments. If you find a diamond, I'm afraid you can't keep that, either!

Be mindful of the environment and make sure you leave the site as you found it.

What to take with you

As I discovered, the Australian outback can be harsh, so I would advise some preparation before you set off. First, if you are planning to drive off the beaten track, you will need a four-wheel drive vehicle. The gravel roads will slow you down considerably otherwise.

Fossicking Equipment

It is not possible to hire or buy equipment at fossicking sites. You must come prepared.

- A shovel or a pick. A pick is good for splitting smaller boulders.

- A spray bottle or bucket of water to wash away dust and make it easier to spot the colour.
- Two sieves, one coarse and one fine, for rinsing and sorting the stones.
- Tweezers for picking out gemstones.
- A container to collect any good finds.

Other Essentials

- Hand cream - the dust will make your hands very dry.
- A sun hat with a net to protect your eyes from the flies - they go for your tear ducts!
- Insect killer spray - spray it on your boots and trousers to stop spiders and ticks.
- Sunscreen, sunglasses and a wide-brimmed hat.
- Sturdy boots or trainers
- Lots of water—fossicking is thirsty work!
- A first aid kit

Top tips for Fossicking, Specking and Digging

- The best time to fossick is after it has rained. The rain will wash dust away and make opal or sapphire colour visible. If it's dry, take a bucket of water (or a spray bottle of water) to wet the stones.
- To avoid fighting with your shadow, fossick when the sun is directly above you.
- Though it seems silly to say, take off your sunglasses! Wear a wide-brimmed hat instead.
- When specking a pile of mullock, always have the sun behind you so the sunlight will catch any gems and make them easier to spot.
- Look for patch, colour in the ground, ironstone, or anything that looks unusual or out of place.
- When you are hand sieving your gravels, put a sapphire (or stone of equivalent weight) in the sieve to help show you where the heavy concentrate is.
- For your safety, stay away from open shafts!
- It's about attitude. Manage your expectations. You've got to put in some effort.



Kim sifting the dirt

Digging for Sapphires in a Creek

As a tourist, you are allowed to stop on any public or main road to dig around in a creek.

To fossick, you will need a shovel, two buckets, a throw screen, a container of water and a sieve. Optional: a willoughby to agitate the sieve at the gravel washing stage.



Kim washing the gravels

Step 1

Firstly, dig around in the creek. Good places to dig are around the roots of trees, in channels between large rocks, and in holes in the rocks—these are where heavy minerals get trapped. Fill your bucket with dirt.

Step 2

Slowly throw the dirt at the throw screen using a circular movement so that the gravel can evenly separate the stones from the dirt. The stones will fall into the second bucket below. If you don't have a throw screen, you can use two sieves (one coarse placed above one fine) to separate the stones from the dirt.

Step 3

Empty the contents of the second bucket into the sieve. Wash the gravels quite rigorously by rhythmically agitating the sieve, ensuring that the water covers the stones. The action of the sieve should bring the heavier stones like zircon and sapphire to one spot.

Step 4

Then, carefully (so that the heavy stones remain in one spot) flip the sieve onto a board or table covered with a plastic sheet. If the sieve is flipped over correctly, the heavies will be in the one spot, making it easier for sorting. If you can sort in the sunshine, the sapphires will be easier to spot. When a sapphire is unearthed, it is customary to hold the stone up to the sky to check the colour and clarity. Some people refer to this as 'skying the stone.'

Where to go fossicking for opal in Australia

Declared fossicking areas for opal include:

Queensland

Yowah

Ideal to speck for opal fragments or Yowah nuts. The fossicking area covers several acres of land – so there's a huge choice of mullock piles. Private claims where you are not permitted to fossick are clearly marked no entry.

Opalton

The Opalton Field, also called the Fermoy Field. Boulder Opal can be specked in opal dumps and old workings in shallow ground. If you stay at Opalton Tourist Park, you can freely fossick in many of the piles of gravel behind the Tourist Park. It's a huge area of land. Be very careful of mineshafts.



Kim looking for sapphires



Kim 'Skying a Sapphire'

From Winton, take the Jundah Road (mostly unsealed) and travel 15km, turn left and travel a further 109km (unsealed road) to Opalton.

Duck Creek

An old opal mining area about 100km south-west of Quilpie.

Sheep Station Creek and Emu Creek

These old mines are just to the south at the head of Sheep Station Creek, a tributary of Yowah Creek.

