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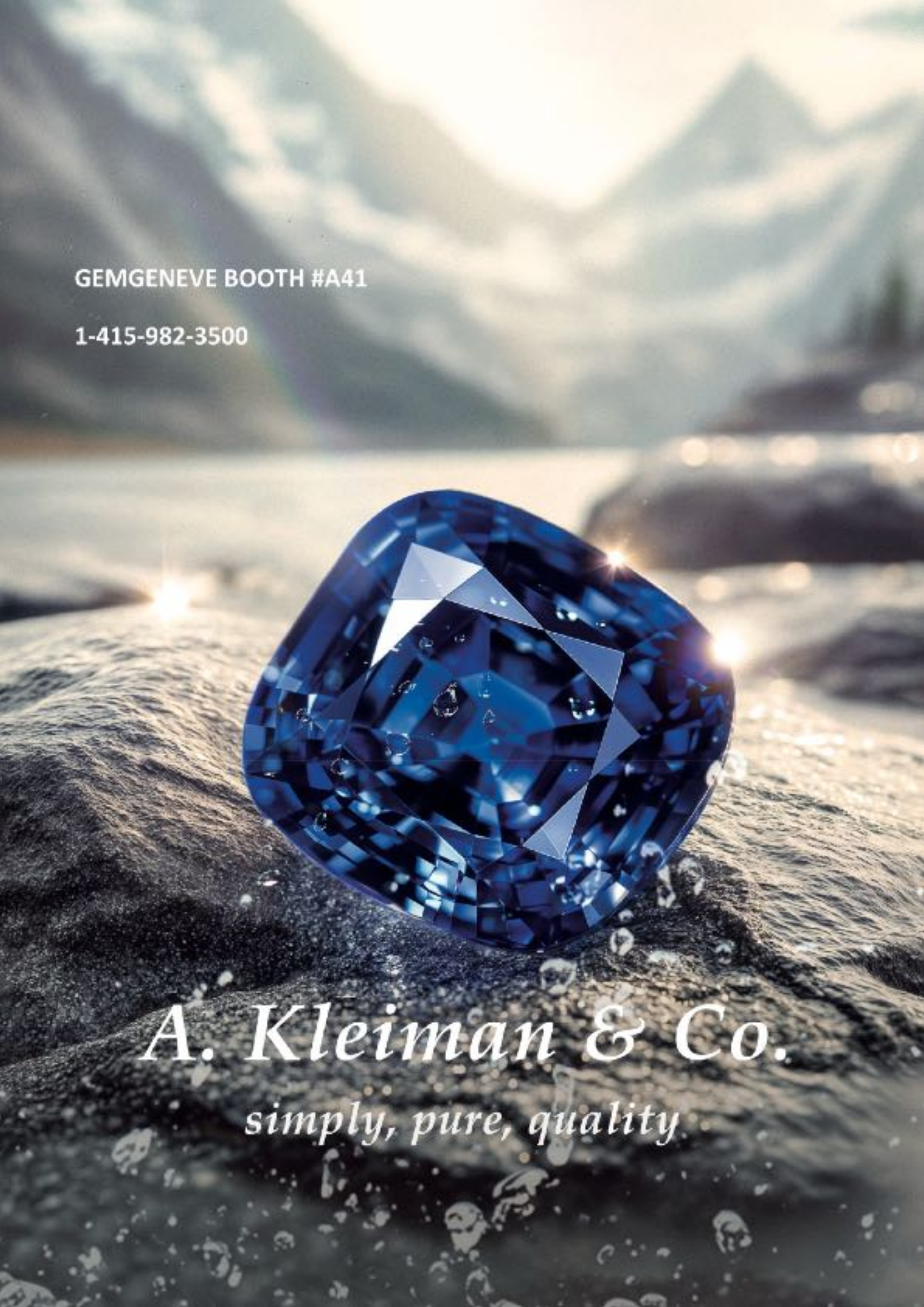
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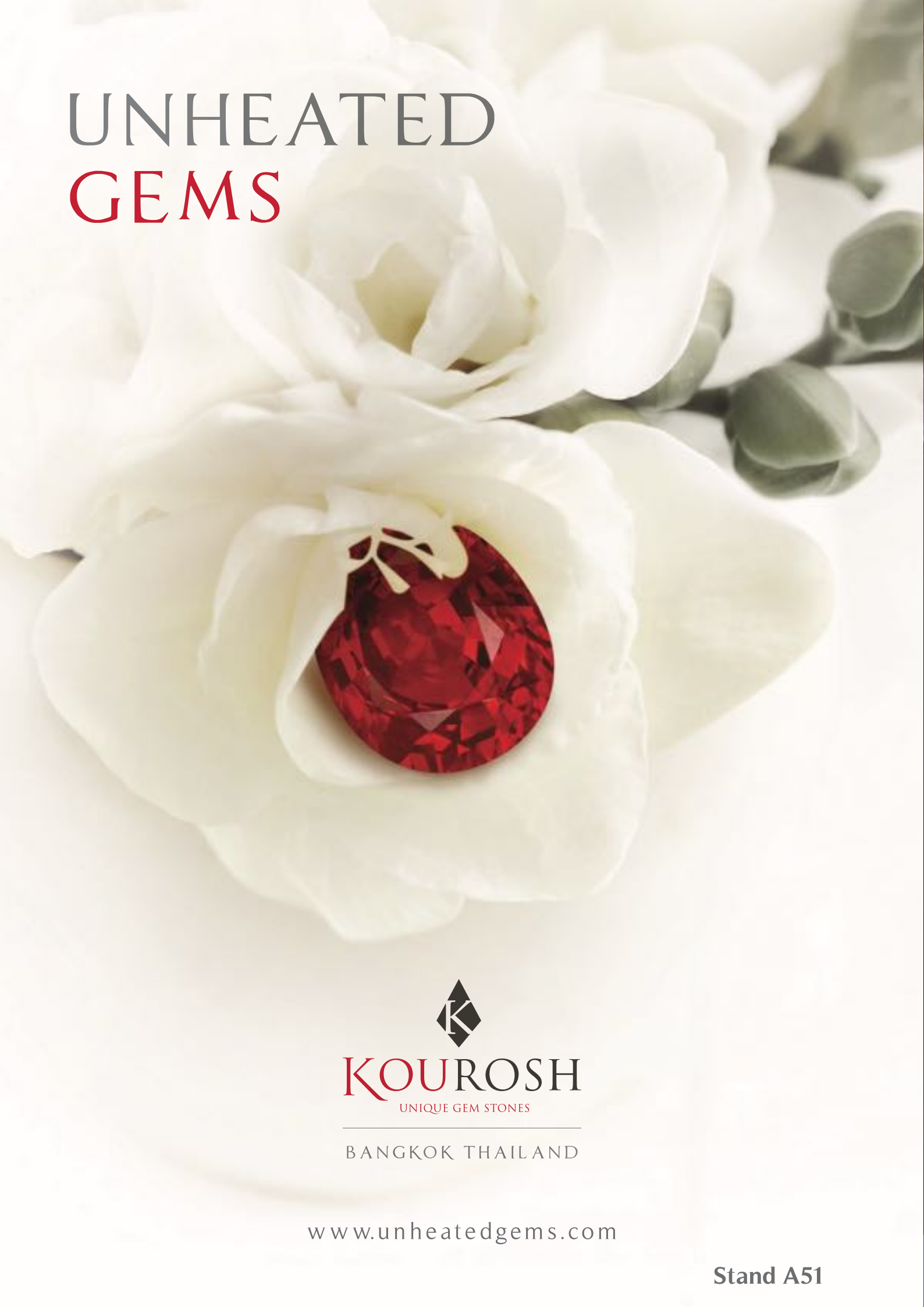

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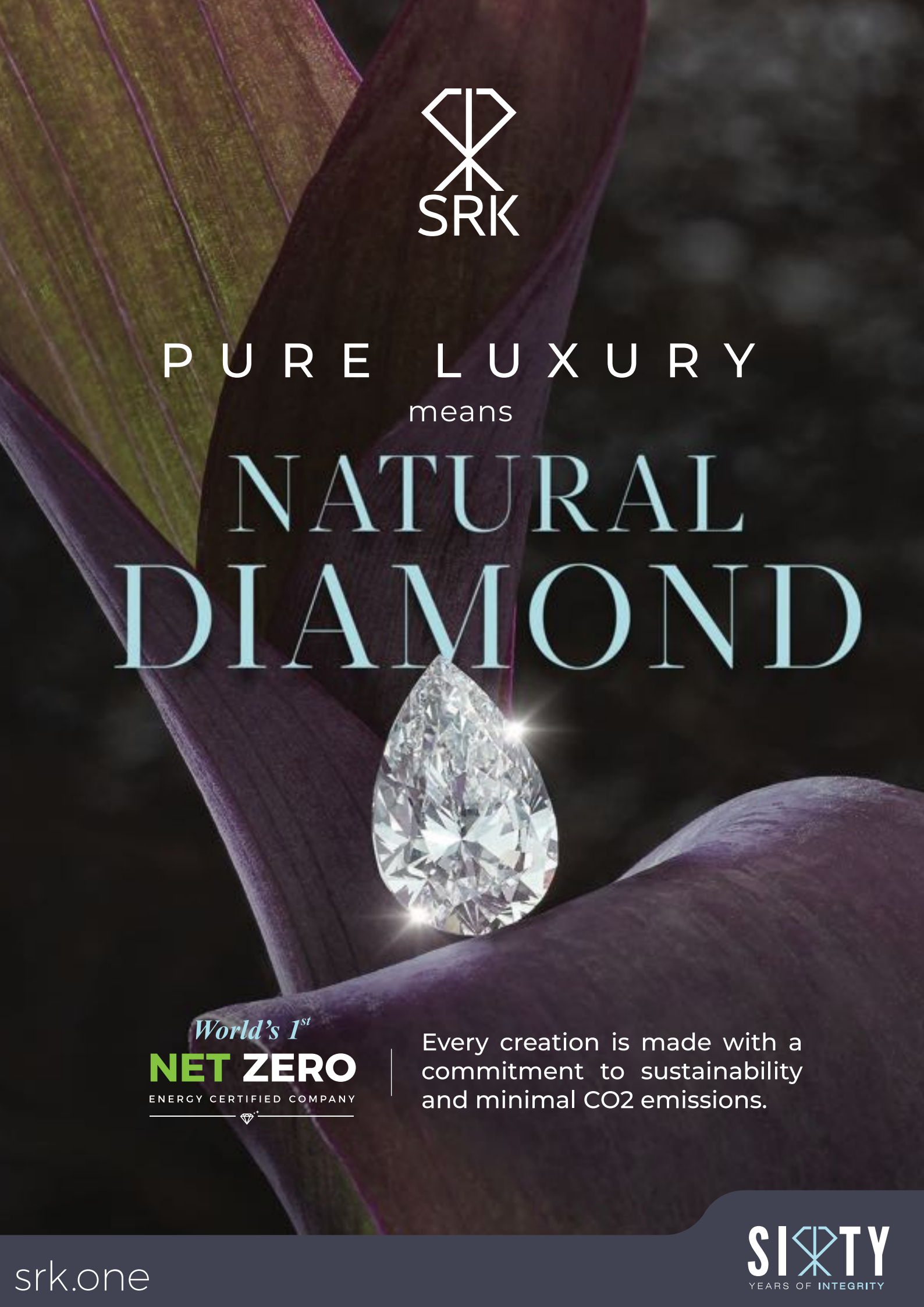
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EVENT

GemGenève 2024

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EXCELLENCE WITHIN EVERYONE'S REACH

From 8 to 11 May 2025, Palexpo in Geneva hosts GemGenève, an event that promises to be more international than ever. Now in its ninth edition, this hybrid fair — part trade show, part cultural event — focuses on breaking boundaries, fostering diversity and encouraging cross-disciplinary connections.

Beauty knows no borders, and neither does the trade in gemstones. This year, GemGenève embraces the theme of "Border(s)" to challenge and transcend them. The numbers speak for themselves: 250 exhibitors from over 75 countries will gather, representing nations as diverse as India, the United States, Brazil, Armenia, Japan, China and Ukraine. This global microcosm has been meeting in Geneva since 2018 for what many describe as a "fair like no other." "GemGenève has succeeded in showcasing the art of jewellery and Geneva itself on the highest international stage, all while maintaining a warm, family-like atmosphere. This is truly our DNA, and I believe it is a fair the market both needed and wanted," says Ronny Totah, co-founder of GemGenève [see p.26]. Firmly established as a key player in the international jewellery fair circuit, the event continues to grow in success with each edition. Last May, GemGenève welcomed 3,566 visitors — a 10% increase compared to its seventh edition.

GemGenève serves as a global hub, bringing together gemstone dealers, specialists in coloured stones and natural pearls, experts in antique jewellery, designers, associations, laboratories and art schools. "The presence of such a diverse range of participants creates incredible synergy. Relationships are forged, new ideas emerge, and fresh networks are built," explains Nadège Totah, co-organiser of the event.

Once again, GemGenève is forging a host of new partnerships this year, further cementing its reputation as a dynamic and forward-thinking event. Among these collaborations is one with the Digital Jewelry Week (DJW), founded by Dario Rjeili, which bridges the gap between the digital and physical worlds by showcasing the tangible creations of promising young designers. Armenian Jewellers Association (AJA) also returns for its second participation, shining a spotlight on Armenian craftsmanship [see box p.23]. Meanwhile, a partnership with the Jewellery & Gemstone Association of Africa (JGAA) — the first African organisation dedicated to supporting the continent's jewellery industry — introduces a "Focus on African creation". This initiative highlights Africa's vibrant creative energy and its emerging models of sustainable economies [see p.34]. "Since the very first edition, GemGenève has championed under-the-radar creators. Finally opening the fair to young African talents is one of our proudest achievements," says Nadège Totah.

Open to all

One of GemGenève's defining features is its accessibility to the

— Carine Claude

Cultural programme

Conferences, panel discussions and book signings punctuate the four days of GemGenève, offering visitors a rich cultural experience. Capucine Juncker will sign her book on the *Diamonds from Golconda* [see p.50], while journalist and gemstone expert Richa Goyal Sikri will present her investigation into the supply chains of African gemstones [see p.34]. The Métiers d'Art space highlights exceptional craftsmanship, some of which is at risk of disappearing. Enamellers, chain makers, engravers, pearl stringers, lapidaries and setters will all demonstrate their expertise. Sara Bran will discuss her mastery of gold lacework, a highly precise technique requiring 600 hours of work for each creation. Meanwhile, Lison de Caunes will revive the art of straw marquetry, which reached its peak during the Art Deco period. Other masterpieces on display include the work of Nelly Saunier, an exceptional feather artist who has collaborated with Harry Winston, Van Cleef & Arpels and Piaget. Saunier will showcase her talents in the Masterpiece space [see p.72], offering visitors a glimpse into the extraordinary artistry behind her creations.

> GemGenève is far more than just a jewellery exhibition: it is a global hub for fine jewellery, rare gemstones and some of the industry's most innovative creators. This prestigious event brings together designers, gem specialists, collectors and industry experts, offering an unparalleled opportunity to explore exclusive collections and connect with the best professionals in the field. — *Armenian Jewellers Association*

general public. While most jewellery fairs remain exclusive to industry professionals, GemGenève has, from the outset, welcomed visitors of all kinds — enthusiasts, amateurs or simply the curious — offering them a rare glimpse into the often opaque world of fine jewellery. "We have always been open to the public, Nadège Totah emphasises. It is part of our DNA. We are somewhat at odds with other Swiss fairs, which cater exclusively to professionals. From the very first edition in 2018, our goal was to lift the veil on our industry, to show how it works and to help the public understand what they are buying."

This year, GemGenève takes its mission of accessibility a step further by offering practical acquisition tips to its visitors. From trusting your eye and choosing the right lighting to checking the overall condition, considering hardness levels, handling stones with care, embracing unexpected colours and seeking second opinions, these "Reflex tips" aim to help buyers make confident decisions. "These are simple, actionable tips that can be applied at GemGenève or elsewhere, encouraging people to engage with merchants and better understand this fascinating world, explains Nadège Totah. We are not a shop. What we want to say to our visitors is: come, and we will guide you."

A community of loyal exhibitors

GemGenève's hybrid formula continues to strike a chord, with many exhibitors returning year after year. Among them is William L. Griffiths, a self-taught Australian jeweller and founder of Metal Couture, who describes himself as "pro-technology but anti-AI". Known for his intricate miniature automata, Griffiths would not miss the chance to return. "I first came to GemGenève last year and I enjoyed it so much that I had to come back. I am looking forward to reconnecting with the wonderful people we met last year and making new friends as well," he shares. For Griffiths, the experience has been nothing short of inspiring. "Last year, during our stay in Geneva, we visited the Patek Philippe Museum, and I was captivated by the automata on display. Later in the year, during a trip to Los Angeles, I was mesmerised by the hummingbirds in the Huntington Gardens. These experiences inspired me to create a mechanical hummingbird pendant, which I will be bringing to Geneva for its debut. I also challenged myself by working with titanium for the first time. I wanted the beautiful blue-violet hue that titanium takes

GemGenève 2024

Photo Mickaël Pijoubert. © Art Media Agency

GemGenève 2024

Photo Mickaël Pijoubert. © Art Media Agency

Tube necklace, Richard Wu

on for the hummingbird's body. Designing the mechanism was tricky, but I figured out how to make the bird's wings flutter using a small lever on the side of the pendant. It captures the bird mid-flight, sipping nectar from a flower."

Another loyal exhibitor, Constantin Wild, is full of praise for GemGenève: "GemGenève is a small fair, but it is exceptionally well-organised for dealers of high-end gemstones and antique jewellery from around the world, many of whom were previously exhibitors at Basel World, a fair that no longer exists." A specialist in premium-quality gemstones such as sapphires, rubies, vibrant tourmalines, saturated blue aquamarines, rare garnets and tanzanites — essentially the full spectrum of colourful rarities — the German jeweller represents the tenth generation of a dynasty of gemmology experts. At this year's event, Wild will showcase a personal project titled *Jungle dance*, a striking ensemble of gemstones inspired by Disney's original 1967 film *The jungle book*, a childhood favourite he still cherishes. The collection features five cushion-shaped and oval mandarin orange garnets, ten oval green peridots, and ten octagonal green and blue-green tourmalines, with a total weight of 316 carats. "It took me years to gather and arrange all the stones in the right sizes and colour palette to create the perfect atmosphere," he reveals.

Fresh faces

GemGenève also welcomes new exhibitors, including Turkish jeweller Arman Suciyan, who arrives with unique creations such as a pair of earrings from his *Odyssey* collection titled *Behind their wings earrings*. "We are thrilled to present our collections at GemGenève, where we aim to showcase the craftsmanship, innovation and dedication that define our brand. Our goal is to inspire and connect with a diverse global audience that values art and quality," says Suciyan, a winner of the Goldsmiths Craft Council and DeBeers Jewelry Design Award. Known for his sculptural designs, Suciyan works with gold, silver and bronze to create pieces that blend artistry with technical mastery.

The Designer village

At the heart of GemGenève lies the Designer village, a space dedicated to nurturing young talent and early-career designers. Spearheaded by Nadège Totah, this initiative provides a springboard for emerging creators to establish themselves in the industry. Returning to the Village this year are Armenian designer Shavarsh Hakobian, Chinese talent A.Win Siu, and the Ukrainian collective Strong & Precious, all of whom will unveil new creations [see box p.28]. For Alice Villa of Italian house Villa Milano, this year marks her first participation as a New Designer, though she previously showcased her work in the Emerging Talents section during the last two editions.

> The May fair is the annual gathering of the *Who's Who* of the global jewellery industry, with top-tier exhibitors and visitors. The uniform yet elegant booth design minimises visual clutter, ensuring the focus remains on the gemstones and jewellery themselves.
>
> — *Constantin Wild*

Spotlight on Armenia

For its second participation, the Armenian Jewellers Association (AJA), which "celebrates the global Armenian jewellery community", is showcasing the work of designers from Armenia and the diaspora. Each year, this international association organises a design competition to promote Armenian craftsmanship to an international audience, offering winners "prestigious recognition and the opportunity to present their jewellery." This year, jury includes Shavarsh Hakobian, first Armenian designer to be featured at GemGenève in November 2023. "GemGenève gave me invaluable visibility, he explains. The press, bloggers and industry specialists noticed my work, appreciated it and shared it widely. At GemGenève, you are engaging with a community of true connoisseurs and experts whose feedback and perspectives are incredibly valuable." Hakobian, who has been creating unisex jewellery in Yerevan since 2008, focuses exclusively on unique pieces or ultra-limited editions. For his third participation in the fair, he is unveiling a new collection created specifically for the occasion. "He has been working tirelessly on it for a year and he is pushed his boundaries even further," says Nadège Totah, admiring his dedication. AJA's presence also offers a chance to discover other Armenian designers, including Armen Shahinyan, Vasken Melikian, Vladimir Manukyan, Karen Hovhannisyan and Mike Saatji.

> With *Prismatica*, visitors can witness a piece of jewellery being brought to life over the four days of the exhibition. The project brings together five craftsmen who create a brooch inspired by the GemGenève logo. *Prismatica* also creates synergies between different jewellery-making disciplines and techniques, combining 3D modelling with craftsmanship. — *Mathieu Dekeuklaire*

> GemGenève offers an exceptional platform for engaging with like-minded professionals and industry leaders. We look forward to exploring new partnerships, sharing ideas and contributing to the vibrant global jewellery community. — *Arman Suciyan*

"I have always had a very positive experience, and I expect the same from this upcoming edition. It is a fantastic networking opportunity — not only can we meet many of our suppliers in person and all in one place, but it is also a key moment to connect with members of the industry press," she explains. Villa will present standout pieces from her contemporary lines, which combine lightweight aluminium with diamonds and gemstones, as well as a series of silk-cord necklaces with adjustable sliding elements inspired by Art Deco. "It is a versatile collection, sitting at the crossroads of fashion and fine jewellery, with a timeless charm," she adds.

A showcase of Art Deco elegance

The highlight of GemGenève's ninth edition is a special exhibition celebrating the enduring allure of the Art Deco style. With vintage and historical jewellery enjoying a resurgence, the fair marks the centenary of the 1925 Exposition Internationale des Arts Décoratifs et Industriels Modernes with "Art Deco: A legacy of timeless elegance" [see p.42]. The exhibition's inventory is nothing short of extraordinary. Chaumet contributes over 15 pieces from its heritage collection, while iconic designs by Madeleine Vionnet, Worth and Jean Patou are on loan from the Azzedine Alaïa Foundation. *Avant-garde* powder compacts, vanity cases and jewellery from the Faerber Collection are joined by pieces from Maison Golay Fils & Stahl. On the institutional side, the International Watchmaking Museum in La Chaux-de-Fonds lends a Cartier *Tank watch* (1919) and a Jaeger-LeCoultre *Reverso* (1931), two legendary designs of the era. Meanwhile, the Museum of Art and History in Geneva contributes three world-time watches featuring mechanisms invented during the Art Deco period by Geneva's master watchmaker Louis Cottier.

Passing the torch to future generations

GemGenève's cultural programme promises to be rich and engaging [see box p.28]. But the fair's commitment to the future of the jewellery industry extends beyond exhibitions, with a network of partner schools that has been growing for years. These include CPNE – Pôle Arts Appliqués, École Technique de la Vallée de Joux, CFP Arts Genève, Galdus School in Milan, the Société Royale Belge de Gemmologie and the Eric Horovitz Foundation. In collaboration with the Haute École d'Art et de Design (HEAD) — the only school in Switzerland offering a Bachelor's degree in Product Design with a focus on jewellery and accessories — GemGenève invites 15 students to reimagine jewellery as a vessel under the theme "Elixir". This concept draws inspiration from Richard Wagner's opera *Tristan and Isolde*, performed earlier this season at the Grand Théâtre de Genève. Far from being outdated, the jewellery trade is thriving. In May 2024, visitors under the age of 30 accounted for a quarter of the fair's attendance, offering a reassuring glimpse into the future of the industry.

GemGenève Brooch (*Prismatica*, 2024)

Photo David Fraga. Courtesy GemGenève

INTERVIEW

Ronny Tota h

Photo Gregory Maillot. Courtoisie GemGenève

“THE SECRET LIES IN PUTTING YOURSELF IN THE OTHER PERSON’S SHOES”

A guiding figure at GemGenève, Ronny Totah speaks “from the heart”. Attentive to the needs of his exhibitors, the fair he envisioned back in 2016 has become a key event in the industry, serving as a bridge to connect with future generations.

Ronny Totah is one of the two founding fathers of GemGenève, alongside Thomas Faerber. A prominent figure in the world of precious stone trading, Totah is known for his candid nature. Sometimes nicknamed the “King of Kashmir” due to his passion and expertise in the renowned sapphires, his company, Horovitz & Totah S.A., founded with Eric Horovitz, has been passing the torch for three generations. A member of the board of the Swiss Gemmological Institute (SSEF) since 1990, Totah works exclusively with natural, untreated gemstones. Here, he reflects on his journey and the motivations that led him to create this unique fair.

You were not destined to become a precious stone trader. How did you end up in this field?

I recently met someone who used an expression that feels perfectly fitting: the light switched on. You see, I did not come from this world at all. My background is in civil engineering — I graduated from the École Polytechnique in Lausanne. To be honest, I was not particularly good at it. And when you graduate in civil engineering from Polytechnique, you do not really know how to do much — well, almost nothing! The training focuses on adaptability and theoretical calculations, which are mostly useful for passing the exams. So, I quickly realised that since I did not know much to begin with, I would not lose anything by learning something entirely new!

What did you do after earning your degree?

I had a few months to spare before heading off for military service. During that time, I helped my father, who was partnered with a major figure in our industry, Mr Horovitz. I handled the accounts, ran errands, went to the post office — lots of small tasks.

When you talk about their profession, were they traders?

Yes. My father dealt exclusively with finance and had nothing to do with gemstones, while Mr Horovitz was a leading authority in the field of stones but did not touch the management side of things. Being around them, I began to understand something fundamental: the secret lies in always putting yourself in the shoes of the person standing in front of you.

What happened next?

I went to Morocco for military service. When I returned, their company was in serious trouble. A theft had occurred and the insurance refused to pay. Essentially, we were in virtual bankruptcy, repaying debts bit by bit. I stayed to help with sales, starting small — selling a watch here and there to make 50 or 100 francs. A little while later, I came up with a strategy — though the word might be a bit strong — to counter the

— Carine Claude

insurance company, and we won. That gave me a certain level of credibility. And so, I stayed. That is the real story. I could spin a more glamorous tale about transitioning from the "big stones" of engineering to the "small stones" of trading, but that is how it actually began.

Still, your engineering background seems to have given you a certain flexibility to adapt to unexpected situations…

Adaptability is the right word. When you have nothing to lose, there is no risk in trying something new. There is no point in being afraid once you have started — it is already too late by then!

What do you take away from those early years?

My father was the backbone of the company, but he was not the public face. Mr Horovitz, on the other hand, was more of a mentor to me. Believe it or not, their goal was not to make money immediately or at all costs — it was to do their job well. When someone comes to buy something from me, of course I ask about their budget, but I also try to understand their actual financial situation — even if that might seem a bit direct. Let me give you an example: imagine a *fiancé* who wants to buy a ring for CHF20,000 for his future wife. If he spends all his savings on it, will he be able to afford matching earrings a few years later for the birth of their first child or a bracelet for a wedding anniversary? If he keeps some of his budget aside, he will have the means to offer another gift later. But you can only do this if you genuinely care about people's lives and put yourself in their shoes. It is a mix of empathy and kindness, but it is also a long-term perspective — because, in a way, it builds trust with your client. There is no secret: the key is to be honest — with yourself and with others — and to see things from their perspective. That is what I have tried to pass on to my daughters and today, all of these values are embedded in the concept of GemGenève.

Why did you create GemGenève?

In the industry, I had become something of an advisor to everyone. If you had a problem with your neighbour or competitor, you would come to me. We exhibited all over the world, but BaselWorld was a key event. However, by 2016, it became clear that we were no longer welcome. Dealers were pushed to the back of a hall, hidden away to avoid competing with brands. Booth prices doubled,

3 questions to... Nadège Totah

Nadège Totah is one of the co-organisers of GemGenève.

Can you give us an overview of your selection for the Designer's Village?

The Designer's Village showcases creators who are still under the radar. At GemGenève, we feature both Emerging Talents — hidden gems yet to be discovered — and New Designers, who are slightly more established but do not yet meet the criteria to exhibit as manufacturers. The event acts as a springboard for them. Year after year, some designers return and occasionally move from one category to another — within the limit of three participations per category. Take Villa Milano, for instance, a remarkable Italian house that started as an Emerging Talent and is now transitioning to New Designer status. I am thrilled to see some designers preparing new collections specifically for the occasion, like A.win Siu, who had never exhibited outside China before coming to Geneva, or Armenian jeweller Shavarsh Hakobian, who continues to push boundaries with his latest creations [see box p.23]. Watching these styles and personalities evolve over time is my little source of pride.

Vintage jewellery is in the spotlight. Does vintage always mean collector's items?

Yes, but not exclusively. Of course, major collectors often seek pieces with prestigious origins and signatures. However, vintage jewellery can be perfectly accessible to the general public. It has plenty of advantages: it aligns with second-hand and upcycling principles, which are very much in vogue; there is also a growing interest in so-called "pre-loved" jewellery, which carries its own story. Vintage pieces can be uniquely customised — for instance, wearing a brooch as a pendant, on a cap, or even on a bag. Repurposing and modernising an old piece allows you to express your personality in a way that is truly unique, unlike a store-bought item, even an iconic one, which is always mass-produced. There is something for every budget — you just need to know where to look.

Talking about it, where can you find interesting vintage pieces?

Events like GemGenève are, of course, a great place to start. Exhibitors can offer advice on transforming pieces or simply provide inspiration. But there is no denying that the Internet remains a major resource, even for us as dealers. For example, small provincial auctions often hide incredible treasures waiting to be discovered.

Nadège Totah

Photo Mickaël Pijoubert. © Art Media Agency

> We are exhibitors ourselves. So it is not about imposing a pre-packaged formula and asking others to join once everything is set in stone. That is what makes us a fair created by exhibitors for exhibitors. You could compare us to wedding planners. You do not organise a wedding without the bride and groom!
>
> — *Rony Totah*

then quadrupled — it was no longer sustainable. I decided to stop exhibiting. Then a colleague came to me and said, "If you do something in Geneva, we will follow you." Then another said the same. And then another. Around the same time, I learned that Thomas Faerber had also been thinking about creating an alternative fair. We have known each other for over forty years — we have been colleagues, competitors and friends. That is how the idea for GemGenève was born: a fair created by exhibitors, for exhibitors.

What were your initial ideas?

We wanted a fair that was clearly different. Different how? We did not know yet, but we knew exactly what we did not want. We launched in 2018 with zero funding and just four volunteers, until 80 people said "OK, we are in." That is when we started studying the costs and feasibility, knowing full well that organising a fair was not our profession! The goal was not to make money but simply not to lose some either. Our ages — rookies of over 70 at the time — and our reputations certainly helped. We also surrounded ourselves with our daughters, Ida Faerber and Nadège Totah [see box p.28] as well as professionals. When you take the leap, you have no choice but to keep moving forward.

What makes GemGenève so successful today?

It is all about creating an environment where clients feel good. If they feel good, they will come back. If they come back, exhibitors will be happy and they will return as well. It is as simple as that. The fair is unlike any other commercial event in our industry. While it is not entirely open to the general public, we have made an effort to go beyond just professionals. For instance, when we organise a non-commercial exhibition during GemGenève [see p.42], it costs us money — we do not earn anything from it. But it pays off immensely in terms of image and reputation. These exhibitions help create an atmosphere and ambiance that put people at ease.

How to pass on the passion for your profession?

First of all, it is not just one profession — it is a multitude of them. Out of 100 people, you will get 60 different ways of approaching the trade. Some are drawn to the stones themselves. When they buy them, they might want to tweak something to enhance their beauty and take pleasure in admiring the result. There are the ones motivated by money, though they rarely admit it! As for antique jewellery, that is a totally different story. I do not think you can work in that field without passion. Personally, I feel I have a clear lack of knowledge in that area.

Would you say that young people are interested in this industry?

Schools attend every year, but let me give you another example. Last year, a grandfather wanted to bring his 7-year-old grandson to the fair. His ticket did not work at the entrance. I called them over and invited them in. I asked the boy, "What do you like?" — "Inclusions", he replied. So, I gave him a guided tour! Or take the little girl who came with her mother and sister. She was wearing earrings she had made herself with colourful beads. These are wonderful memories. For me, moments like these are the greatest reward.

***Rotonde* Cuffs, *Hat* collection**

Courtesy Isabelle Fa. GemGenève

GemGenève 2024

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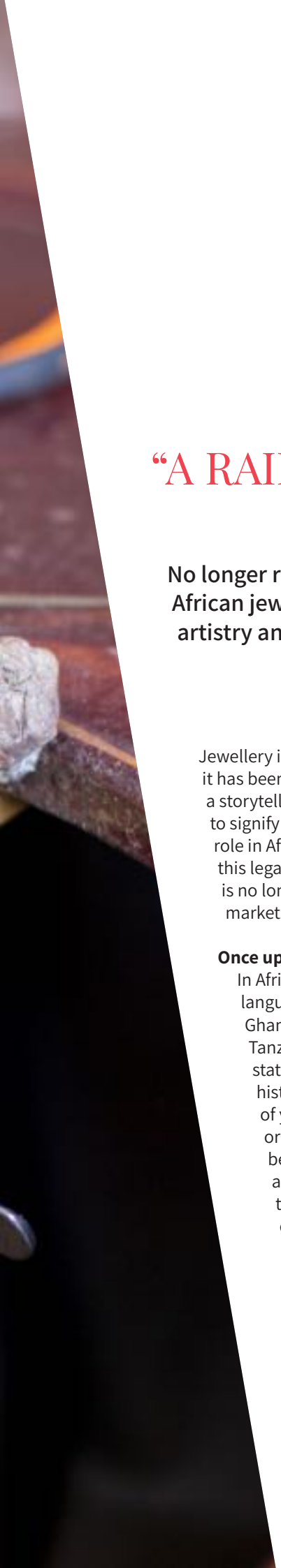


"A RAINBOW BENEATH THEIR FEET"

No longer relegated to museum displays or treated as exotic artefacts, African jewellery is now recognised for its complexity, artistry and evolving design languages.

Jewellery in Africa is more than just an accessory. For millennia, it has been a marker of identity, a bearer of cultural values and a storytelling medium. Whether worn for spiritual protection or to signify status and power, jewellery has always held a central role in African life. Simultaneously ancient and *avant-garde*, this legacy is now being redefined. Today, Africa's jewellery is no longer about supplying raw materials for global markets; it is about creating value where the story begins.

Once upon a time…

In African cultures, jewellery has always served as a visual language. From the golden regalia of the Ashanti kings of Ghana to the intricate beadwork of the Maasai of Kenya and Tanzania, these ornaments have always communicated status, spiritual beliefs and identity. The continent's history with adornment stretches back tens of thousands of years. The oldest recorded instance of personal ornamentation, consisting of a string of perforated shell beads, was found in Blombos Cave, South Africa, and is at least 75,000 years old. This discovery speaks about the long-standing human desire to adorn and communicate through form and material.

Besides its deep history, it might be wrong to fix African identity under one umbrella. In Ancient Egypt, for example, jewellery was inseparable from spiritual and societal life. Pharaohs were buried with gold and gemstone amulets believed to grant protection and divine favour. Gold, which was believed to be the flesh of the gods, became a symbol of immortality. However, in West Africa, the Akan people of present-day Ghana developed intricate gold-smithing traditions. The Ashanti royal court possessed extraordinary gold regalia, all coded with proverbs and political meaning. Jewellery was a language understood only by those who knew the signs, and wearing gold was to declare one's authority, lineage and connection to the ancestors. Across the Sahel, the nomadic Tuareg people carved their identity into silver. Their cross pendants are engraved with celestial and tribal symbols. In East and Southern Africa, materials like ostrich shells, bone, beads and even plant matter were ingeniously adapted to local belief systems. The Maasai of Kenya and Tanzania developed a striking beadwork tradition where colour combinations and patterns signified marital status, age and role in the community. In every region, ancient jewellery tradition was a statement, a symbol of its people. This rooted diversity has made jewellery a living archive of African civilisation.

A rainbow of gemstones

Beyond its rich cultural heritage, Africa is also a geological wonder.

— Nahir Fuente

When we think of the primary sources of gemstones like rubies, emeralds and sapphires, places like Colombia or Sri Lanka often come to mind. However, as gem expert Richa Goyal Sikri [see p.66] points out, "80% of the coloured stones come from the incredibly diverse and beautiful continent of Africa, most unearthed as recently as the last 15 to 60 years." In her book, *No stone unturned: The hunt for African gems*, she documents 24 short adventures based on actual experiences from international and local individuals involved in Africa's gem trade [see box p.68].

gemstone offerings. Ethiopia, in particular, has gained global recognition for its mesmerising opals, which are known for their vivid play-of-colour and unique patterns. These precious stones not only elevate African jewellery but also reflect the precious "rainbow beneath their feet".

Besides being one of the oldest known deposits of these precious stones, Africa is also the birthplace of diamonds [see p.50]. The discovery of these brilliant treasures in Kimberly (South Africa) in 1867 not only sparked the global diamond industry but also had a profound impact on colonial geopolitics. Today, the continent remains home to some of the world's most prominent diamond producers, being the most highly valued gem. In countries like Botswana, a unique partnership with De Beers, the South African–British corporation specialising in all aspects of the diamond industry, has helped shape the economy and trade. Meanwhile, nations such as Angola, Namibia and Lesotho contribute to the global diamond supply with an impressive variety, from marine diamonds dredged off the coast to rare pink and blue diamonds extracted deep underground.