Lightning Ridge

The main areas for fossicking near Lightning Ridge are Grawin, Glengarry and the Sheeppark. There is a huge dumping ground in Grawin, where there are regular deliveries – trucks from the mines drive up onto the dumps and unload 5 or 10 cubic metres of mine tailings each time.

Quilpie

The Toompine Field is located between Quilpie and Yowah.

Other fossicking locations recommended by tourists:

Queensland

Agate Creek, Georgetown, Forsayth

Fullerton River, for garnets

Conclurry Trails

Mount Surprise near Townsville, for topaz and aquamarine.

Tomahawk Creek, Willows, Glen Elva, Rubyvale and Sapphire are all sapphire fossicking areas in Gemfields, Queensland. Queensland blue sapphires are darker blue because they contain more iron. Willows and Glen Elva fossicking areas are famous for golden yellow and orange sapphires.

Top Tip: Go to Glen Elva to fossick. At 1 foot deep and grassy, it's an easy fossick, and you might just manage to recoup the cost of your holiday!

Western Australia

Bendigo, for gold detecting.

Poona, north east of Perth, for emeralds.



Mine Shaft

New South Wales

Inverell, Glen Innes, for lighter blue sapphires than in Queensland.

Tinga, near Inverell, for sapphires and zircon, rhodonite and grass stone (a clear stone with rutile quartz).

Torrington, for emeralds, topaz, smoky quartz and other minerals.

Northern Territory

Gemtree, Mudtank, for garnets and zircon.

Tenant Creek, for gold.

Hart's Range, for an abundance of minerals including iolite and zircon.

All photographs copyright Kim Rix



Looking for the pattern in Boulder Opal



Fossicking



Peter in his Sapphire Mine (Gemfields)



The Toompine Pub - Toompine known as 'The pub without a town'



Opalton Bush Park

Out of this World



In this issue, NINA ZOLOTUKHINA looks at tiny micro-meteorites, what they are, where they perhaps come from, how we can collect them and why they might just answer some important questions about Planet Earth.



Treasures from the Sky

Did you know that every time it rains, myriads of micro treasures are falling down practically on our heads?

No, no, I'm not joking at all!

The story begins.....

This all started with one of my clients and friend Rosen Avramov. He is a mineral lover and gold and meteorites searcher. On one of his visits, he brought small metal and glass-looking spheres to show me. 'These are meteorites I have collected for the last five years' - he told me, 'I collected them from the ... rain'. To be honest, his words sounded more than a little strange, they seemed quite unbelievable. When I opened the little paper envelope, I saw these spheres for the first time. I had never seen anything like this: there were plenty of little, approximately 1mm in size, close to ideal rounded metal and glass - looking spheres. The metal pieces were easily attracted using a magnet. I started to search for information on the Internet and finally found some articles about micrometeorites, and about the existence of micrometeorites from the rain and an amazing project called 'Star Dust' founded by the well known 'rain meteorites' searcher, Norwegian musician Jon Larsen. After making some calls to my mineralogist colleagues, while there were differing opinions regarding the origin of these pieces, it was clear that this phenomenon exists and micrometeorites called 'star dust' can fall with rain drops right under our feet! I could not miss this opportunity and decided to make some photomicrographs of these pieces on high magnification. I was absolutely shocked when I saw them in detail!

So what are they, these treasures from the sky?

During my research I made some conclusions observing the micro spheres and divided them into three large groups:

- Metal spheres
- Glass spheres
- Crystal spheres

Metal spheres look different from each other; they also can be divided into one-piece spheres, spheres consisting of a lot of smaller pieces, spheres with meteorite type surfaces, spheres with crystals and glass-looking spheres with the traces of melting on the surface.

Glass spheres are colorless and have rounded or a slightly elongated drop-like form. They are matt with a lot of micro scratches covering their surface, which is the indirect evidence of their low hardness.

They have an interesting reaction under short wave UV light radiation, exhibiting a pink fluorescence.

Crystal spheres are of particular interest to me because I immediately started to recognize various crystal forms in them! One of them looked like zircon and had a brown color, another was reminiscent of a diamond and had yellow and pink colors while a third was similar to olivine crystals.

Where do they come from?

There are several theories of their origin. Some of these pieces could have an 'earthly' origin and could have risen into the atmosphere as a consequence of tornados, hurricanes, volcanic eruptions or by other factors, suspended in the atmosphere until they are captured by heavy water drops and brought down to the ground.