> Tsavorite is everything a fine gemstone should be, and then some more!
>
> — *Henry Platt*

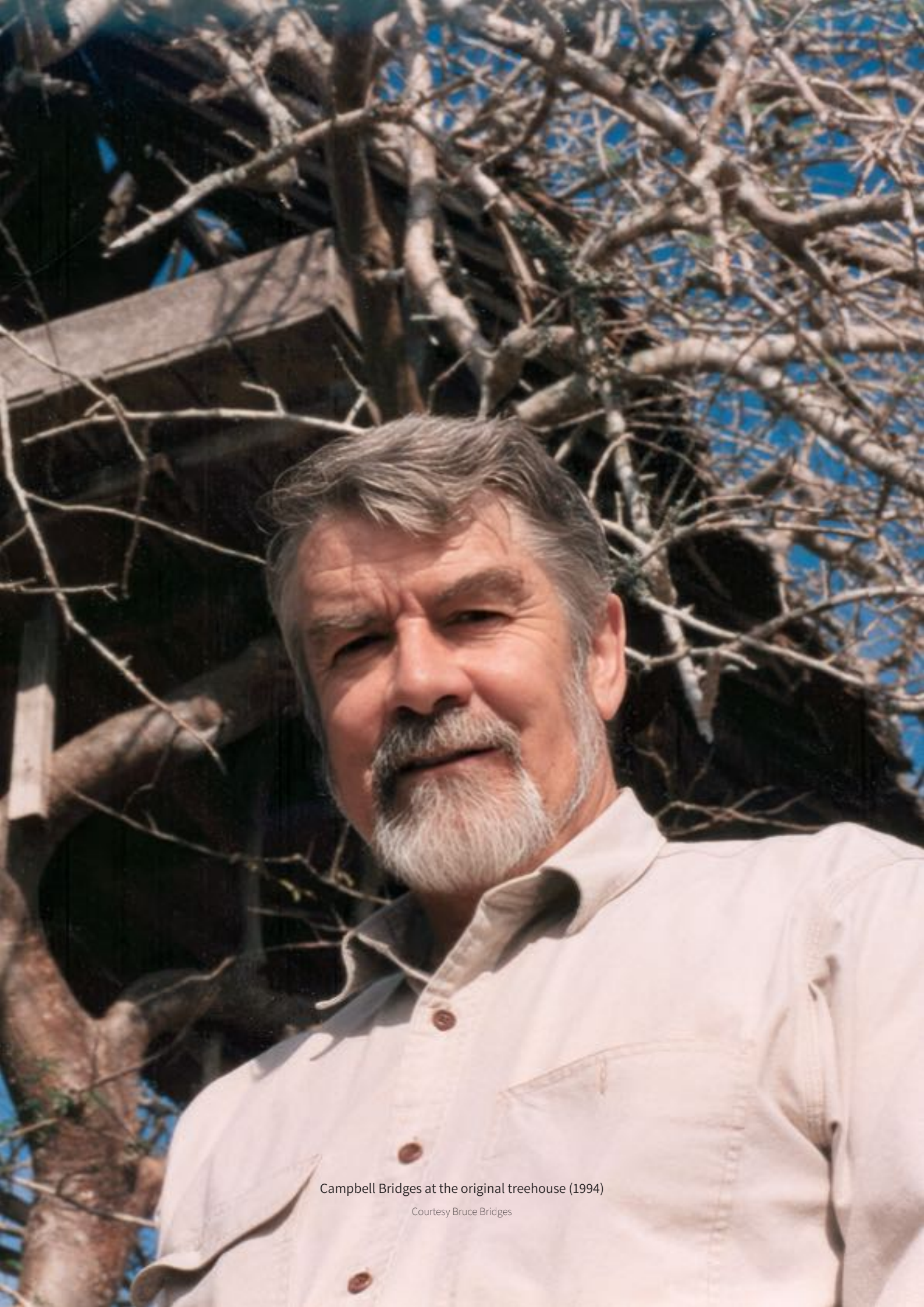
Among these treasures, Zambia stands out. The country is regarded as the second most important source of emeralds by value globally, producing deep green stones that are highly prized in both local and international markets. In Mozambique and Madagascar, rubies and sapphires contribute vibrant reds and blues to the continent's jewellery *palette*, often used in intricate beadwork and ceremonial adornments. Nigeria is renowned for its exceptional varieties of tourmaline, ranging from bright pinks to deep greens, which are increasingly popular in modern African jewellery designs. Spinels, garnets, and aquamarines — found in countries like Tanzania, Zambia, and Ethiopia — add further richness and variety to the continent's

Tsavorite

With its fiery brilliance, exceptional clarity and a refractive index higher than that of emerald, tsavorite has emerged as one of the most captivating green gemstones in fine jewellery. Unlike emeralds, which are mined in over 30 countries, tsavorite is found almost exclusively in Kenya and Tanzania, along the geological corridor of the Mozambique Belt. Its scarcity sets it apart: Tsavorite is 1,000 to 5,000 times rarer than emerald, especially in sizes above three carats, yet it remains relatively underrepresented in the global market. Compared to most gems, tsavorite is 100% natural and does not undergo oiling, heating or irradiation. What you see is entirely what came from the Earth. When purchasing tsavorite, collectors should seek stones with saturated greens. Ideally, the gem should have a medium to medium-dark tone with either a pure green or a slight bluish secondary hue. Tsavorite's magic lies in combining vibrant colour with exceptional sparkle, avoiding stones that are too dark or too light. Beyond its colour, tsavorite also offers remarkable durability. While emeralds and tsavorite score around 7.5 on Mohs scale, emeralds tend to be more brittle due to internal inclusions and natural fissures, often treated with oil to enhance their appearance. Tsavorite, on the other hand, has a cubic crystal structure with no cleavage points, making it more resistant to chipping and cracking during daily wear. Despite its superior characteristics, tsavorite still trades at a fraction of the price of comparable emeralds, often a fifth to a tenth of the cost, making it not only a beautiful choice but a savvy investment.

Tanzanite Angel Marquise

Courtesy Compagnie des Gemmes



Campbell Bridges at the original treehouse (1994)

Courtesy Bruce Bridges

Gemstone Association of Africa

Founded in 2022, the Jewellery and Gemstone Association of Africa (JGAA) is at the forefront of a cultural and economic renaissance across the continent. Initially established as the Jewellery and Gemstone Association of Zambia, the initiative quickly expanded into a pan-African movement, now connecting over 20 professional jewellers from across Zambia, Kenya, Egypt, South Africa and the African diaspora, including members in Europe and the United States. JGAA emerged from a simple yet powerful question: Why are African gemstones exported raw, only to return as expensive finished products? The association aims to reverse this trend by building infrastructure for local gemstone cutting, jewellery design, training and international marketing. This includes developing over 30 educational courses, partnerships with global experts and collaborations with institutions like the Sanchi Arts Jewellery School in Zambia, a program empowering vulnerable women through jewellery-making using local copper, supported by First Quantum Mines. Gender inclusion is another cornerstone of JGAA's work. While the trade is often passed through male lineage, the association aims to include women in the value chain. Recognising that African women contribute significantly to informal economies but remain underrepresented in formal sectors, JGAA creates pathways for female artisans to enter the jewellery industry.

Therefore, JGAA's mission is threefold: education and training; economic empowerment by building a sustainable chain from mine to market; representation and visibility for African jewellers. In GemGenève 2025, JGAA presents six African jeweller-makers selected through a continent-wide competition. A separate diaspora category also includes African-descended talent who create a piece in real-time during the fair days.

While supported by international partners like Platinum Guild International, Gemfields and CIBJO (World Jewellery Confederation), JGAA is African-led and globally connected. Their partnerships foster cross-cultural exchanges, not top-down aid, ensuring skills and ideas flow both ways. The association also develops free educational resources through initiatives like the "Rainbow beneath our feet" podcast and a learning platform.

African uniqueness

However, if that were not enough, Africa's mineral wealth extends beyond colourful gems and diamonds. The continent's unique geological formations have given rise to stones that are not only rare but often exclusive to certain regions. Two East African gemstones, tsavorite and tanzanite, exemplify this rarity. Both have captured international attention, earning a place in some of the world's most exclusive and high-end jewellery designs. In 1961, Scottish geologist Campbell Bridges first encountered tsavorite [see box p.36], which was then known as Rhodesia. It was not until 1967, near the village of Komolo in northern Tanzania, that Bridges rediscovered the same vibrant green garnet and could mine it. After his Tanzanian mines were nationalised in 1970, he moved north to Kenya, where he rediscovered the gem and opened new mines near Tsavo National Park. Initially known as "green grossular garnet", the gem needed a commercial name. "My father suggested naming it after Tsavo Park and added the '-ite' suffix. That is how tsavorite was born. Tiffany & Co launched it to the world a few years later, in 1974," recounts Bruce Bridges, son of the discoverer. The gem's introduction was bold: full-page ads in *The New York Times* and *The New Yorker*, co-promoted with Campbell's name, unheard of at the time for an individual in the jewellery world. "It is a pure, natural gem that does not need enhancement. That is what my father believed in — natural beauty and responsible sourcing," he states. Since his father's death in an ambush, Bruce continues his family's legacy by running Bridges Tsavorite, one of the few mine-to-market tsavorite businesses in Africa. As a passionate advocate for this green gem, he champions global recognition for its beauty and ethical sourcing.

The Bridges family has collaborated closely with Kenyan authorities and local tribes to ensure their operations remain ethical and sustainable, creating jobs and providing educational opportunities in the region. As he puts it, "Every time someone wears a piece of tsavorite, they are wearing part of East Africa's history. These stones are our heritage."

Tanzanite is another African gemstone that has captivated the world with its deep blue-violet hues. Discovered in 1967 — a landmark year for African gems — tanzanite is found exclusively in the foothills of Mount Kilimanjaro, near Merelani in northeastern Tanzania, making it one of the rarest gemstones on Earth. Initially, it was identified as an unknown blue zoisite, although the mineral was never recorded in this vivid blue form. Gemologists were stunned by its trichroism, the ability to display three distinct colours (blue, violet and burgundy) depending on the viewing angle and lighting conditions. Though the exact gem's discovery remains unclear, Campbell Bridges was among the first to recognise

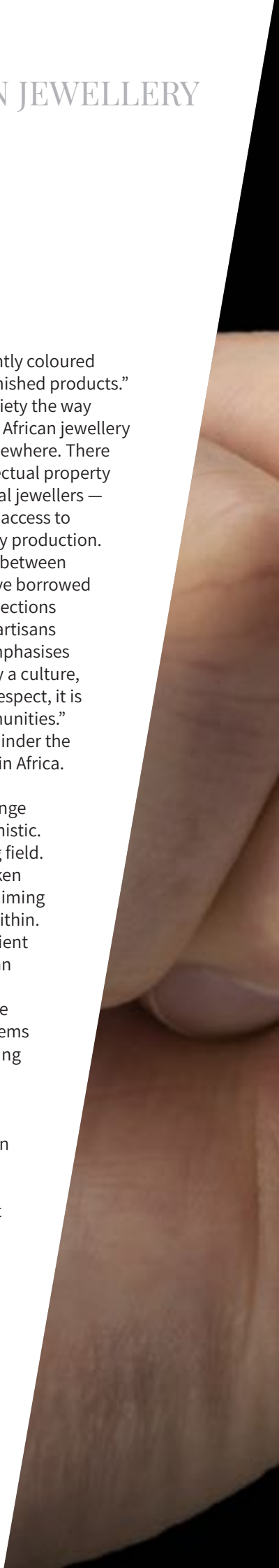
its significance. Mistaking the early samples for sapphires, he brought them to the U.S. and presented them to Harry Platt, then-president of Tiffany & Co. By 1969, tanzanite made its debut, with Elizabeth Taylor becoming the face of the stone, which perfectly mirrored her iconic blue eyes. Tiffany & Co. became its exclusive seller, launching tanzanite into the global spotlight. Its rarity, paired with its dramatic beauty, quickly earned it the nickname "Africa's sapphire", though many regard it as even more unique. As for its characteristics, Tanzanite is slightly softer than tsavorite or sapphire, with a Mohs hardness of about 6 to 7, making it more suitable for earrings, pendants or rings with protective settings to prevent scratches. Nearly all tanzanite on the market undergoes a gentle heat treatment to enhance its vivid blue and violet tones. This process is stable, permanent and widely accepted within the industry. Today, the global market for rough tanzanite is estimated at around $100 million annually. For exceptionally fine stones under 50 carats, prices can reach up to $1,000 per carat.

Contemporary times

Longo Mulaisho-Zinsner, Zambian-born and UK-based, is on a mission to reclaim Africa's legacy in jewellery and rewrite the narrative of its gemstone and metal wealth. As the founder and president of the Jewellery and Gemstone Association of Africa (JGAA) [see box p.39], Mulaisho-Zinsner envisions a future where African jewellers not only own their craft but control their economy. "As Africans, we walk on a rainbow beneath our feet," she says, describing the continent's wealth. "A rainbow of vibrantly coloured gemstones and metals that the world often owns as finished products." So why was African jewellery not central to African society the way it is in the West? Despite its rich diversity and heritage, African jewellery often lacks the institutional support systems found elsewhere. There is no centralised database, no widely accessible intellectual property protections and a limited infrastructure to support local jewellers — from training and certification to basic necessities like access to water, which is essential for certain aspects of jewellery production. The contemporary moment is also marked by tension between inspiration and appropriation. Many luxury brands have borrowed African forms without acknowledgement, creating collections "inspired by" the continent without engaging with its artisans or investing in its communities. Author Richa Goyal emphasises the importance of ethical creativity. "If I am inspired by a culture, it is my duty to acknowledge it. This is not just about respect, it is about restoring agency to African designers and communities." Among others, these are some of the challenges that hinder the growth of a global and competitive jewellery industry in Africa.

Fortunately, associations like JGAA are working to change that. Despite the challenges, its founder remains optimistic. "The jewellery industry has started to level the playing field. Education and training are key, and they cannot be taken away from us." Also, a wave of African jewellers is reclaiming narrative power, leading a cultural renaissance from within. Egyptian designer Azza Fahmy continues to revive ancient goldsmithing techniques, while contemporary Zambian creatives like La Feliz Dion draw on local stones and symbols to reimagine African luxury. These creators are not only designing objects; they are designing ecosystems and creating new worldwide narratives. They train young artisans, develop ethical sourcing systems and offer new models of business grounded in local values and global standards. Digital platforms, exhibitions like GemGenève and growing international media attention provide the visibility needed to support their growth.

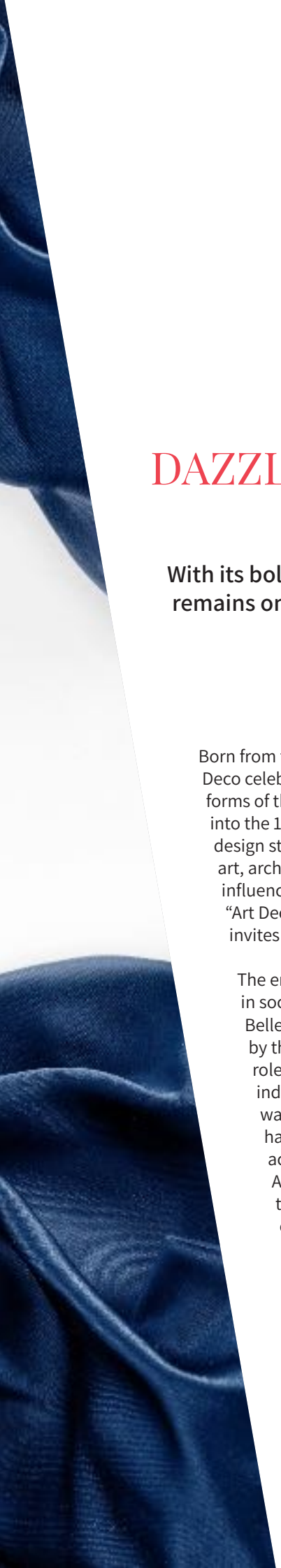
However, to redefine the narrative, it is necessary to first challenge the narrow definition of "African jewellery" in the global imagination. "There is not one version of African jewellery. It differs across regions, histories and cultures, explains Mulaisho-Zinsner. It is a continent, not a country." But this is not just about gemstones or precious metals; it is about the voices, the stories and the cultures that have always been present. Now is the time for a significant shift; a transformation of materials, people and perceptions. "It is time Africa speaks for itself; through its jewels, its people and its rainbow beneath our feet."



Malaya garnet of over 18 carats, cushion cut

Bracelet (1928), Van Cleef & Arpels

Courtesy Private collection. Steven Neckman Inc. GemGenève



DAZZLING LEGACY

With its bold geometry, vibrant colours and modern glamour, Art Deco remains one of the most iconic styles a century after its golden years.

Born from the desire to challenge conventional traditions, Art Deco celebrated the triumph of technology and the liberating forms of the machine age. Emerging in the 1920s and flourishing into the 1930s, the movement evolved beyond a mere design style; it became a cultural phenomenon that fused art, architecture, fashion and industrial design with global influences and a deep reverence for craftsmanship. With "Art Deco: A legacy of timeless elegance", GemGenève 2025 invites visitors to rediscover the master artisans of that era.

The end of the First World War marked a significant shift in society, rejecting the excesses of the Edwardian and Belle Époque eras. Europe's cultural hubs were devastated by the war, while women, who stepped into industrial roles previously occupied by men, gained greater independence and visibility. This newfound freedom was also evident in fashion, which embraced shorter hairstyles, more relaxed clothing and assertive accessories. Although some trace the origins of Art Deco back to as early as 1915, it was not until the 1925 Exposition Internationale des Arts Décoratifs et Industriels Modernes in Paris [see box p.44] that it had its first public showcase. The movement emerged as a deliberate departure from the curvilinear, organic forms of Art Nouveau, embracing instead geometric lines and symmetry. Art Deco also captured the spirit of the modern age, reflecting the rapid industrial advancements and the growing desire for forward-thinking aesthetics. In this changing environment, Art Deco design emerged, uniquely combining luxury and craftsmanship.

Legacy of timeless elegance

To commemorate the 100th anniversary of the International Exhibition of Modern Decorative and Industrial Arts, GemGenève 2025 revisits this golden period with "Art Deco: A legacy of timeless elegance". Curated by GemGenève's Director, Mathieu Dekeukelaire, the exhibition offers visitors a multidimensional journey into the Art Deco world. With works dating from the 1920s to the 1930s, "The idea was to create a dialogue between different types of pieces to show visitors that Art Deco was a total art" explains Dekeukelaire [see box p.47]. Curated to illustrate the movement's influence across disciplines and continents, the exhibition celebrates the fusion of function and luxury. "We showcase jewellery pieces, haute couture, furniture, watchmaking and some art objects as well." Although these items were produced in significant numbers during the Art Deco period, time has not always been kind to them. "Today, it is rare to find such pieces in perfect condition. Many have suffered damage, lost components or required careful restoration."

— Nahir Fuente

Jewellery takes centre stage, showcasing a variety of items. "It was a period where you could have lots of jewellery with lots of white diamonds, onyx and platinum," Dekeukelaire said. However, it was also a time of exceptional craftsmanship, "even incorporating non-precious materials like silver, wood and enamel." The collection also highlights the international scope of Art Deco's inspirations, featuring pieces influenced by Asian aesthetics, American innovation and Egyptian motifs, particularly resonant after the discovery of Tutankhamun's tomb. Furniture pieces also reflect the refined craftsmanship characteristic of the era. One highlighted technique is marquetry, a type of inlay work known for its luminous surfaces and vibrant colour combinations. "They cut and stick them on some furniture or art pieces. This brings lots of colours and lights into the materials," he explains, a form of artistry that was quite trendy during the Art Deco period. The fashion component is equally captivating. From evening dresses by Madeleine Vionnet — the inventor of draping and the bias cut — to iconic Paris fashion designers like Jean Patou or Worth, the exhibition includes five *haute couture* garments that encapsulate the glamour of the 1920s. "The idea was to illustrate women's fashion through short, embroidered dresses and liberated designs, inspired by the Gatsby and Charleston styles that celebrated the movement," the organiser notes. Among the standout pieces is a mid-1930s evening dress from Vionnet, alongside more casual yet exquisitely crafted designs. All textile items are loaned from Azzedine Alaïa Foundation's collection, which curates over 35,000 items, including works by leading Art Deco fashion figures. Lastly, the most technical pieces

Art Deco and the Paris Exhibition of 1925

From April to October 1925, sixteen million visitors attended the Paris International Exhibition of Modern Decorative and Industrial Arts. There were 15,000 exhibitors from twenty countries, including Britain, Italy, Spain, France, Belgium, the Netherlands and Japan. The exhibition aimed to showcase the modern style of architecture, decoration, furniture, glass, jewellery and other decorative arts on an international scale. The objects displayed were made with rare and expensive materials such as ebony, ivory, mother-of-pearl, sharkskin and exotic woods. For the first time at an international exposition, pieces of furniture were exhibited not as individual items but in rooms similar to those in a home, where all the decor was coordinated. The program specified that artists and manufacturers would not be allowed in the exhibition if they did not meet the conditions outlined in the program. Many pieces were specially commissioned and created for the exposition, making them essential works that defined the period. However, Le Corbusier showcased modernism in the Esprit Nouveau pavilion while rebelling against the luxurious decorative styles shown at the exposition. "Decorative art", Le Corbusier wrote: "as opposed to the machine phenomenon, is […] a dying thing. Our pavilion will contain only mass-produced items from factories, truly the objects of today." Architecture schools gradually embraced Le Corbusier's ideas, leading to the abandonment of Art Deco aesthetics and shifting the focus toward modernism. Today, the fair is celebrated as the event that marked the birth of Art Deco, playing a crucial role in inspiring designers worldwide to adopt the style in the following years.