Other pieces that are not round in shape may be environmental waste, thrown into the atmosphere by environmental emissions.

Another interesting version of their origin is waste that arises from blasting bombs. It could consist of rare earth elements, which are similar to impact bodies. In the words of one specialist, after a bomb blast there are tons of these micro pieces in the atmosphere and they can be travelling there for at least a hundred years...

And the last origin is impact of course! These guests from outer space could reach the Earth's surface, travelling millions of kilometers and thousands of light years, not only from our Solar System, but from other Galaxies as well!

What are micrometeorites?

The term 'Micrometeorite' was first coined by Fred Lawrence Whipple in the 1950's in his 'Theory of Micro-Meteorites'. The size of each particle ranges from 50µm to 2 mm.

They can be found in various forms and chemical compositions (metals, crystals and etc). They could be as old as 4.5 billion years ago, the time of the birth of our Solar System.

There is a huge research company directed at collecting and studying micrometeorites provided by Royal Belgian Institute of Natural Sciences. They have collected these micro pieces in Antarctica where they mined them from the virgin earth soil or from the snow using special melting and separating techniques. Micrometeorites could also be found in the desert and deep-sea sediment.

Other micrometeorites are collected directly from the space using a very costly method of meteorite destruction and subsequent collecting of micro pieces, which are formed after it.

There are several techniques being used to study these meteorite spheres such as micro-probe by evaporation, chemical analysis, the use of X-Rays, research using electronic microscopes where each piece is covered with resin and polished to see the internal structure, to destructive methods using acids to dissolve them.

How can 'rain meteorites' be collected at home?

Places to collect 'rain meteorites' could include in the grouting between tiles on floors or anywhere water collects. Roofs can be good places to find them as well as 'virgin' terrain that is relatively untouched by humans or animals.

A strong neodymium magnet can be an effective way of collecting metallic 'Rain meteorites' by wrapping the magnet in white tissue paper and then putting it in a plastic bag. The metallic micro-pieces will be attracted by the magnetic force and will adhere to the plastic bag. If the bag is then positioned over a pre-prepared area and the magnet is withdrawn, the micro pieces will be deposited onto the collection area.

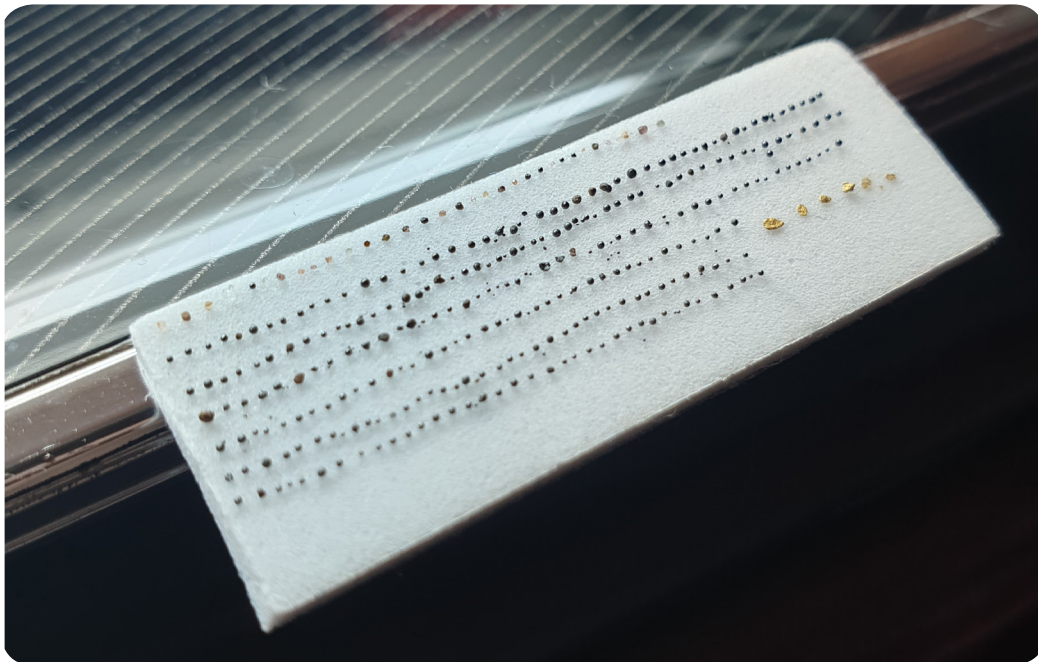
Collecting non-metallic micro crystals and glass spheres is far more complicated and requires the collection of pure rainwater, allowing it to evaporate and then sifting through the sediment with a small brush and a magnifier.



Rosen collecting samples (Photo courtesy R. Avramov)



Rosen collecting samples (Photo courtesy R. Avramov)



Collection of Micro Spheres (Photo courtesy of Nina Zolotukhina)

Conclusions

Our world is full of wonders yet with our busy lives, we sometimes do not notice them. Meanwhile the treasures just lie there under our feet!

These small spheres are unique, and each of them resembles a small planet. These micro crystals could also contain new minerals never seen before. They could tell us about our past and perhaps even give us an insight into our future. Sometimes big things can be discovered from small things! Someday they may even play an important role in a big discovery that could change our perception of the world, as we know it. Who knows?

References

Wikipedia: <https://en.wikipedia.org/wiki/Micrometeorite>

Royal Belgian Institute of Natural Sciences: https://www.youtube.com/watch?v=zi5ma_4aq3o

Star Dust Project by Jon Larsen: <https://www.facebook.com/micrometeorites>

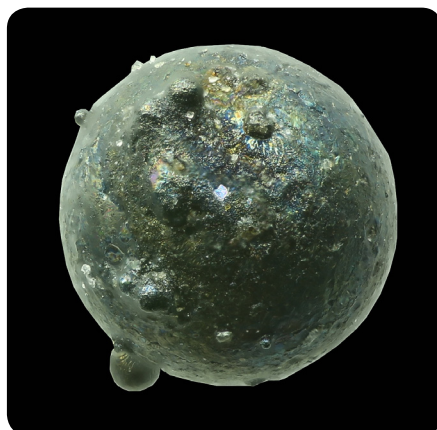
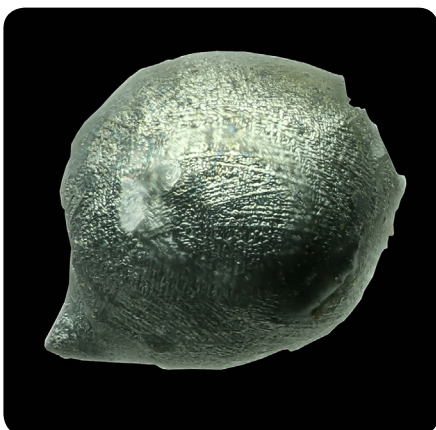
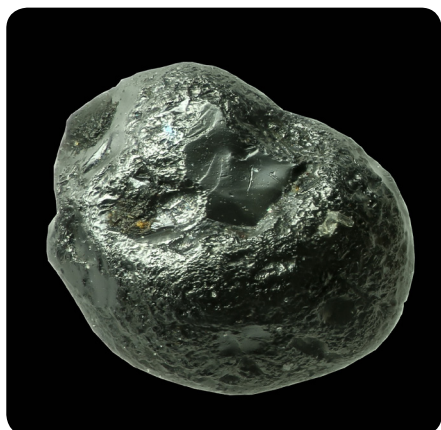
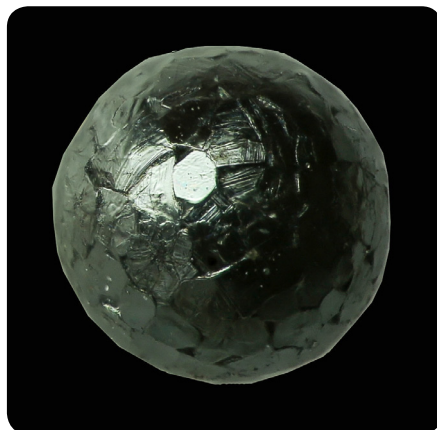
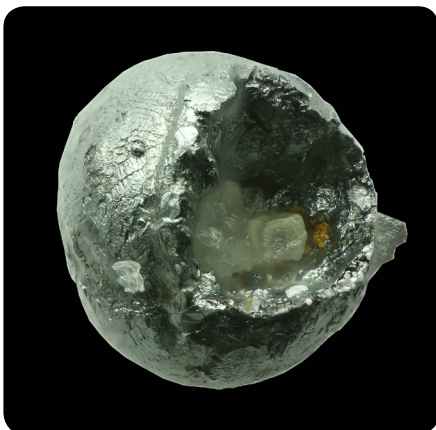
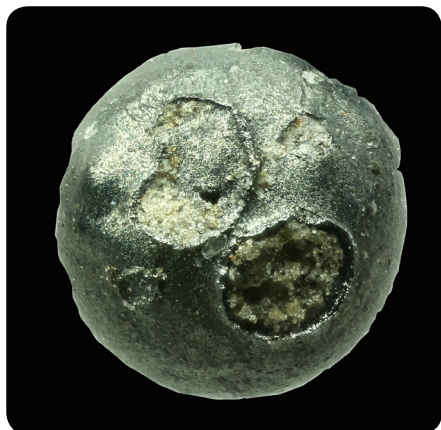
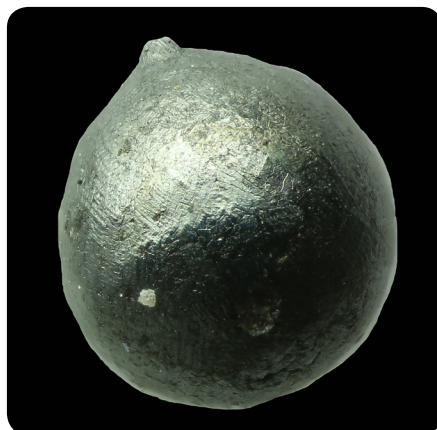
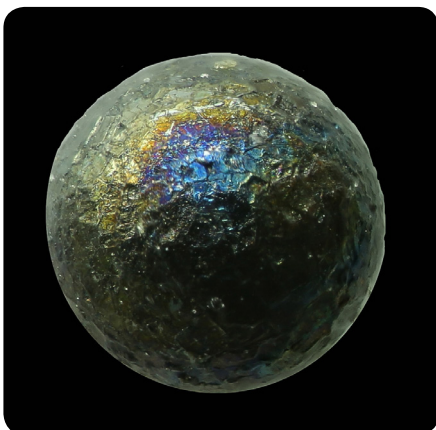
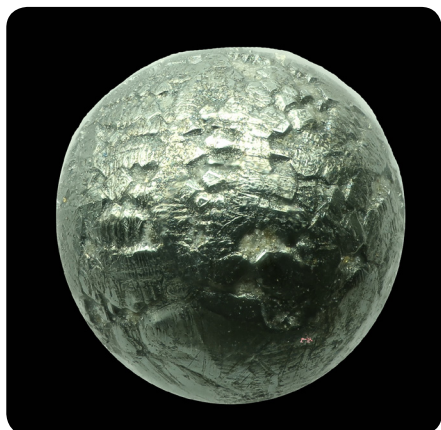
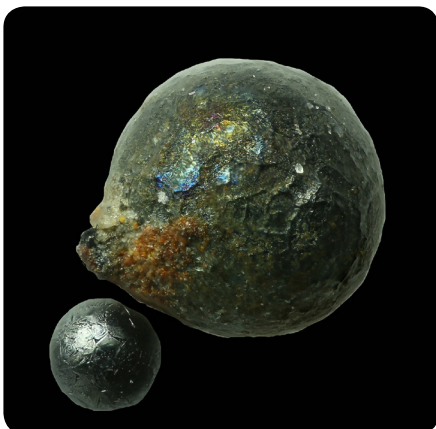


Metallic Sphere (Photo courtesy of Nina Zolotukhina)