Engraved emeralds

Engraved emeralds tell a story that weaves through ancient civilisations, imperial courts and contemporary ateliers. These green gemstones, prized for their colour and rarity, have been carved and inscribed for their beauty and cultural and spiritual resonance for millennia. The earliest roots of emerald engraving trace back to ancient trade networks linking Egypt, Mesopotamia, India and China in the 18th century BC. Mesopotamians, who pioneered the art of stone engraving with their iconic cylinder seals around 3500 BC, also infused their stones with celestial symbolism. Meanwhile, although limited by the poor quality of their emeralds, Egyptians maintained a monopoly on the trade from the Middle Kingdom onward, exporting gems and symbolic traditions. India embraced emeralds spiritually and artistically. Sanskrit texts reference them as early as 1500 BC and, by the Mughal era, emeralds had become emblems of power, purity and paradise. In Islam, green is sacred and under Mughal rule, engraved emeralds often bore Qur'anic verses, transforming them into talismans as much as ornaments. The famed 217.80-carat *Mogul Mughal* emerald, dated 1695, is a prime example, echoing the empire's devotion to gemstone and scripture.

But the fascination did not end with the empire. By the early 20th century, engraved emeralds found new life in the hands of Western jewellers like Cartier and Chaumet. Inspired by Indian artistry, this technique gave rise to Art Deco's "Tutti Frutti" style, where carved emeralds, rubies and sapphires formed unique compositions of leaves and berries. These Art Deco reinterpretations were often crafted from stones of lesser clarity, yet their value lay in design and craftsmanship rather than gemological perfection.

Villa van Buuren

Courtesy Musée & Jardins van Buuren

Evening dress (1925),
Madeleine Vionnet

Courtesy Azzedine Alaïa
Foundation. GemGenève

on display include three *World time* watches. Created during the Art Deco era by renowned Geneva watchmaker Louis Cottier, the *World time* complication revolutionised horology by allowing all global time zones to be displayed simultaneously, regardless of the wearer's location. The piece is a pocket watch crafted by Cottier himself and loaned by the Genève Art and History Museum. Complementing these historical timepieces, visitors can also encounter a heritage watch from Golay Fils & Stahl and a rare wristwatch from a private collection.

Covering over 100 sqm, the exhibition is built on collaborations with prestigious institutions, blending private collections and museum loans. Notable partners include Boghossian Foundation, International Museum of Horology in La Chaux-de-Fonds and Ateliers Lison de Caunes in Paris, among others. "Some of the pieces are for sale, but they all are of museum quality," Dekeukelaire explains, highlighting the blend of access and excellence.

Art Deco novelties

Art Deco jewellery was sleek and striking, distinguished by sharp edges and a consistent use of surface, line and volume. Designers introduced unconventional stone combinations, often merging natural materials like onyx, emeralds [see box p.44], rubies, jade, silver, ivory, lapis and rock crystal, with synthetic options like plastic and glass. Although designers came from various backgrounds, they all shared a common vision: breaking tradition and eliminating unnecessary ornamentation. Numerous Art Deco jewellers also crafted new items such as lacquered boxes, smoking accessories and vanity cases. However, the innovations of the Art Deco era extended beyond new materials, shapes and techniques. European designers looked beyond their borders for the first time, drawing creatively from foreign cultures. A wave of fascination with Egyptian, Chinese and Japanese art in the early 20th century opened up a new visual vocabulary. This cross-cultural exchange introduced motifs and materials previously unfamiliar in Western design. Artists began incorporating elements like coral, lacquer, enamel and pearls — traditionally used in Asian jewellery — into their creations. Some designs replicated dragons,

3 questions to... Mathieu Dekeukeleire

Mathieu Dekeukelaire is the Director of GemGenève.

What does the exhibition reveal about Art Deco?

With "Art Deco: A legacy of timeless elegance", I wanted to show visitors that Art Deco was not just a passing style, it was a total art form. From luxurious jewellery to finely crafted furniture, the exhibition invites people to see Art Deco as a cultural movement that touches every aspect of design and daily life. You can sense it in the variety of materials, the international influences and the remarkable craftsmanship of the era. The goal is to draw connections between different pieces and reveal how they speak the same artistic language.

Which objects would perfectly encapsulate the spirit of Art Deco?

One piece from the Faerber Collection that perfectly embodies just that. This bracelet, crafted from diamonds and onyx, draws inspiration from the New York skyline, a city central to the Art Deco era. The craftsmanship is exceptional and the piece perfectly reflects the period's historical significance and artistic innovation. Another standout piece is a vanity case from the Chaumet Heritage Collection that showcases the Asian influences in Art Deco designs. With engraved stones like jade and lapis lazuli, this piece exemplifies the diverse cultural inspirations while maintaining the luxurious materiality. Both perfectly represent the movement's flair, history and enduring influence.

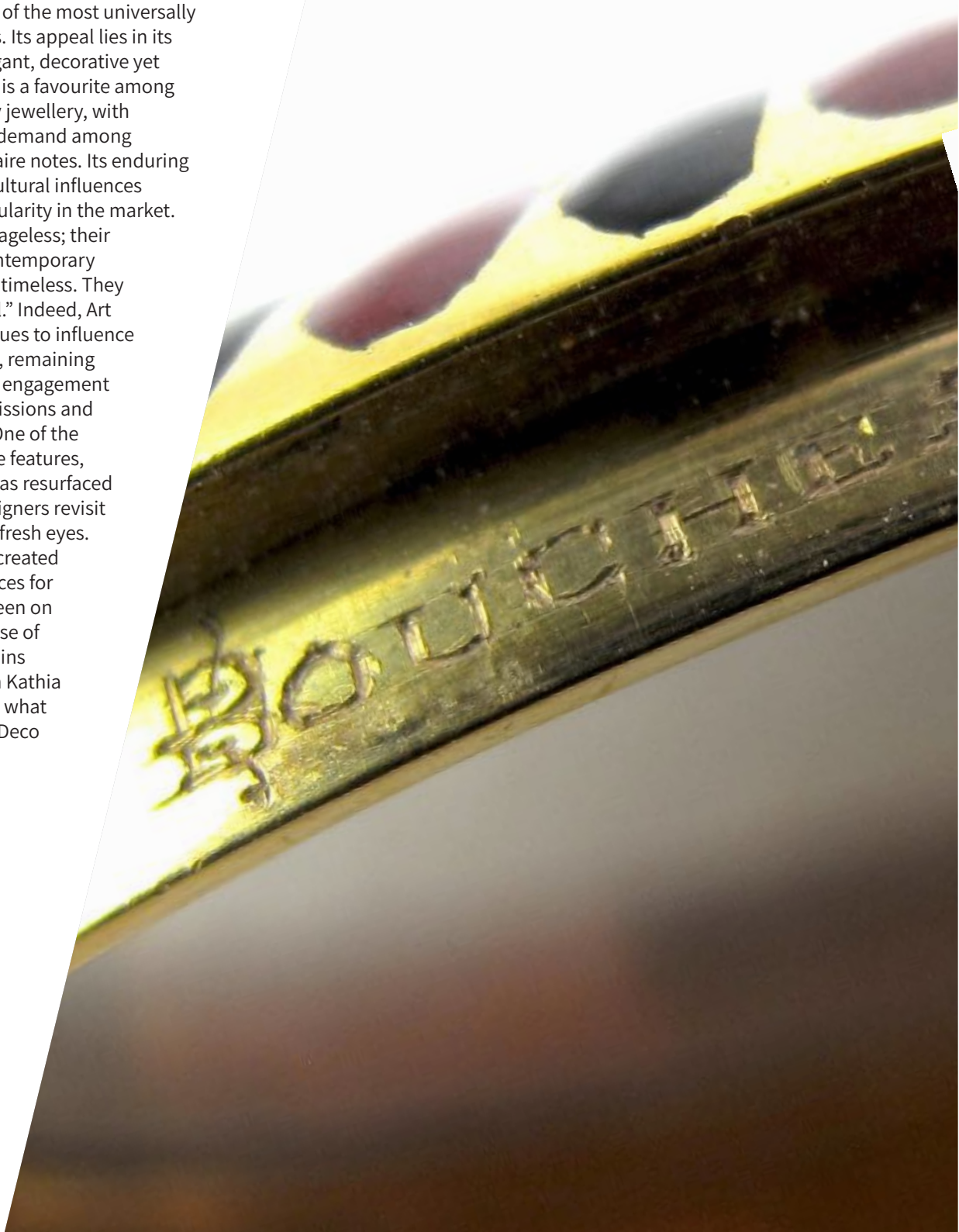
Beyond the Art Deco homage, are there any novelties this year?

There are two exciting new elements this year. First, the participation of the JGAA brings an authentic narrative about African craftsmanship and cultural innovation [see box p.39]. The second is a live jewellery-making experience called *Prismatica*, where visitors can witness a piece of jewellery being brought to life over the four days of the exhibition. The project brings together five craftsmen — Matteo Stauffacher, Félicien Riondel, Aymeric Pittet, Richard Lundin and Thibault Leclerc — who create a brooch inspired by the GemGenève logo. The aim is to embody the core values of the event: expertise, passion and the transmission of tradition. *Prismatica* also creates a synergy between different jewellery-making disciplines, combining 3D modelling with craftsmanship. The first brooch is on display in the Métiers d'Art section, serving as a reference to follow the step-by-step creation of the second piece.

pagodas and Chinese characters, while others offered more interpretative tributes to Eastern aesthetics. Persian carpets and miniatures inspired stylised floral and botanical patterns and bold colour pairings. Parisian jewellers Templier, Van Cleef & Arpels, Cartier and Paul Brandt crafted some of the best pieces of the time.

A century later

Art Deco remains one of the most universally admired design styles. Its appeal lies in its balance: bold yet elegant, decorative yet elaborated. “Art Deco is a favourite among buyers of 20th-century jewellery, with its pieces still in high demand among collectors,” Dekeukelaire notes. Its enduring elegance and cross-cultural influences help maintain its popularity in the market. “Many pieces remain ageless; their designs are highly contemporary and the materials are timeless. They have universal appeal.” Indeed, Art Deco jewellery continues to influence contemporary design, remaining a preferred choice for engagement rings, bespoke commissions and vintage enthusiasts. One of the movement’s signature features, engraved emeralds, has resurfaced in recent years as designers revisit historical motifs with fresh eyes. “Jewellers who once created fabulous Art Deco pieces for the maharajahs are keen on reviving not just the use of engraved gems, explains art jewellery historian Kathia Pinckernelle, but also what has become their Art Deco and Indian heritage.” She highlights Viren Bhagat as a leading figure in this revival. As GemGenève 2025 prepares to celebrate this legacy, visitors can see beautiful craftsmanship that encapsulates a century of elegance, innovation and cross-cultural artistry.



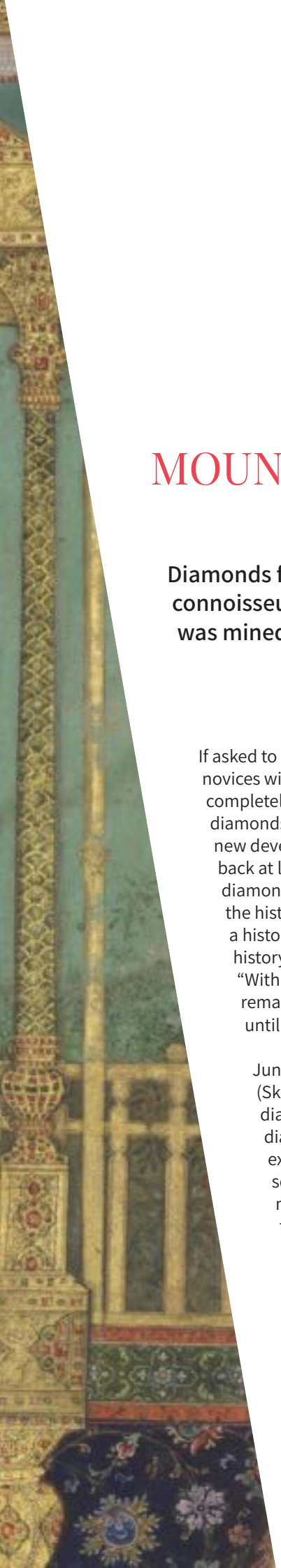
Enamel powder box (1923), Boucheron

Courtesy Faerber Collection. GemGenève

WIDE ANGLE

Portrait of the Mughal Emperor Shah Jahan on the Peacock Throne (c. 1635), Govardhan (attr.)

Photo Marc Pelletreau. © The Museum of Islamic Art



MOUNTAINS OF LIGHT

Diamonds from the Golconda mines in India enchant the hearts of gem connoisseurs. Since it is scientifically impossible to prove where a diamond was mined, how do these special stones maintain their value and allure?

If asked to identify the cradle of diamond mining, most novices will likely say Africa. Though incorrect, it would not be a completely ignorant answer. Around two-thirds of newly mined diamonds today do come from Africa. But that is a relatively new development. The history of diamond mining stretches back at least six centuries, while the earliest known African diamond mines are only around 150 years old. "India is the historical cradle of diamonds," says Capucine Juncker, a historian, gemologist, and author specialising in the history of jewellery and the cultural exchange of gemstones. "With the exception of modest deposits in Borneo, India remained the world's only known source of diamonds until the discovery of Brazilian mines around 1725."

Juncker's latest book, *Diamonds from Golconda* (Skira, 2024), is devoted to India's legendary Golconda diamonds, considered by many to be the most desirable diamonds in the world. Hers is the first book focused exclusively on the subject. "According to available sources, it is reasonable to assume that diamond mining took place [in India] at least as early as the fourth century BC, and may even be rooted in an older mining tradition, Juncker says. The earliest reference text on the subject is found in the *Arthashastra*, a Sanskrit treatise written between the third century BC and the third century AD, which describes an organised system for the production, control and trade of diamonds and gems under state control. This organisation appears to be an extension of even older practices, as suggested by the *Ratnapariksa*, the founding text of the Indian lapidary tradition."

The first century AD Roman author Pliny the Elder explicitly mentions Indian diamonds in his book *Natural history*, Juncker notes. "This confirms not only the antiquity of their exploitation, but also their circulation in an active international trade network between India and the Roman world." But Juncker's interest in Golconda diamonds is not only relegated to facts and dates. It is a passion ignited by the cultural, spiritual and mythical power these stones have wielded over human history. Part of that power comes from the fact that Golconda diamonds are some of the purest diamonds ever mined.

"Who says Golconda, says perfection of the material," says historian and journalist Gabrielle de Montmorin, who is moderating a talk on Golconda diamonds with Juncker at the 2025 edition of GemGenève. "The fascination exerted by the so-called Golconda diamonds is an alchemy mixing history and gemmology, with this chemical Type IIa. That is to say, the purest carbon material. You add the fact that the mine is exhausted

— Phillip Barcio

and you have all the elements of a success story." Type IIa refers to the rating scale that indicates a diamond's chemical quality. Much of that quality is related to nitrogen, says gem and jewellery journalist Richa Goyal Sikri [see p.66]. "Nitrogen is the element that is responsible for the yellow tinge in a diamond, Sikri says. Diamonds from the Golconda region are famed because many contain no measurable traces of nitrogen."

Around 98% of natural diamonds contain significant amounts of nitrogen and are classified as Type Ia. "Type I does not in any way prevent a diamond from being colourless and internally flawless, Juncker notes. Visual and optical grading criteria used in gemological assessment are evaluated independently of the diamond's chemical type." Type IIa diamonds, which are prized for their chemical purity, represent less than 2% of global production. Type IIb diamonds, which account for less than 0.1% of diamonds mined but include such famed stones as the *Hope* diamond, the *Wittelsbach*, the *Farnese blue* and the *Idol's eye*, contain boron."That gives them a characteristic blue-greyish tint, says Juncker. Although even rarer than Iia diamonds, they are not purer, since boron is also an impurity."

"Most of the ancient diamonds sourced from India were also high quality because they were alluvial," says Sikri. Alluvial refers to something that was transported from its point of origin by moving waters. When a natural diamond deposit is disrupted by water erosion, the lower quality stones can break apart or be damaged during the process. Only the strongest survive the journey, which is why alluvial deposits tend to contain the best diamonds.

The alluvial deposits from which the legendary Golconda diamonds were mined were exhausted by the early 19th century. That is one cause of their rarity today. Also adding to that rarity is the fact that proving a diamond's provenance is difficult at best. "It is impossible to certify a Golconda diamond, Montmorin says. There are other sites for the extraction of Type IIa diamonds, starting with South Africa. A stone quarried there could very well have travelled to India to be cut, so the association that IIa equals Golconda is unfounded. Moreover, a laboratory like The Swiss Gemmological Institute (SSEF) refuses to certify such an origin because it is simply scientifically and geologically impossible."

Juncker agrees. "It is scientifically impossible to determine where a diamond was mined," she says. Anyway, she notes that the term Golconda does not even refer to a single mine. "It refers to a historic region and a series of mines, most of which were located along the Krishna River, she says. What is more, not all the diamonds mined there were of exceptional quality. They also produced Type I diamonds. The 'Golconda' label is often idealised. 'Golconda' refers to an area (the Deccan), a history, a date (before 1725 — when Brazilian mines began producing stones of similar quality) and a specific Indo-Islamic culture, not a universal quality. In reality, the true definition of a Golconda diamond is based on a long history of mining, documented traceability and sometimes exceptional gemmological qualities."

If diamonds of similar quality have been mined elsewhere for centuries, and provenance is debatable, how have Golconda diamonds maintained their unique value? One reason is the mysterious, intangible quality they are said to possess, which some believe is perceptible more by feeling than by scientific analyses. Olivier Baroin is the owner of *La Golconde*, an antique jewellery shoppe in Paris that also manages the archives of legendary jewellery designer Suzanne Belperron. Baroin recalls a recent commission he received from a major auction house to appraise some jewellery. "While consulting the archives of the original client, I came across a note dated 17 August 1938, Baroin says. "This revealed that the client had been presented with two rings — one featuring a 7.80-carat Golconda diamond priced at 200,000 francs, and the other with an 8.28-carat Brazilian stone, offered at 100,000 francs. The emphasis was not on factors such as colour or clarity, but rather on a unique crystalline quality referred to as 'la matière'. This purchase, and the emphasis placed on its provenance, underscores the notion that this exceptional quality, this 'matière', was already held in high regard." But what is 'la matière' of a Golconda diamond? Is it a substance? Is it a form? Is it a quality?

"They are mythical diamonds!" says Juncker. Ancient Sanskrit lapidary treatises attributed "highly codified symbolic, astrological and spiritual properties" to diamonds, she points out. "Certain crystalline shapes, colours or sexual 'natures' (female, neutral) could be considered inappropriate or even harmful, depending on the caste, sex or situation of the wearer. Certain diamonds were strongly discouraged for pregnant women, as their energy was said to be disruptive."

Some Golconda diamonds have even been associated with curses. "The most emblematic of these

Capucine Juncker

Courtesy Capucine Juncker

Beau Sancy (pre-17th century)

is undoubtedly the *Koh-i-Noor*, Juncker says. This legendary diamond, whose name translates to "Mountain of light", has passed through the hands of many dynasties — Mughal, Persian, Afghan, Sikh and then British — in a history of conquest, plunder and murder." There is a belief that only female rulers could wear the *Koh-i-Noor* and any male who wore it would die."We know from the remarkable book on the subject by William Dalrymple and Anita Anand that this legend was born in 1849, at the time of the British annexation of the Punjab, when the diamond was taken from the hands of the last Sikh ruler, the young Duleep Singh, to be given to Queen Victoria, Juncker says. Since then, it has only been worn by England's queens, a practice that continues to this day, most notably in the Queen Mother's crown."

Other Golconda diamonds have been linked to upheavals of history."One of the most famous thefts in French history, that of the *Crown diamonds of France*, took place in 1792 during the turmoil of the French Revolution, Juncker says. Stolen over several successive nights from the Garde-Meuble de la Couronne, some of the diamonds were recovered, others disappeared irretrievably and still others were 'masked' by remnants such as the *Hope*." The so-called *Hope* diamond — a 45.52 carat, blue-violet diamond currently in the collection of the Smithsonian — is believed to have been cut from one of the stones Juncker mentioned were stolen during the French Revolution. The original, larger diamond is said to have left India in 1666 in uncut form with French gem merchant Jean-Baptiste Tavernier. Tavernier gave it the name *Le bleu de France* and sold it to King Louis XIV two years later. Through succession, it became the possession of King Louis XVI and his wife Marie Antoinette, who were executed by guillotine shortly after *Le bleu de France* was stolen in the revolution. Sometime later, *Le bleu de France* was re-cut, which darkened the stone, and was then purchased by members of the Hope banking family, who gave it its current name.

In 1911, Evalyn Walsh McLean, an American heiress and socialite, acquired the *Hope* diamond, an event that Juncker says is in part responsible for the place Golconda

3 questions to... Capucine Juncker

Capucine Juncker is the author of *Diamonds from Golconda* (Skira, 2024).

What inspired you to write your book *Diamonds from Golconda*?

This book was born of the convergence of several passions: my background in gemmology, my interest in cultural exchanges between India and Europe, and my fascination with the very name Golconda — a word charged with prestige, but often dissociated from its historical and geographical reality. The aim was to tell the real story of these diamonds: their Indian roots, and their journey from the alluvial mines of the Deccan to the various empires that fought over them. I wanted to combine geography, history, myths, culture and gemmology, to offer an account that was both rigorous and sensitive.

Have diamonds always been used as adornment?

While it is true that diamonds have been used as ornaments since ancient times, especially in the ancient statuary of Hindu temples depicting goddesses dripping with jewels, it seems to me that their primary function was of a different order: spiritual, talismanic and political. In ancient India, the diamond was seen as a stone of power: it protected, associated with the divine and consolidated sovereignty. Hindu lapidary treatises such as the *Ratnapariksa* or the *Brhatsamhita*, written for jewellers, merchants and princes, show that diamonds were valued according to both physical and symbolic criteria: their crystalline form (for example, octahedral), their colour (associated with a deity or a caste), their optical purity and their "sexual nature" (male, female or neutral) determined their beneficial or harmful virtues. It was also associated with the planet Venus (Sukra), reinforcing its astrological value. In this tradition, a good diamond would protect the ruler, ward off evil forces and promote balance in the kingdom.

Do the utilitarian qualities of diamonds also have ancient roots?

Yes, in addition to their symbolic function, diamonds had an economic and strategic dimension. As early as the *Arthashastra*, diamonds are mentioned as a precious commodity with high added value, used to build royal treasuries, forge alliances and assert the power of the state. Hindu jewellers used the exceptional hardness of diamonds to cut or engrave other precious stones. It was probably only later that their aesthetic value came to the fore, particularly in royal jewellery. This use was first established at the Bahmanid and Deccan courts, before reaching its apogee under the Mughals, then the Safavid, Ottoman and finally European jewellery traditions, where the diamond became the stone *par excellence* of royal prestige.

diamonds hold in Hollywood lore and contemporary pop culture. “Pierre Cartier orchestrated its sale with an almost cinematic *mise-en-scène*: royal heritage, ancient spell, family tragedy, Juncker says. The *Hope* became Walsh McLean’s favourite piece of jewellery, which she wore on social occasions and even made her dog, Mike, a Great Dane, wear it! This kind of story helped to fuel a collective imagination that Hollywood gradually seized upon. Films featuring ‘cursed’ diamonds, inspired by the story of the *Hope* or similar legends were made. Examples include *The Hope diamond mystery* (1921), inspired directly by the *Hope*, and *The Moonstone*, adapted several times for the cinema, based on the earlier novel by Wilkie Collins.”

Ultimately, it may not matter whether the curses associated with some Golconda diamonds are real, or even whether a particular diamond can definitively be traced to the original mines. The origins of diamonds have always been enmeshed in unprovable layers of mystery and myth. That is part of their allure. Juncker quotes her favourite legend about the origins of diamonds in the first chapter of her book. “It is a story from the Sanskrit tradition about an asura — a kind of titan or demigod — who was captured by the gods of the Hindu pantheon and forced to sacrifice himself, she says. Struck by Indra’s thunderbolt (*vajra*), his limbs are said to have been transformed into ‘a seed of jewels.’ Since then, ‘various diamonds have been found in the places on Earth where some fragments of the bones of the Lightning Bearer’s rival happened to fall.’” It is the beauty and ambiguity of stories like this that give these precious stones their strange appeal. Connoisseurs are left to their own sensibilities to determine whether their diamonds have “la matière”, or “the stuff”, to be called Golconda.

adon-green diamond

ent collector Hans Sloane
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ornament. This is how it
Vault in Dresden.

u Michael Dieppsch, 1769,
ünes Gewölbe, Staatliche

Diamonds from Golconda (2024), Capucine Juncker

© Skira

et la partie comprenant le Vert de D
un bord de chapeau. C'est sous cette
est visible aujourd'hui à la Voûte verte
S'il n'a jamais quitté la Prusse, le Vert d
plusieurs fois être mis à l'abri des avanies
Caché dans la forteresse de Königste
la guerre de Sept ans (1756-1763), il y
1813 pendant la campagne d'Allemagne
de libération), et à nouveau en 1942
Seconde Guerre mondiale. À l'issue du
Russes emportèrent à Moscou le Vert d
les collections royales, avant de les restit
En 1959, l'exposition des joyaux à l'Alb
Dresde témoigna de cette restitution
l'ensemble retrouva les salles de la V
reconstruite à la suite des immenses
causés par le bombardement de la vi
Un matin de novembre 2019, alors qu
d'un transformateur électrique avai
l'alarme du musée, deux cambrioleurs
de nombreux joyaux de la Voûte
heureusement, le Vert de Dresde, alor
New York, ne s'y trouvait pas. Une fois en
manqué de peu de disparaître.

While Prussia, and later Germany, has
its home, the Dresden Green has had to
from the ravages of history on several occa
hidden in the Königstein Fortress during
Years' War (1756–63), returned there in
the German Campaign (War of Liberation
again in 1942 during the Second World
end of the war, the Russians took the Dre
and the royal collections to Moscow, return
1958. The restitution was celebrated in an e
jewels at the Albertinum of Dresden in 19
the collection was returned to the Green V
reconstructed after the heavy damage infl
WWII bombardments. One morning in
2019, after a fire disabled an electrical trans
thus the museum's alarm system, two bu
many of the jewels in the Green Vault. Fort
Dresden Green was not among them: it w
to the New York Metropolitan Museum o
again, it had narrowly eluded the vagaries

Face mask *Shifts souls* in titanium (2019), Iris van der Herpen

Photo Filippo Fior

METAL FORGES CONTEMPORARY DESIGNS

Jewellery fashion continues to evolve, with metals playing a central role in new trends showcased on runways and in designer collections.

Metals have become powerful symbols in contemporary fashion jewellery. As fashion embraces sustainability and gender fluidity, these materials form the core narrative in modern accessorising. They offer a dynamic range of expressions, whether polished to a high sheen, oxidised for depth, recycled for eco-conscious appeal, or anodised to reveal vivid colour palettes. Their adaptability enables designers to create pieces that are minimalist or bold, industrial or ornate, shaping the silhouette of contemporary jewellery design.

Gold. **Golden expressions**

Gold is known for its resistance to corrosion and rust, making it a popular choice in jewellery. Pure gold (24K) is soft, allowing artisans to easily shape, engrave, and set it with gemstones. Its strength increases when combined with metals like copper or silver, making it more suitable for daily wear. Luxury fashion has used gold in sculptural storytelling and broadened its colour palette.

For example, in Schiaparelli's *Haute couture* Fall/Winter 2023 collection, Daniel Roseberry introduced gilded breastplates, hammered gold spiral busts and masks made from brass, bronze, and gold-plated alloys. These sculptures blurred the lines between jewellery and wearable art. Meanwhile, yellow gold remains classic, exuding warmth, luxury and tradition, particularly featured in baroque-inspired collections such as Dolce & Gabbana's *Alta Moda* in the summer of 2024. Conversely, white gold offers a glossy finish that is ideal for minimalist styles from brands like Jil Sander and The Row.

Originally used in vintage lockets, rose gold grew in popularity in the 2010s. Its warm hue and romantic connotations resonated with the millennial pink trend, complementing pastel styles and rose-toned editorials. Rose gold immediately became a symbol of soft luxury showcased by brands like Catbird and Mejuri. This creative use of metals in fashion reflects their significance in the global economy. As jewellery and couture highlight gold's aesthetic appeal, interest in gold as a safe-haven asset continues, especially during economic uncertainties. In 2023, China topped global gold production, followed by Russia and Australia.

Silver. **A must-have**

Once overshadowed by gold, silver has made a steady comeback on the 2025 runways. Known for its affordability and versatility, silver has been a staple in minimalist and contemporary jewellery designs, particularly appealing to younger audiences. Although silver is not the

— Nahir Fuente

most durable or low-maintenance metal, its softness and malleability make it popular in designs such as handmade rings and necklaces, gothic, ethnic, edgy streetwear, and punk styles. Even though silver oxidises over time, many appreciate the vintage effect and it is easy to re-polish. This year's runways showcased silver jewellery layered boldly across futuristic silhouettes and streetwear looks. Brands like Coach, Marine Serre, Acne Studios and Carolina Herrera featured silver earrings and chokers in their latest shows, aligning with the clean girl aesthetic and quiet grunge. In recent years, fashion brands have increasingly used recycled gold and silver to meet consumer demand for environmentally responsible options, and runway styling represents this trend. For example, Dior's 2024 *couture* show showcased statement chokers made from reclaimed silver and found objects, blending high jewellery with eco-conscious storytelling.

Platinum. **Say yes!**

Valued for its strength and rarity, platinum is the preferred choice for bridal jewellery. This rare metal occurs in some nickel and copper ores as well as in certain native deposits in South Africa. Like gold, it is dense, malleable, ductile and unreactive with elements such as air, water, or other chemicals, contributing to its durability and corrosion resistance. In high fashion, platinum remains the go-to metal for its icy brightness; think statement cuffs and architectural rings at events like the Met Gala, where designers use it to contrast with delicate fabrics.

Titanium. **Futuristic fashion**

With its lightweight and corrosion-resistant properties, titanium has gained popularity in men's jewellery and *avant-garde* designs. Its featherlight feel and ability to be anodised in vibrant neon hues make it a preferred metal for futurist fashion. Brands like Delfina Delettrez and Tiffany & Co. Men have embraced titanium for sculptural rings and cuffs. But only a few have pushed the boundaries of titanium quite like Iris van Herpen. Between 2020 and 2023, she integrated 3D-printed titanium and laser-cut metals into her signature fluid, organic silhouettes. A standout moment came with her *Shift souls* collection, unveiled at Paris Fashion Week in 2019, where she debuted a series of 3D-printed facial ornaments titled *Cellchemy*. Each piece was custom-designed using facial scans of the models, resulting in intricate, lace-like masks that explored themes of human-animal hybridity.

Osmium

Osmium is the rarest non-radioactive element on Earth, with only about 300 kg of crystalline osmium ever known. Not only is it rare, but it is also valuable, with a market price of around €1,700 per gram. Each piece of crystalline osmium is unique. Like a fingerprint, it offers precise identification at a resolution 10,000 times greater per square millimetre. This makes it unforgeable, traceable and ideal for certified jewellery and tangible investments. Each piece is ESG-M compliant, documented and recognisable without laboratory tools. Crystalline osmium is not processed like traditional metals; it is treated more like a gemstone. It is neither melted nor cut in-house. Instead, the Osmium Institute supplies pre-cut, pre-registered shapes, including customised ones with ultra-high precision. It can be set, glued or laser-welded. Although slightly brittle and best handled like emeralds, it is surprisingly durable and compatible with standard gemstone-setting techniques. The result is jewellery with an otherworldly shimmer, often more reflective than platinum, and biocompatible despite being toxic in its raw form. Will it replace gold or platinum? No, due to its rarity and inability to be mass-produced. However, it will redefine prestige and exclusivity in jewellery. Crystalline osmium represents a new generation that values science, sustainability and storytelling. Whether worn as couture, stored as wealth or admired as a work of nature-meets-art, osmium is the future of high-end, responsible jewellery.

Osmium is now present in over 40 countries, partnered with more than 1,200 collaborators. Cultural perspectives vary: in Germany, osmium is embraced primarily as a long-term tangible investment; in Korea, it is celebrated as a luxury fashion material; in the Middle East, both aspects are fully appreciated, with osmium seen as a hybrid of style and value. Worldwide, osmium has already attracted the attention of luxury brands and visionary designers. Ulysse Nardin, Hublot and Czapek were the first watchmakers to incorporate it. Designers such as Myriam Soseilos with her *Aqua wave* ring in London, Anthony Garcia's *Supernova* ring in Brazil and Tania Chan's *Palais* collection in Hong Kong are expanding the creative boundaries of this rare metal. These designers also serve as judges for the Osmium Visionary Contest, with the winners being unveiled on GemGenève 2025.

Aluminium dress (2021), Paco Rabanne

Classic watch by Paul Chassignet
Restored with Osmium

Courtesy Osmium Institute

Aluminium. **Fashion textile**

Aluminium's lightweight nature and malleability make it an appealing material for industrial-style jewellery. Its capacity for anodisation allows designers to explore a variety of vibrant colours and matte finishes, broadening creative possibilities. This material aligns with the industrial trend in jewellery, which embraces raw textures and mechanical connotations. This aesthetic attracts consumers looking for unconventional accessories that challenge traditional notions of luxury and refinement. Designer Paco Rabanne, associated with metal-wear since the 1960s, elevated this concept to high fashion. Known for his experimental approach, he famously "knitted" with metals, with aluminium as his preferred material. At Fashion Week 2022, he revisited sculptural metalwork with fluid dresses composed of gold discs and metal netting. His work blurred the lines between jewellery and garment design, resulting in some of the most avant-garde, futuristic, and iconic creations in 20th-century fashion history.

Copper and brass. **Living metals**

Copper and brass are becoming increasingly popular in bohemian and artisanal designs. Their tendency to develop a patina over time adds character to each piece. Often featured in jewellery that tells stories of craft and decay, these materials embody a bohemian, artisanal and warm aesthetic. Brands that embrace vintage and *wabi-sabi* aesthetics celebrate imperfection and oxidation. Copper and brass naturally oxidise and change colour over time, forming a patina that reflects the wearer's journey. Brands like Alighieri, Foundrae and Justine Clenquet intentionally use patina to create objects that evolve alongside the wearer.

Iron. **Industrial grace**

The cost-effectiveness and eco-friendliness of iron attract modern consumers seeking sustainable accessories. Craftspeople are exploring its industrial style and versatility, creating items contrasting its robustness with graceful shapes. Brands such as Ladies of Iron highlight handmade iron jewellery, moving away from traditional status symbols to prioritise innovative design and craftsmanship. The Portuguese brand Clocks and Colour presents a collection of women's designer and gothic jewellery, showcasing elegant designs. The revival of iron in jewellery reflects broader trends that embrace industrial materials and minimalist aesthetics.

Zirconium. **Bold and black**

Zirconium, especially in its blackened form, is gaining attention for its durability and striking appearance. When heat-treated, zirconium develops a ceramic-like surface that is hard and hypoallergenic, making it suitable for everyday wear. Designers are utilising its deep black hue to create sleek, modern pieces that provide an alternative to traditional metals. This trend reflects a broader movement towards materials that combine aesthetic appeal with functional benefits, catering to consumers who prioritise style and practicality.

Black Rhodium. **Dark elegance**

Black rhodium and oxidised silver contrast traditional polished metals, providing a dark, moody finish. High jewellery houses have utilised blackened metals to create bold and dramatic aesthetics. In recent seasons, blackened jewellery, such as oxidised silver and black rhodium-plated gold, has been resurgent in line with the tech *noir* trend — a fusion of futuristic minimalism and dark romanticism. Prestigious *maisons* such as Dior and Bulgari have incorporated black rhodium into their jewellery collections to amplify the brilliance of gemstones and introduce a sophisticated, subversive allure.

Niobium. **The rainbow metal**

Niobium is a versatile and increasingly popular metal in contemporary jewellery design, celebrated for its combination of aesthetic and functional properties. Naturally hypoallergenic, niobium is an excellent choice for individuals with metal sensitivities, ensuring comfortable wear without adverse reactions. Because of this, it is frequently used in body piercings, where biocompatibility is essential. One of its most distinctive features is its ability to undergo anodisation. This process forms a transparent oxide layer on its surface, resulting in a vibrant spectrum of colours ranging from blues and purples to greens and yellows. This colouration is achieved without the use of dyes, offering a durable and fade-resistant finish to those seeking personalised and colourful jewellery pieces. Beyond its visual appeal, niobium is highly malleable and lightweight, allowing artisans to craft intricate designs with ease. Its resistance to corrosion enhances its durability, ensuring that niobium jewellery requires minimal maintenance. These attributes collectively position niobium as a favoured material among jewellery designers aiming to blend innovation with style. With its chameleon-like anodised hues, niobium is emerging in *avant-garde* collections that are iridescent, futuristic and fantastical.

Tantalum. **Limited stock**

With its deep grey-blue hue and durability, tantalum is a rare metal that is new to the jewellery world and is gaining popularity, reflecting a shift toward non-traditional and masculine luxury. It is used in gender-neutral wedding bands and fashion rings with a matte, modern finish. Tantalum appears in contemporary rings vand bracelets that are mysterious and perfect for dark academic looks or techno tailoring. It is found in Australia and South America. However, current estimates suggest that the resources will be exhausted within the next 50 years, as tantalum is also used in capacitors in smartphones and computers.

Palladium. **Sculptural and sustainable**

Palladium has been used in jewellery designs since 1939. It is the rarest of precious metals and one of the hardest, making it durable for everyday jewellery. Mined from ore deposits in South Africa, Russia, Canada and the United States, it is considered an environmentally friendly metal because it is extracted as a by-product. It does not require rhodium re-plating, does not oxidise, and is nickel-free, making it hypoallergenic. Since platinum was deemed a war metal during World War II, palladium became the metal of choice for designing jewellery. Palladium is lighter and more malleable, which enables designers to create larger pieces without the jewellery feeling too heavy. Currently, it is carving out a place in the fashion jewellery scene, appealing to luxury minimalists and forward-thinking designers. Its cool, white sheen offers a modern aesthetic, perfect for today's quiet luxury. In 2025, independent designers like Charlotte Chesnais and Spinelli Kilcollin incorporated palladium into modular ring stacks and sculptural cuffs. It is also being embraced by tech-adjacent jewellery brands exploring palladium in merging accessories with wearables, such as biometric bracelets with a luxury finish.