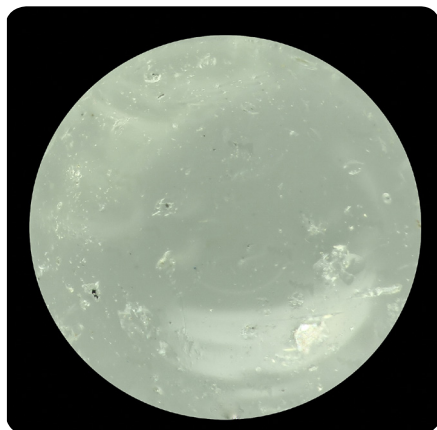
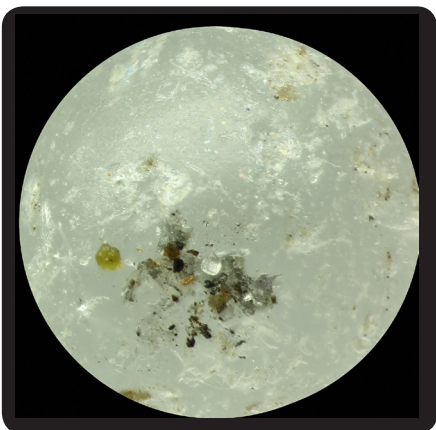
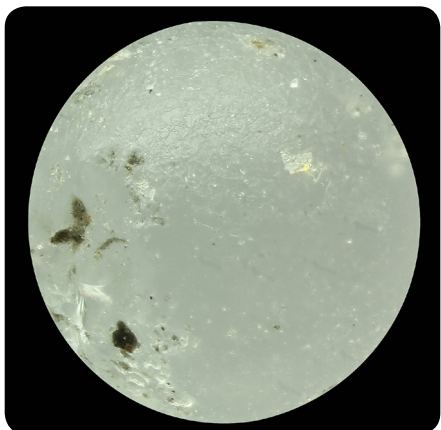
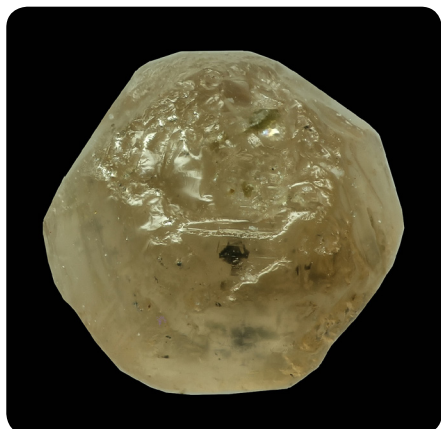
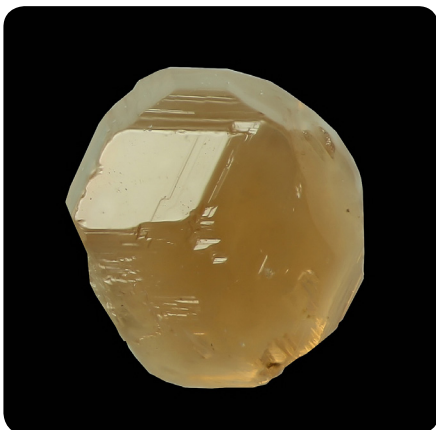
Metallic Sphere (Photo courtesy of Nina Zolotukhina)

Metallic Spheres



Rows 1 to 4 - A Selection of Metallic Spheres
(Photo courtesy of Nina Zolotukhina)

Crystal & Glass Spheres



Rows 1 to 3 - A Selection of Crystal Spheres
Row 4 - A Selection of Glass Spheres
(Photo courtesy of Nina Zolotukhina)

Meet the Team



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

Geoffrey Dominy (World Gem Foundation) 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 fifty-three countries, is used by fourteen schools, colleges, universities and gemmological organizations as their recommended textbook and now features photographic contributions by other award winning photographers including Jeff Scovil.

In 2018, Geoff released a 5th Anniversary Printed Edition (Two Volumes) and on December 14th, 2019, released his first book in Spanish 'Gemología Para Todos' (the first 14 chapters of the Handbook of Gemmology).

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

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

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

Deborah Mazza (British Gem Academy) 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 DGGG, this led 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.

Conny Forsberg (Scandinavian Gem Academy) 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 photomicrographs featured in the 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) 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.

Gérard Raphaël Quintin (South American Gem Academy) 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.

Marie-Hélène Corbin (Gem Academy of Canada) is an FGA gemmologist and accredited Senior Gemmologist through the AGA.

Following a busy career in real estate, she wanted to change her professional path and became interested in gemmology. This discovery of gemstones turned into a passion. Marie-Hélène studied at the EGM and successfully passed her Gemmology Diploma.

Guided by the desire to pass on her love for gems, she became the new Director of EGM in 2016, with a strong desire to modernize the school. As a teacher, she instills in her students the desire to learn more about the world of gemstones.

This passion for gems does not stop there, and Marie-Hélène created Quebec's first independent gem identification laboratory, Lelièvre Laboratoire de Gemmologie (LLG) in 2018. In order to offer the most complete service to her clients, she created the Gems and Jewelry Appraisal Center in 2019, also in Montreal.