Tungsten. **Forever fit**

Known for its hardness and scratch-resistant properties, Tungsten has become one of the favourite metals in contemporary jewellery design. Its distinctive gunmetal grey hue imparts rings and bracelets a modern, industrial aesthetic. This year, tungsten rings have emerged as a popular choice for individuals seeking durable and striking jewellery that withstands daily wear. Designers are experimenting with it by incorporating inlays of precious metals or using innovative finishes. Despite its many advantages, tungsten has a few limitations. Rings made from this material cannot be resized because of their hardness. Additionally, tungsten is denser and heavier than most traditional metals. While some wearers appreciate its solid, substantial feel, others may find it too bulky for everyday comfort.

Steel. **Stainless metal**

Once considered a low-end material, steel is now used in fashion jewellery for its durability and modern appearance. Minimalist and conceptual brands, such as Ambush and 1017 ALYX 9SM, known for blending streetwear with luxury metals, have embraced this trend. The rise of gender-neutral fashion has fostered a love for steel, which is matte, durable and affordable. Steel's versatility and strength have made it a staple for brands like Fossil, Montblanc and Philipp Plein. Fossil incorporates stainless steel into its watches and accessories, Montblanc combines it with precious metals and gemstones, and Philipp Plein features steel in jewellery that embodies a rebellious spirit, often showcasing motifs like skulls and studs.

Jean Schlumberger platinium ring, Tiffany

PORTAL

Scorpions and Raiders – Naushad (1979-1981)

Courtesy Naushad

WRITTEN IN STONES

Gem and jewellery journalist Richa Goyal Sikri is helping discover and preserve gemmology's lost and disappearing histories.

Most people in the gemstone game know about the Mohs Hardness Scale. It describes the relative hardness of various minerals as determined by their ability to scratch each other's surfaces. Diamonds are at the top of the 10-point scale, rating a ten. Talc is at the bottom. The scale was developed in 1812 by German chemist and mineralogist Friedrich Mohs. It is so commonly taught and used that many lapidists today assume Mohs was the first person in history to assemble such a compendium. They are surprised to learn about Ahmad ibn Yusuf al Tifaschi, an Arab writer who, in 1253, wrote his own treatise describing the properties of more than two dozen mineral and gemstones; or Greek scholar Theophrastus, who 1,000 years earlier wrote in his book *On stones*, that some gemstones "can be carved, or turned on a lathe, or sawn; there are some on which an iron tool cannot operate at all, and others on which it works badly and with difficulty."

And the origins of the field date back even farther than the ancient Greeks. "Gemmology started with the Egyptians, and was even mentioned in the Vedas in India 4,000 years ago," says gem and jewellery journalist Richa Goyal Sikri. After earning a master's degree in business administration, then working 20 years in the travel and tourism industry, Sikri pivoted into a gem career after nearly being conned in a ruby transaction. "I was trying to buy Burmese rubies, and almost got cheated," Sikri says. In an effort to learn more about coloured stones, she made her first visit to a sapphire mine in 2014, in Sri Lanka, then soon found herself making multiple trips to mines every year.

"In 2017, I started documenting my gem experiences and learnings on an Instagram account because my friends were tired of hearing about stones, Sikri says. They said go find your people. This is how magazine editors found me and approached me to start writing for their publications. The account was supposed to only be a digital scrapbook, I was storytelling so it would be easy for me to remember gemological concepts and jewellery history." Sikri has since covered the gemstone field for *Harper's Bazaar*, *India Today* and *Vogue*. She recently published a book documenting the vanishing stories of pioneers in the contemporary African gem trade [see p.34]. Titled *No stone unturned: The hunt for African gems: True short stories*, the book was commissioned by Gemfields, a world leader in mining and marketing coloured gemstones. "It is a collection of 24 short adventure stories, Sikri says. Every story is based on a real person and actual events that happened. They are short stories, action-packed. One opens with a death threat. The other opens in the middle of a jungle. But

— Phillip Barcio

it is all real. Even my wildest imagination could not have come up with the stories in this book. You do not need fiction in this industry."

Sikri is bringing her trademark mix of passionate research and human storytelling to the 2025 edition of GemGenève, where she delivers a talk titled "Gems & Gemmology: ancient origins and tales from the East." The purpose of the talk is to expand people's understanding of the vast history of gems and jewellery. It is a history, she notes, that is too often told only in a Western context. One reason for this, she speculates, could be that Western cultures have always prioritised written documentation. Whoever the most recent authoritative author is on a subject becomes the most quoted source, while past progenitors of knowledge get forgotten. Then there are other cultures, such as those from Africa, where oral traditions have been seen as more important. Those people are either left out of the historical record entirely or their knowledge and accomplishments are assimilated into contemporary narratives. The Mohs scale is just one example. "My presentation at GemGenève is going to talk about how the real origins of gemmology go back thousands of years, Sikri says, not hundreds."

In addition to uncovering the true history of gemstones and jewellery, Sikri is fascinated by the ways gems and jewels have shaped the broader history of the world. One example is the story of the Mughal Empire, which ruled a massive swath of South Asia, including modern day India, for more than three centuries prior to European colonisation. "The Mughal empire would not have happened had it not been for a bag of precious stones, Sikri says. When the Mughal emperor Humayun lost a pivotal battle to Sher Shah Suri in 1540, he escaped with a bag of precious diamonds, rubies, emeralds and sapphires. He presented the stones to the Persian king, Shah Tahmasp, who gave him refuge and supported him for 15 years until he could return, reclaim the throne, and rebuild the Mughal dynasty."

Not every person's interactions with gems and jewellery have such dire historical consequences. But that does not make precious stones less important or meaningful in those people's daily lives, Sikri says. "Stones, since time immemorial, have served various functions in our cultural history. They have denoted rank, or acted as a talisman for protection." They also serve as a communicator, she says, which today we also see in the context of fashion brands. "Why do you wear a particular brand, not even necessarily an expensive brand?" she asks. "You wear it because you are trying to communicate something. When you walk into a room, you are trying to say something about yourself,

Human stories of the African gem trade

Eighty percent of coloured stones mined today come from the African continent, and almost all of those deposits were only discovered in the last 60 years. When COVID happened, the African gem industry started losing senior people to the illness. "We were losing with them vital stories connected to Africa's gem history," says gem and jewellery journalist Richa Goyal Sikri. "This is a secretive industry. There are articles in trade journals about gem deposits, but the human stories behind those discoveries, the human histories of those stones, had never been documented."

Sikri is a self-described outsider to the field. "I come from civil aviation, airline marketing and travel marketing," she says. "I am a second generation entrepreneur. I was supposed to be CEO and director of the family company." Sikri's life plan changed unexpectedly after the seller in a ruby transaction attempted to cheat her. The experience inspired her to teach herself about precious gemstones, an odyssey that has since taken her around the world, from the sapphire mines of Sri Lanka, to the Gemological Institute of America. She has become a sought-after expert and speaker who has delivered talks at GemGenève, the Art Science Museum in Singapore and companies like Buccellati and Fabergé. She has written articles on the topic for *Harper's Bazaar*, *Robb Report*, *India Today* and *Vogue*.

Sikri's latest achievement is a book titled *No stone unturned: The hunt for African gems: True short stories*. Commissioned by Gemfields, a global leader in mining and marketing coloured gemstones, the book documents the vanishing stories of pioneers in the contemporary African gem trade through 24 short adventure stories, about real people and actual events. At the same time, it is not a pure history book, Sikri says. It is what she calls edu-tainment. "That is my thing," she says. "I am a translator between the industry and people who might not even know that a ruby is red and an emerald is green, or those who almost see the industry with a suspicious eye. My objective is first of all to bring those people in and entertain them, and by the end of the story they will learn something without realising it."

Richa Goyal Sikri

Courtesy Richa Goyal Sikri

or hide something about yourself. That is what jewellery does. It is an extension of the clothes you wear."

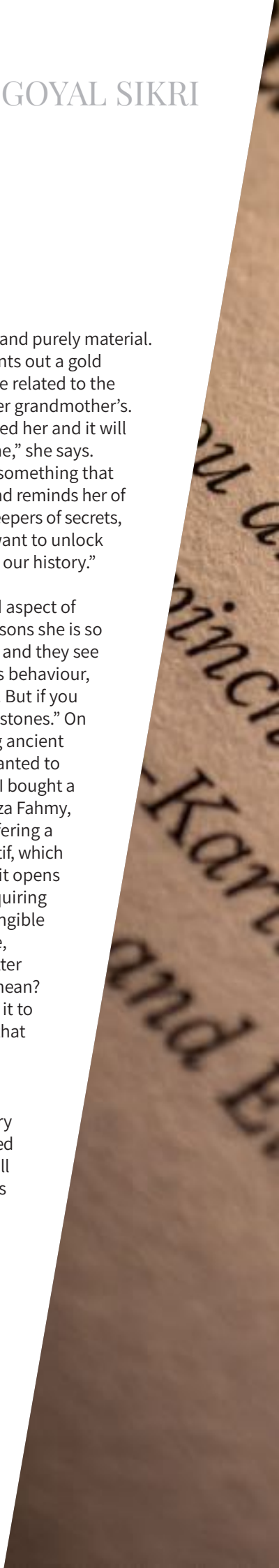
These things were also meaningful in the ancient world, Sikri says, and many contemporary people in the East continue to preserve these traditions. "I am from India and it is one of the few countries left in the world where you will see people wearing the same traditional clothes like saris, *salwar kameez*, *kurtas*, everyday in corporate offices, villages, towns and even on the red carpet," she says. "Jewellery is an important part of that, intricately woven in India's cultural fabric, offering a continued connection with our ancient history."

Sikri acknowledges that one of the biggest drivers of the gemstone and jewellery market has always been what she calls "intrinsic value." That is to say, the market value of precious metals and stones. "For some, jewellery is the sum of its parts, Sikri says. How much gold? What is the carat weight? An outsider may wonder why Asians cannot appreciate a jewel solely for its beauty. But there is a historical reason for even that. In India, for example, before colonial occupation, before the advent of the banking sector as we know it today, a family's net worth was kept in jewellery, artefacts, household utensils. Whenever a family came into money, they would commission new pieces or upgrade their jewels. When you travel outside the cities in India, you will see women in Rajasthan, for example, or others decked in silver jewellery from head to toe. Current generations carry the imprint of these ancient behaviour patterns because their connection to their history, their roots, is strong."

So yes, there is an aspect of jewellery that is utilitarian and purely material. But there is also something that goes deeper. Sikri points out a gold bracelet that she wears. The bracelet has intrinsic value related to the amount of gold in it. But she wears it because it was her grandmother's. "My grandmother wore it every day of her life. It survived her and it will survive me, and still be in existence after I am long gone," she says. She considers the bracelet a talisman of protection — something that transcends the ephemeral concerns of day to day life and reminds her of something more enduring. "Jewellery and stones are keepers of secrets, of history, of human stories, Sikri says, but only if we want to unlock them, learn from them, and learn through them about our history."

Their capacity to help us learn is an under-appreciated aspect of gemstones and jewellery, Sikri says. It is one of the reasons she is so interested in the field. "Most people look at gemstones and they see an elite industry, they see luxury, they see ostentatious behaviour, bling bling, and they think this is not for me, Sikri says. But if you see only that, you miss the real spirituality of precious stones." On a recent trip to Egypt, after taking a Nile cruise, visiting ancient tombs and immersing herself in history books, Sikri wanted to acquire a piece of jewellery to commemorate the trip. "I bought a pair of earrings from a renowned Egyptian designer, Azza Fahmy, she says. They are silver and depict papyrus leaves, offering a contemporary interpretation of an ancient Egyptian motif, which represents life, renewal, and rebirth. When you travel, it opens your eyes to that culture, their beliefs, their truths. Acquiring jewellery from another culture allows you to have a tangible connection to what that jewel represents. If we choose, a jewel can open a doorway through which we can better understand why it was created. What does the design mean? Why did they use a particular stone or a metal to bring it to life? Decoding the why is what brings me joy because that learning serves to intellectually stimulate the mind."

Sikri's mission to "decode the why" stretches back to the most ancient stories of humanity's earliest jewellery makers. Some of the oldest necklace beads ever discovered were found in the Blombos cave in South Africa. The shell beads are believed to be around 75,000 years old. "This discovery rewrote ancient human history because it informed us that humans had the ability to communicate earlier than we believed, before the great migration from Africa," Sikri says. Even older beads, dating back more than 140,000 years, have since been found in North Africa. "In the words of Prof. Henshilwood, who found the Blombos cave and heads the research team, this ancient necklace is 'an unambiguous marker of modern human behaviour'. For an ancient human to take these shells, match them and arrange them to form a design, and then wear them like a necklace, goes to the core of what makes us human."

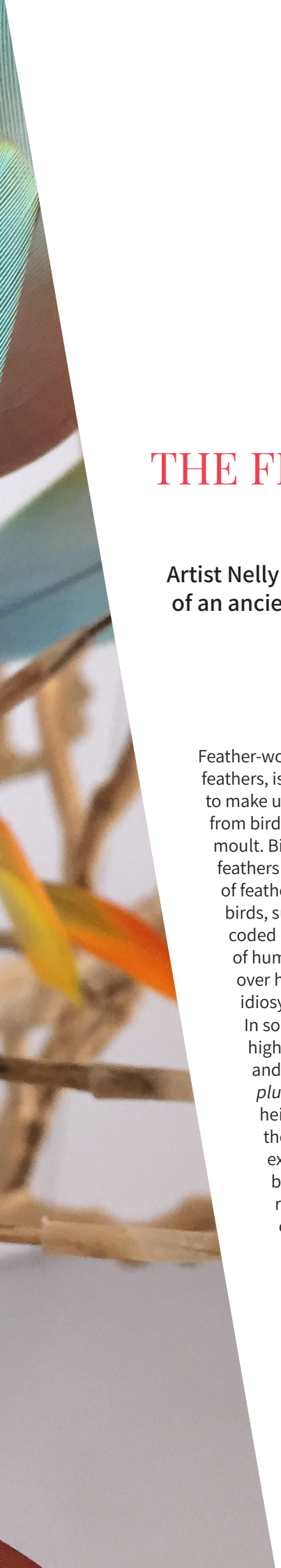


Ruby land – Unheated Mozambican ruby

Photo Richa Goyal Sikri

DISCUSSION

Arabustier, Nelly Saunier



THE FEATHER ARTIST

Artist Nelly Saunier is keeping *plumasserie*, the unique French variant of an ancient feather-work tradition, alive while expanding it into new horizons.

Feather-work, or the art of making cultural artefacts out of feathers, is an ancient craft. The medium originated as a way to make use of an abundant natural resource: feathers, either from birds hunted for food, or those shed by birds when they moult. Birds moult constantly, either to replace damaged feathers or to make way for new feathers. Some types of feathers communicate important messages to other birds, such as age, gender, or the time of year. Similar coded messages have found their way into the symbolism of human feather-work. Indigenous cultures the world over have engaged in the tradition, creating highly idiosyncratic techniques and unique visual vocabularies. In some cultures, feather-work has even evolved into a highly regarded profession. The pastime has a distinctive and renowned history in France, where it is known as *plumasserie* and where its artefacts have reached the heights of haute couture and the fine art world. But in the modern age, *plumassièr(e)s* have nearly become extinct. French feather-work artist Nelly Saunier has been on the vanguard of the field's contemporary resurgence for decades. Her work has attracted commissions from many of the world's top fashion and jewellery brands, and has earned her such distinctions as the Maître d'art, Chevalier des arts et des lettres and the Liliane Bettencourt prize. In addition to the impact she has had through her own creations, she has also been busy teaching the next generation of *plumassièr(e)s*. She shares the history, and her passion for this ancient art form, and some of the sources of her inspiration.

How did you first become interested in feather-work?

I have been passionate about nature and birds since childhood. I grew up in the countryside, and my parents would often find me nestled in a tree, quietly observing, hoping to spot a winged friend. This unique connection with feathers became a calling at the age of 14 — a certainty that has never wavered and continues to be renewed over time.

How did the French art of *plumasserie* develop?

Feather art is a sacred form of expression, likely as ancient as human societies themselves. In the 13th century, the guild of the "Peacock matmakers" was established. The profession evolved over time and by the end of the 16th century, under Henri IV, it became the guild of Maîtres Plumassiers de Panache ("Masters of feather ornamentation"). In 1659, under Louis XIV, it transformed again into Plumassiers Panachiers Bouquetiers Enjoliveurs, reflecting a broader range of decorative

— Phillip Barcio

expertise. In 1692, still under Louis XIV, the profession was officially recognised on the list of registered trades. Etymologically, the term *plumassier* comes from Latin *plumarius*, meaning "one who wove fabrics with feathers". The word *plumassier* is uniquely French and culturally specific, with no exact equivalent in other languages. In contrast, the term "feather art" is broader and more universal, and can be more easily translated — such as into English, for instance. The golden age of feather work took place around 1860-1870 and reached its peak in the early 20th century, up until the outbreak of the First World War in 1914. At that time, the profession of *plumassier* was widespread, driven by high demand — women frequently adorned their hats with feathers and changed them often. The decline of the trade was brought about by profound changes in everyday life. War and the financial crisis that struck Europe drastically reduced the industry, though they did not cause it to disappear entirely. It survived — barely — following the changing whims of fashion. Today, only a handful of feather ateliers employing skilled *plumassièr(e)s* remain. Even though feathers are once again in vogue, the feather industry as it once existed has not been revived — it remains a craft, not a mass industry. The current context is favourable, but incomparable to the early 20th century. Some historic workshops have been acquired by major luxury brands seeking to preserve this savoir-faire. These ateliers now mostly operate on large-scale commissions, often as subcontractors for the fashion and entertainment industries.

How important is it to use natural feathers?

I work exclusively with natural feathers. For certain pieces, I dye the feathers to achieve a specific colour, but none of them are synthetic or artificial. Nature is, for me, a rich and abundant source of inspiration. It plays a central role in my creative process and naturally resonates with feathers. It offers a foundation from which I invite others to rediscover the beauty of the natural world. To me, nature evokes universality and harmonises with all who take the time to contemplate it. Like an endless source of inspiration beyond language, it tells stories. I am also deeply sensitive to everything related to the preservation of our planet and the study of life on Earth. Writer and naturalist David Attenborough is a leading figure in this field and his work fascinates me. He sheds light on the diversity of animal and plant species and allows me to travel far beyond

Transformed nature

Plumassière Nelly Saunier has created a new masterpiece for GemGenève 2025, the prestigious gem and jewelry trade show now in its 9th edition. Saunier's relationship with GemGenève goes back to 2023, when she was invited to deliver a talk at the show on "The Enchantment of Colour" in dialogue with Swiss watchmaker and jeweller Maison Piaget. Saunier had been collaborating with Piaget for more than a decade, designing feather art for the house's renowned watches, as well as unique jewellery items, such as cuffs for the brand's *Sunny side of life* collection. Following on the success of Saunier's talk, GemGenève invited her to come back and create something for the trade show in 2025. She used the opportunity to expand on her series called *Transformed nature*.

"Nature is, for me, an inexhaustible source of inspiration — a reservoir of universal stories that transcend words, Saunier says. It speaks to all who take the time to observe it, offering a harmony between the visible and the imaginary. With my series *Transformed nature*, I have explored a poetic reinterpretation of material: feathers are transformed, techniques break free from tradition and *trompe-l'œil* redefines perception. These metamorphoses invite us to dream, to reinterpret nature in a state of wonder and surprise — feelings that lie at the heart of my artistic expression."

The work Saunier is exhibiting at GemGenève, titled *Arabustier*, imagines a tree with leaves made of colourful tropical feathers. (Ara is the French word for a type of parrot called a Macaw.) "The tree and the bird merge in a metaphorical dance, Saunier says. The tree becomes the bird, the bird takes on the form of the tree, and from this duality emerges a visual poetry — a subtle alchemy where plant and animal life engage in a dialogue of reflections and transformations. The light and the viewer's movements transform the artwork: colours begin to shimmer, taking on an organic, almost living intensity — like the breath of a beating heart." As with all of Saunier's work, the materials and methods she used to create *Arabustier* convey her patience and profound respect for the natural world. "The feathers used come exclusively from natural bird moults, carefully collected by a breeder over a period of three years. This waiting time enhances the process, lending the work a deeper resonance where nature and art come together."

Dahlia, Nelly Saunier

Nelly Saunier

Photo Éric Chenal. © Heart & Crafts

my surroundings without ever moving. With the series *Transformed nature* [see box p.74] I have reimagined the use of feathers, transcended technique, reinterpreted materials and played with *trompe-l'œil* effects — reinventing nature by creating a poetic, transformed state. This blending of two worlds — the artificial one I create and the very real one of nature — captivates me. Like the "feather flower," born from my imagination yet so close to reality. Feathers, for me, carry emotion; they create illusion, an invisible link to nature. These metamorphoses invite daydreaming. To surprise is, for me, a unique form of expression — it is my signature.

How do you approach your collaborations with luxury brands?

Each collaboration begins with a creative brief linked to a collection and design created by the Artistic Direction of the brand. The luxury company then gives me carte blanche to express myself with its signature material to develop a creative idea and a technical application. For each collaboration, I immerse myself in the unique identity and culture of the brand. When creating a one-of-a-kind piece for a luxury house, I refine and reinterpret my technical working methods to meet the specifications and constraints related to the final purpose of each piece, while also giving free rein to my creative imagination, which the brand sought when entrusting me with the project. It is a delicate balance, but also a wonderful human adventure with passionate artistic and technical teams. Each collaboration is a beautiful story that unfolds day by day.

What are some of your most memorable commissions?

The creation of the *Boléro perroquet* for Jean-Paul Gaultier in 1997, during his very first haute couture show, marked a defining moment. This spectacular bolero, made from multicoloured macaw feathers, has since become an iconic piece. It was also the starting point of a seventeen-year creative collaboration with Jean-Paul Gaultier. Each commission is a true challenge and a beautiful adventure. Every collaboration is a unique, rich, and incomparable experience. It is a core principle of my work and my ethics to never repeat the same creative process. With every project, I strive to reinvent myself while meeting the client's expectations — pushing technical boundaries and offering a fresh aesthetic vision. Everything is new, every time.

Would you talk a bit about your artistic work?

I am drawn to many forms of artistic expression — whether in the worlds of fashion, visual arts, theatre, dance, design or contemporary art. For me, the feather knows no boundaries in its ability to convey emotion across all artistic realms. It is a means of expression that transcends disciplines. What excites me most is the opportunity to explore new creative horizons and to collaborate with other artists who, like me, are navigating this ever-evolving world. My driving force is the desire to venture into uncharted territory and to share moments of emotion and wonder with the public.

What thoughts do you have for the next generation of feather artists?

The art of feather-work, in its tradition, is closely linked to the precision of the gesture and specific techniques that ensure the creations endure over time while enhancing the material. I have made it my mission to pass on this rigour of the ancestral gesture's precision, so that this tradition does not fade and future generations understand its practice. Of course, one of the key qualities required to practice the art of feather-work is knowledge of birds, as well as the environment in which they live! From an aesthetic point of view, to appreciate the beauty, the quality of the material, the various textures, and the infinite richness of feathers, it is essential to have a deep understanding of our winged friends. This learning is an ongoing process, which I began at a young age and continue to deepen — for the world of birds is rich and complex! Whether through direct contact with the birds, observing them in nature, discoveries during travels to foreign countries, exchanges with ornithologists and other experts at bird parks, or readings… all of these contribute to the expansion of knowledge.

Majesctic plumage, Nelly Saunier

Photo Étienne Delacretaz. © Piaget

ECOLOGI

ZFB boxes

Photo Mickaël Pijoubert. © Art Media Agency

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SUSTAINABLE INNOVATIONS IN ARCHIVAL PACKAGING

Manfred Anders and Katharina Schuhmann of ZFB discuss their work on archival packaging, sustainable materials, automation and collaboration within EU-funded projects like GREENART.

Since 1997, ZFB Centre for Book Conservation has been at the forefront of archival packaging and paper conservation, combining traditional expertise with cutting-edge research. Manfred Anders, a chemist specialising in cellulose, paper and textile chemistry, has been with ZFB since the beginning, serving as Head of R&D and later as Managing Director. Katharina Schuhmann, an engineer in printing and packaging technologies, joined in 2015. Together, they drive innovation in sustainable packaging materials while tackling the challenges in archival storage, alternative fibres and intelligent packaging solutions.

What are the core services of ZFB?

We focus on the preservation and conservation of paper-based cultural heritage, offering mass deacidification, freeze-drying, surface and dry cleaning, as well as paper and cover restoration. Since 2015, ZFB has also expanded its production of archival boxes. In Germany, these boxes are primarily used for storing books, files, and other written documents. However, we also produce fully customised designs tailored to the storage needs of diverse collection objects, regardless of shape or material. These solutions are particularly beneficial for museums.

What problems in the use of traditional box materials might arise for conservation?

Archival boxes significantly improve storage conditions, offering protection against UV light, mechanical damage, and dust, while providing a buffering effect against humidity fluctuations. To ensure long-term protection, it is recommended to use materials that comply with ISO standard 16245-A. This standard requires lignin-free and alkaline boards made from cellulose-based materials. Achieving the "lignin-free" benchmark (kappa value below 5) typically excludes recycled fibres of unknown origin and composition, as they may not meet the purity and durability criteria. Instead, the industry standard relies on virgin wood fibres. However, given the high energy and water consumption required for pulping, we have explored plant residues as a more sustainable alternative for archival board production. Additionally, the long-term availability of wood as a raw material for paper production is expected to be limited in the coming decades, making alternative sources an important area of research.

What materials do you use for your boxes? Do you foresee any improvements in this aspect?

Currently, we produce archival boxes and enclosures using corrugated and solid boards made from virgin wood fibres — specifically northern bleached

softwood pulp (NBSK) — in compliance with ISO 16245-A requirements. This material is exclusively developed and produced for ZFB, and we maintain continuous collaboration with paper mills and converters. Over the years, we have made significant improvements, particularly in non-fade properties and moisture resistance. As part of the GREENART project, we have explored the potential of fibres from annual plant residuals as a sustainable alternative to replace one or more paper liners in our boards. Additionally, we are investigating the use of polypropylene hollow chamber sheets and bubble boards, particularly those made from recycled or bio-based plastics, as another innovative approach to archival storage materials.

How automated is your custom-made box production and how are you improving it?

ZFB primarily manufactures and distributes archival boxes. Currently, we produce 50,000 to 100,000 archival packaging boxes and aim to scale up to several hundred thousand boxes annually. Over the past years, we have developed a highly automated workflow, creating an extensive library of standard construction templates. For example, when packaging a large collection of books, we use a survey device to measure each book's dimensions. These measurements are seamlessly integrated into our workflow, where all CAD drawings are automatically generated, sent to, and processed by an automated cutting table. However, we collaborate with external die-cutters for large-scale production runs of identical designs. When it comes to custom-made constructions, our product designers develop tailored solutions. We can generate 3D previews and provide physical samples to ensure clear communication with our customers, allowing them to review the design before production begins.

What challenges do the fast-growing plants you are sourcing present?

So far, we have evaluated a wide range of plant fibres and papers, including hemp, abaca, bagasse, flax, jute, wheat straw, cotton, silphia, and mixed agricultural residuals. We have produced our own papers on a lab scale and at a technical centre, while also exploring commercial papers made from these materials. However, we are not directly involved in the planting or farming processes. Many plant fibres were used in paper production before wood pulp became dominant. Our research confirms that they can still produce high-quality papers. To ensure suitability, we have tested them for compliance with ISO 16245-A and assessed their material emissions and impact on cellulose degradation, in collaboration with the University of Ljubljana. Several promising fibres have been identified from a technical perspective. In the final year of our project, the University of Venice and Green Decision will conduct a life cycle assessment on all proposed materials. This will help determine the most sustainable option based on environmental impact. One of the biggest challenges remains cost. Although these fibres are agricultural byproducts, their specialised production in small batches (a few tonnes) makes them more expensive than virgin wood pulp. As with many sustainable choices, it ultimately comes down to deciding what price we are willing to pay for the benefit of our planet and future generations.

What box designs are you developing?

As part of the GREENART project and the previous APACHE (Active and Intelligent Packaging Materials for Cultural Heritage) project, we have developed tightly sealed archival boxes with no holes or slits and additional material layers. Climate chamber tests with cyclic humidity changes have demonstrated that this tight construction provides a two to six times higher buffering effect compared to a standard box.

What types of coatings do you use?

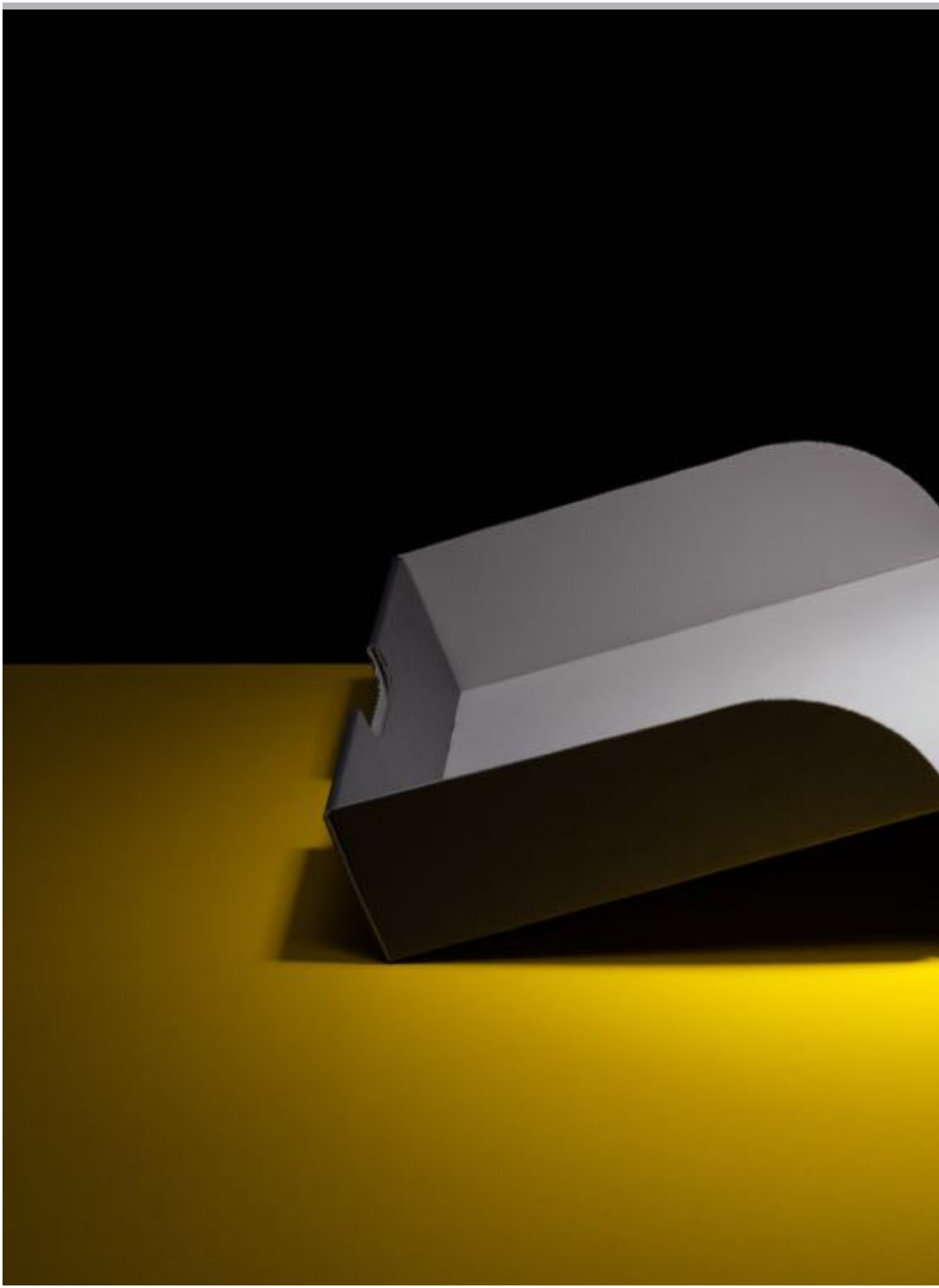
We have tested various coatings, including water-based dispersions, UV-curing varnishes, and bio-based wax coatings to enhance air-tightness and improve the buffering effect. While these coatings improved humidity regulation, tests according to ISO 23404 revealed emissions that slightly degraded cellulose-based objects. For this reason, we cannot currently recommend the tested coatings, but we continue searching for effective and sustainable solutions that balance protection, conservation, and long-term material stability.

Do you plan to standardise the addition of sensors to your boxes?

Yes, we plan to develop optional sensor systems that can be integrated into newly purchased

Katharina Schuhmann

Courtesy ZFB



ZFB box

Courtesy ZFB

and existing archival boxes. In an airtight enclosure, temperature and humidity monitoring are the most critical factors for ensuring the safety of stored objects. By tracking these conditions, we can help prevent deterioration caused by fluctuations in moisture and temperature, which are major risks for paper-based and other sensitive materials.

Can standard boxes be improved?

Yes, they can be equipped with sensors for environmental monitoring or integrated with adsorbing materials developed by other GREENART partners. However, available space inside the box is a limitation — safe integration requires room, typically in the lid or base area. We also explored a refurbishing treatment to reduce harmful emissions from aged, acidic archival boxes. A water-based deacidification solution was developed for spray or brush application directly within collecting institutions. However, our tests showed that this treatment had limited effectiveness while requiring significant effort. Compared to bespoke boxes, standard boxes offer some degree of improvement, but they cannot match the precision fit, tailored protection, and advanced material options of custom-made solutions.

Have you worked on previous EU projects before GREENART?

Over the past ten years, we have contributed to several EU-funded projects led by Piero Baglioni and his team at CSGI (Centre for Colloid and Surface Science) in Florence. In the NanoForArt and NanoRestArt projects, we worked on developing formulations for the protection of leather book bindings, stone and metal surfaces, as well as the consolidation of canvas using in-house-developed nanodispersions and nanocellulose. Since the APACHE project in 2019, our focus has shifted toward active, intelligent and sustainable solutions for improving conventional archival packaging boxes.

How do you collaborate with GREENART project partners?

We closely collaborate with various partners, adapting our approach based on their expertise. We have a strong partnership with the University of Ljubljana, which plays a key role in chemically assessing our proposed materials and solutions. Additionally, we coordinate the integration of greener adsorbing materials and sensors developed by partners such as Chalmers University (Göteborg, Sweden), University College Cork (Ireland) and The Foundation for Research and Technology – Hellas (FORTH, Greece). For museum case studies, we design custom-made boxes that include at least one active component tailored to the specific needs of the stored objects. While the collaboration process varies, scientific institutions primarily focus on research, material testing, and innovation, while museums and institutions provide practical insights and real-world applications. The exchange is dynamic, but the highlight is always the opportunity to meet in person at annual consortium meetings, where interdisciplinary discussions greatly enrich our development process.

Which museums and institutions are testing your products? Have you received any unexpected feedback?

Our novel greener packaging materials are being tested by several prestigious institutions, including the Peggy Guggenheim Collection (Venice, Italy), Hungarian National Museum (Budapest, Hungary), Ministero della Cultura (Rome, Italy), Los Angeles County Museum of Art (LACMA, USA), Slovenian National and University Library (Ljubljana, Slovenia) and the National History Museum (Leipzig, Germany). So far, all institutions have been enthusiastic about testing our packaging solutions. However, since we are still in the middle of the GREENART case studies, we anticipate more detailed feedback in the coming months.

Do you collaborate with other scientific projects?

Yes, ZFB has always been actively involved in internal and national research projects, with a large R&D department for an SME. Beyond archival packaging, our recent research focuses on microfibrillated cellulose production and innovative mass treatments for paper conservation, including paper strengthening and cleaning processes. We would be grateful to continue developing these innovations within the international research network, contributing to future EU projects that support sustainability and conservation advancements.

ZFB factory

Courtesy ZFB

Manfred Anders

Courtesy ZFB

ECOLOGY

Martina Vuga

Courtesy University of Ljubljana

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OBSERVATIONS ON GREENART'S NEW CLEANING SYSTEMS FOR VARNISH REMOVAL

Conservators with the University of Ljubljana have been testing the effectiveness of GREENART's gels and nanofluids on the removal of natural varnish from paintings and wooden sculptures.

GREENART's new art conservation solutions are being formulated with ecological sustainability in mind. By the time a solution is sent out from the lab for real world testing, it already meets that standard. The professional conservators enlisted to test the products then have a host of their own standards they expect these new solutions to meet. For example, they need them to be at least as effective as existing products on the market and at least as affordable and shelf stable — otherwise how could they convince their institutional employers to adapt?

At GREENART's public training in Paris on 10 and 11 April 2025, Associate Professor Lucija Močnik Ramovš and Assistant Professor Martina Vuga, both from University of Ljubljana in Slovenia, delivered a talk sharing the results of their ongoing testing [see p.104]. The pair has been working with GREENART's Work Package 2 which produces new green nanofluids and organogels since October 2023. "I was always interested in what is going on behind the scenes, understanding materials, says Ramovš, so this project was something I was really looking forward to. In theoretical ways it is interesting, because it combines chemistry with our conservation work. It is helping us understand the behaviour of materials. The more we test these products, the more we understand."

Their main focus was on varnish removal, so they specifically looked for older artworks to test the products on. They sought pieces that showed significantly altered varnish appearances, with a suitable varnish thickness on relatively stable painted surfaces. They looked at ease of preparation of the new cleaning solutions, ease of application, adaptation of the solutions to the surface of the various artworks, ease of removal of the products and the effectiveness of the products in removing varnish from the artworks. Specifically, their testing centred on removal of natural varnishes from a 19th century polychrome wooden sculpture and two oil paintings on canvas.

"For the paintings, we tested the various materials on similar surfaces, making comparisons of different gel systems, Vuga says. We tested various application times. Many materials were successfully used. There was no universal solution. For example, two paintings may have the same type of varnish applied to the painting with the same binder, but the effectiveness of the system may be different." Their conclusions regarding GREENART's cleaning solutions on the paintings were largely positive — for the most part the varnishes were successfully removed.

For the sculpture, however, they had more mixed results. "Of course, there are different challenges when working with 2D and 3D objects,

— Pierre Naquin and Phillip Barcio

Ramovš says. With paintings, the surfaces are generally flat, making gel application relatively straightforward. In contrast, 3D objects present greater challenges in terms of the flexibility and adaptability of the gels needed to ensure proper contact. That said, similar difficulties can also arise with heavily textured or *impasto* paint layers on 2D surfaces."

"A common problem I see in sculptures is overpainting, says Ramovš. Removing overpaint is very difficult with traditional materials." The sculpture she selected had a surface with a particularly complex structure caused by deep brush marks. Layers of varnish had accumulated in the low spots of the brush marks. There was also gilding, so in the end the overpainting was really thick. The polychromatic surface further complicated the process. "I thought maybe if I applied these new cleaning materials for several hours they could do something," Ramovš says. But in the end it was clear that GREENART's cleaning solutions were insufficient in this particular test case. They were more time consuming to prepare and apply than existing products and they showed signs that they could potentially cause damage to the sculpture's surface.

Ramovš and Vuga also have thoughts about the shelf life of the products and how the solutions are being packaged. "The gels have limited time use, Vuga says. That means you cannot afford to buy a lot of these materials if you do not think you are going to use them quickly." After the use-by date, the materials would have to be thrown away, so even if they are more "green" in the beginning, that designation goes away once they perish. "If they only last for a year and then are also packaged in plastic, you have to think about that, too," she says.