Kyalo Kiilu (East African Gem Academy) 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 East African Gem Academy with a strong desire and ambition to share his knowledge of gemstones with his fellow East Africans, 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) 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) 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.

Barickeh Charles Kholifa Koroma (West African Gem Academy) is a freelance gemmologist, diamond grader/valuer, a member of the Gemmological Association of Great Britain and a member of the Scottish Gemmological Association. He was born in Liberia to Sierra Leonean parents and raised in the mineral rich country of Sierra Leone where he survived a devastating brutal civil war which lasted for almost 12 years.

He relocated to the United Kingdom in 2004 and received help on how to cope with Post Traumatic Stress Disorder (PTSD), which now proves pivotal in his approach to life.

He attended the coveted School of Jewellery, Birmingham City University (BCU) where he studied a diploma in diamonds (Gem-A) and a BSc (Hons) in Gemmology and Jewellery Studies. He graduated with a first-class degree in 2018 and was awarded the prestigious Scottish Gemmological Association Prize for Gemmology. He then moved back to Sierra Leone to pursue his dreams. His greatest achievement so far is working as a student mentor during his time at the university, he was able to give advice and guidance to some students that were struggling to cope with the demands of higher education and being away from home.

Like Kyalo, he comes to the World Gem Foundation and specifically the West African Gem Academy with a strong desire and ambition to share his knowledge of gemstones with his fellow West Africans, 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 Sierra Leone.

Dr. Laurent Massi (French-Swiss Gem Academy)

completed his PhD studies on 'Atomic-scale Defects in Brown and Hydrogen-rich Diamonds' at the Department of Physics at Nantes University in France under the direction of Professor Emmanuel Fritsch. During his studies he also taught gemology in Paris at the French National Gemological Institute. Dr. Massi subsequently taught gemology and gave presentations at conferences in numerous countries all around the world. During his career he has also had the opportunity to publish a variety of scientific and educational articles on color-change corundum, hydrogen- and CO₂-related optical centers in diamond, chameleon diamonds, clinohumite, color-change bastnäsite and on a new gem mineral: hibonite, one of the rarest gems on Earth.

Dr. Massi was the Director of the Asian Institute of Gemological Sciences (AIGS) Gem Laboratory and Gem School based in Bangkok - Thailand. He subsequently completed his Graduate Gemologist (GG) studies at the Gemological Institute of America (GIA) headquarters in Carlsbad, USA and then became the Director of the new GIA Thailand Campus located in Bangkok - Thailand.

With more than 20 years of experience in the Gems & Jewelry industry, Dr. Massi is now the head of both the new international gem academy AGAT (for 'Academy of Applied & Technical Gemology') as well as the co-founder of the French-Swiss Gem Academy (from the World Gem Foundation), both housed in the Majestic building - a former palace from the Belle Epoque - located on the French Riviera, in Nice - France.

Ludovic Durand Oro (French-Swiss Gem Academy)

graduated from the Federation for European Education in Gemmology (FEEG) in 2012, has taught at the French Gemological Institute in Paris (France), was the Director of Education of a gem school based in Monaco and in 2019 co-founded the Academy of Applied & Technical Gemology (AGAT gem school) as well as the French-Swiss Gem Academy (FSGA), both based on the French Riviera in Nice, in the south of France.

A true gem enthusiast, he loves to organize gem field trips for his students to gem producing areas around the world while also acquiring top quality gemstones for his private clients.

Cristina Rzepka de Lombas (Central American & Caribbean Gem Academies) 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.

WORLD GEM FOUNDATION TEAM



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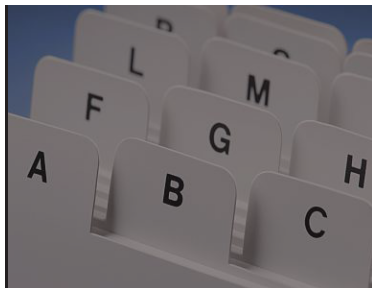
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World Gem Foundation

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Australian Opal Centre

The Australian Opal Centre (AOC) is a not-for-profit facility dedicated to opal-related scientific research, education, training, heritage, arts, travel, cultural and economic development. Based in the classic opal mining locality of Lightning Ridge, Australia, the AOC has developed its public collection and programs since 2004, while working towards construction of an innovative building that will be an international hub for opal-related knowledge and activity.

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