A collective effort

The beauty of GREENART's testing process is that researchers are keen to receive what could be called "negative feedback" from real world testers. These reports are not the end of the process, but simply the next phase. Constructive back and forth has been part of the project from the start of each collaboration. For example, at the start of their relationship with GREENART, Ramovš and Vuga had ideas about the specific challenges they faced in their conservation work. "I had in my mind what would be possible with the problems we have, Vuga says and asked the scientists if they could suggest solutions to us."

"We had many meetings before we received the materials and had many questions about them afterward, Ramovš adds. I had questions about the stability of the organogels and hydrogels, so we asked questions and were prepared in advance." GREENART's testing process is not only a collaborative effort between conservators in the field and GREENART's scientists back in the lab. In the case of Ramovš and Vuga, the collaboration also included their students. "Because we are professors, we have Masters students who have time to arrange for research, Vuga says. We always can find some students who are interested. They can prepare the materials and so on, so we do not have to do everything on our own. It is good if you work together. If you are alone, it is difficult."

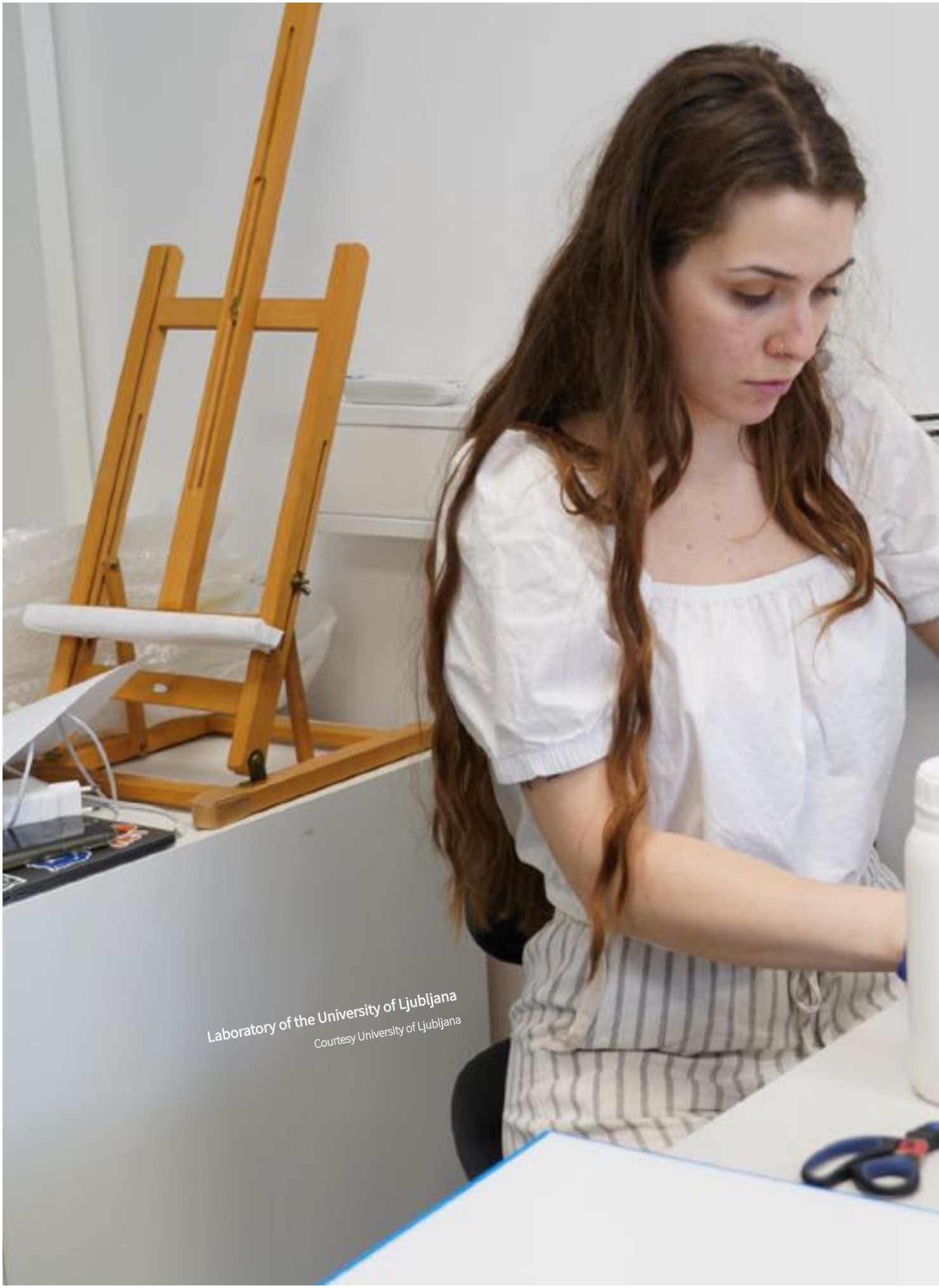
The testing is also a collaboration between a wide range of institutions who are all simultaneously testing the products in various different conditions. Ramovš and Vuga have participated in regular feedback sessions that include researchers at other institutions, who each present their findings. "We held monthly online meetings where we regularly shared experiences, insights and discussed any issues that arose. They hear us and we hear them and exchange knowledge, Ramovš says. We are quite a big group doing different work. There are some who work on sculptures, but even if they present contemporary art or paintings or works on paper, you always can use the knowledge wherever it comes from. It is very important even if it is not exactly the same as yours."

These exchanges are particularly important because it offers an inside glimpse at how various research groups are developing the specifics of their testing protocols. "Using these materials is not just a matter of selecting the right gels, Ramovš says. It is also about the overall approach to choosing and combining materials. We always use gels in conjunction with various liquids, meaning the effectiveness depends on the combined action of all components. The physical properties of the gels play a significant role, which is why we do not adopt new materials simply because they are innovative, but rather consider them as additional tools in our toolkit. What is most important is to understand both the surface being treated and the composition of the materials involved, alongside a thoughtful and informed approach."

By the time a group distills their findings in all of these areas in preparation for an event like the recent public training in Paris, many of those intricate details are left out, because they are perhaps too esoteric and granular for a public talk. "When you present the work to the public you have to concentrate your outcomes, so people never know what was going on behind the scenes," Ramovš says. Vuga adds that it will also be nice to learn about what happens in the laboratory after the scientists receive feedback from these real world tests. "You know about this new material, how it works and you have all these different test cases, so it will be good to hear going forward how the scientists are dealing with the results…"

Lucija Močnik Ramovš

Courtesy Université de Ljubljana



Laboratory of the University of Ljubljana

Courtesy University of Ljubljana

ECOLOGY

Sugarcane cellulose fibers

Photo Mickaël Pijoubert. © Art Media Agency

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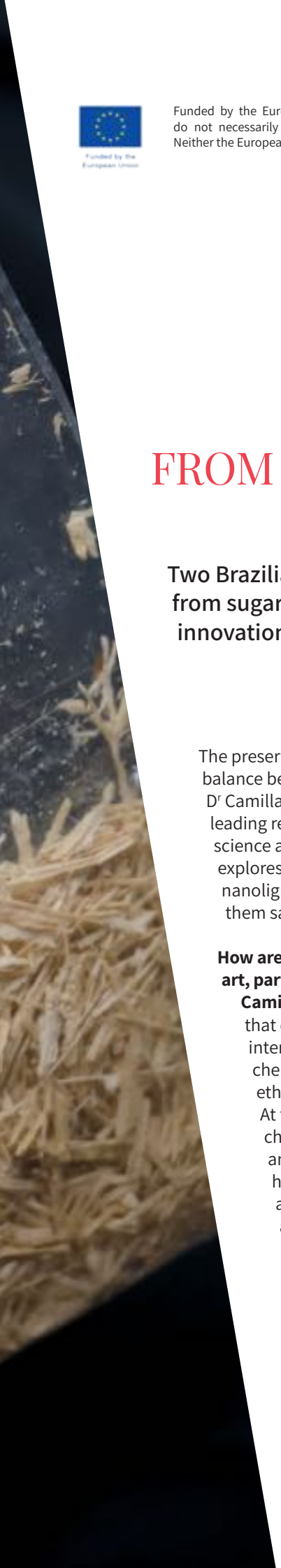

FROM SUGARCANE TO SAFEGUARDING ART

Two Brazilian researchers are pioneering the use of nanocellulose and nanolignin from sugarcane to revolutionise heritage conservation, combining scientific innovation, sustainability and respect for cultural treasures.

The preservation of cultural heritage demands a delicate balance between scientific precision and artistic sensitivity. Dr Camilla Camargos and Professor Camila Rezende are two leading researchers whose work bridges chemistry, materials science and cultural heritage preservation. Their collaboration explores how green technologies, such as nanocellulose and nanolignin, can transform conservation practices, making them safer, more sustainable and more inclusive.

How are you related to the intersection between science and art, particularly in the conservation of cultural heritage?

Camilla Camargos: Our work is rooted in understanding that cultural heritage's conservation is a highly interdisciplinary field. It draws on knowledge from chemistry, materials science, art, history, microbiology, ethics, restoration theory and conservation practice. At this intersection, we explore how science and green chemistry can contribute to the development of safer and more sustainable methods. This convergence has shaped my academic and professional journey, as I come from a background in both Conservation and Chemistry. I earned a bachelor's degree in Conservation and Restoration of Movable Cultural Heritage and a Master's in Chemistry at the Universidade Federal de Minas Gerais (UFMG). Under the supervision of Prof. Camila Rezende, I completed my PHD at the Institute of Chemistry of the Universidade Estadual de Campinas (UNICAMP), where I worked on nanocellulose and nanolignin coatings for paper, wood and textiles. Since 2023, I have coordinated research and teaching at UFMG and founded the research group NANOCOR (Nanotechnologies and Advanced Materials for the Conservation and Restoration of Cultural Heritage). In close collaboration with Prof. Rezende's research group at UNICAMP, we have been actively involved in developing novel green conservation materials within the framework of the GREENART project.

Camila Rezende: My background is in Chemistry, Physical Chemistry and Materials Chemistry, but I have always been fascinated by art-dance, music and visual arts. Being able to apply my classical chemistry background to the field of conservation and restoration is both a privilege and a great source of motivation. I studied at UNICAMP and worked with polymer nanocomposites, coatings, surface characterisation and wetting/dewetting phenomena during my graduate and postdoctoral years. Since 2012, I have coordinated the Laboratory of Chemistry and Biomass Morphology (LaQuiMoBio) at UNICAMP. This laboratory specialises in extracting plant-based components, including cellulose and lignin, for use in films,

— Nahir Fuente

cosmetics, gels and aerogels. In 2017, I was introduced to conservation and restoration by Camilla Camargos, who joined my research group to conduct her PHD project. Since then, we have been working together in a complementary way.

What does "eco-friendly conservation" mean to you?

C.R.: It focuses on preserving cultural heritage while minimising the environmental impact of conservation and restoration practices. It is a comprehensive approach that includes using natural-sourced and more sustainable materials throughout the various steps of the restoration process, reducing the use of harmful chemicals and solvents, conserving energy, minimising waste, ensuring proper disposal of materials and adopting practices to protect the artwork, the environment and conservators.

How does your background in chemistry influence your approaches to preserving and restoring art?

C.C.: Chemistry allows me to approach conservation challenges at both phenomenological and molecular levels. On one hand, it helps me interpret visible deterioration phenomena, such as discolouration, embrittlement, or surface alterations, and relate them to underlying chemical and physical processes. On the other hand, it enables me to investigate the molecular mechanisms that drive degradation and to understand the interactions between historical substrates and conservation materials. This dual perspective is essential for evaluating risks, designing preventive strategies and developing treatments that are effective and removable if necessary. Chemistry also guides the selection and modification of materials, supporting responsible solutions that respond to the specific needs of cultural heritage. Ultimately, it strengthens my ability to bridge technical conservation practice with evidence-based innovation.

C.R.: I enjoy thinking of chemistry as a fascinating science that allows us to understand systems and materials at the molecular level. In the gels, for example, we modify the base polymers, cross-linkers, formulations and preparation methods to achieve the desired performance in terms of cleaning efficiency, flexibility and other properties. These characteristics are achieved by playing with the compounds at the molecular level. The same applies to nanocomposite coating films, where the final macroscopic properties, such as transparency or UV protection, are controlled at the molecular or nanometric scale. This bottom-up approach is particularly helpful in designing materials that meet the specific needs of the application.

Your workshop at GREENART [see p.104] involves nanocellulose and nanolignin coatings as well as hydrogels. How do these green materials compare to traditional conservation techniques?

C.C.: While not all traditional conservation techniques necessarily result in high environmental impact, certain materials raise concerns regarding toxicity and sustainability, such as synthetic copolymer-based coatings. That said, some conventional coatings, especially many cleaning gels already in use, are relatively low-impact. However, thinking about sustainability today requires a broader perspective — one that goes beyond environmental concerns to include economic and social dimensions as well. We focus on developing materials derived from abundant agro-industrial residues, such as sugarcane bagasse in Brazil, to produce nanocellulose and nanolignin, which are then applied in cleaning hydrogels and protective coatings. These green nanomaterials not only present a reduced environmental impact, as they are mainly biodegradable and non-persistent, posing minor health risks for conservators, but they also have the potential to be more accessible in Brazil and across South America. We aim to contribute to a more inclusive and locally viable model of sustainable conservation.

What are the challenges you have faced in cellulosic substrates in books and artworks?

C.C.: One of the challenges lies in developing conservation solutions that are effective and respectful of the material, historical and structural characteristics of cellulosic substrates. Books and paper-based artefacts often present complex layers of meaning and construction, including inks, adhesives, bindings and supports, that require careful, case-by-case assessment before any intervention. Particularly challenging scenarios include works of art on heavily degraded wood-pulp paper, documents on vegetal parchment and collections affected by environmental disasters such as flooding. Insect-damaged graphic documents present another recurring and delicate challenge. In 1943, Monsenhor Joaquim Nabuco published a book titled *Bibliófilos versus bibliófagos* (*Bibliophiles versus book-worms*), a landmark work in which he denounced the widespread damage caused by insect activity in Brazilian collections. Nearly a century later, this concern remains highly relevant and pressing, as many of these objects are too fragile to undergo mechanical or large-scale interventions without risking further loss. In 2023, for example, I supervised an undergraduate thesis focused on the conservation of a 19th-century wood-pulp book

Photo Pierre Naquin. © Art Media Agency


Photo Mickaël Pijoubert. © Art Media Agency

that had belonged to a historically significant figure in the city of Pelotas, Brazil. The book exhibited numerous small lacunae (paper losses) resulting from insect attack. Manual reintegration using nanocellulose enabled precise filling with minimal interference to the original substrate and bookbinding. While projects like this highlight the need for adaptable, low-impact and material-compatible methods, I maintain a deep appreciation and respect for traditional conservation techniques, which I continuously study, apply and pass on to my students. These methods remain essential in practice and form the foundation upon which new materials and approaches must be evaluated and integrated.

How do composites and natural nanoparticles help reduce the chemical footprint in the art world?

C.R.: Natural polymers, like cellulose, lignin and their nanoparticles, have been investigated due to their compelling properties and the potential to reduce the chemical footprint of traditional methods. To begin with, both cellulose and lignin are bio-sourced feedstocks, which already minimises the environmental impact of using fossil-fuel-based polymers and particles. Furthermore, extracting these components from agro-industrial waste, such as sugarcane, is an approach that not only reduces the amount of accumulated waste at processing plants but also adds value and gives this waste a more noble purpose. We also pay special attention to the processes for extracting cellulose nanoparticles (nanocrystals and nanofibrils) and preparing lignin nanoparticles, seeking to use milder reagents at low concentrations and aiming for routes that minimise energy consumption and waste generation. Another interesting aspect of cellulose and lignin nanoparticles is that they are dispersible in water. While macromolecules of cellulose and lignin are not water-soluble, their nanoparticles possess a negative surface charge, which allows these particles to remain stable in aqueous dispersions, significantly contributing to low toxicity. Both components are non-toxic and biodegradable, which is especially important in the case of cleaning gels. Another key point is that cellulose nanocrystals and nanofibrils naturally form gels depending on their concentration in the dispersion. Although these are soft gels that require crosslinkers to become suitable for cleaning applications, their predisposition to gelation facilitates the entire preparation process. The nanoparticles are also compatible with other natural polymers such as alginate, gelatin and gluten, allowing for fine-tuned modulation of the properties needed for cleaning gels. Finally, lignin is a multifunctional compound with antimicrobial, antioxidant and UV-absorbing properties, which is highly beneficial, for example, in film preparation. One single component can provide the functionality of several ingredients in a formulation, minimising the total number of components required. The protective films developed, for instance, contained only three elements: nanolignin, cellulose nanocrystals, and cellulose nanofibrils. Considering all the beneficial properties, natural polymers and their nanoparticles are promising for applications in the art world.

How feasible is it to implement these eco-solutions in museums and archives globally?

C.R.: We are not yet at a stage of large-scale implementation in museums and archives worldwide. Many of the eco-friendly materials we work with are still under development and several aspects must advance before broad adoption becomes feasible, including production processes, testing protocols and long-term performance evaluations. That said, we are actively working toward scalability. Currently, we can produce nanocellulose at pilot scale using an ultrafine friction grinder, which allows us to generate sufficient quantities for experimentation and pre-application studies. Coatings based on nanocellulose and nanolignin are the most promising candidates for short-term scalability, as they are easier to produce, apply and integrate into existing workflows. Gels, on the other hand, remain more challenging. Currently, we can produce cleaning hydrogels in sheets approximately 10 × 10 cm in size, which takes up to 48 hours to be ready for use. Scaling up gel production is one of our current priorities and we are working to optimise formulations to make this possible.

What role do eco-friendly technologies play in the future of art conservation?

C.C.: They are fundamental in shaping the future of art conservation, not only from an environmental perspective, but also through the broader lens of sustainability, including social and economic dimensions. These technologies aim to reduce the use of highly toxic solvents, non-renewable materials and waste-generating processes, thus minimising harm to both conservation professionals and the ecosystems around them. Economically, they represent an opportunity to develop more accessible solutions, especially in regions where high-cost imported products are not viable. By working with renewable raw materials, such as lignocellulosic agro-industrial residues, we can create locally sourced alternatives that reduce dependence on international supply chains and better align with the financial realities of many institutions in South America and Africa. Socially, sustainable

innovation in conservation promotes inclusion by creating knowledge and tools that are adaptable to diverse contexts and available to a broader range of professionals and communities. It also reinforces ethical commitments to future generations by ensuring that our interventions are responsible, considered and attuned to long-term impact. Eco-friendly technologies are not just alternatives; they are part of a necessary transformation of conservation practice, grounded in innovation, responsibility and regional protagonism.

How do you balance the scientific rigour with the artistic sensitivity required when working with cultural artefacts?

C.C.: Conservation and restoration are, by definition, a transdisciplinary field. It draws from the humanities, social and natural sciences, and arts. Scientific rigour is essential to understanding the materials, mechanisms of deterioration and effectiveness of interventions. At the same time, artistic sensitivity is crucial to respecting the formal, symbolic and cultural values embedded in each cultural object. Rather than seeing scientific contribution and artistic interpretation as opposing forces, I approach them as complementary ways of knowledge. Understanding the historical context of an artefact, its original techniques and its meaning to different communities is as important as identifying the molecular aspects involved in its degradation and the material interactions related to its conservation. In practice, balancing both dimensions often means listening closely to the object. In my teaching and research, I emphasise that sensitivity and precision are not mutually exclusive. Meaningful conservation approaches require a deep engagement across disciplinary frontiers.

Camila Rezende and Camilla Camargos

Photo Mickaël Pijoubert. © Art Media Agency.

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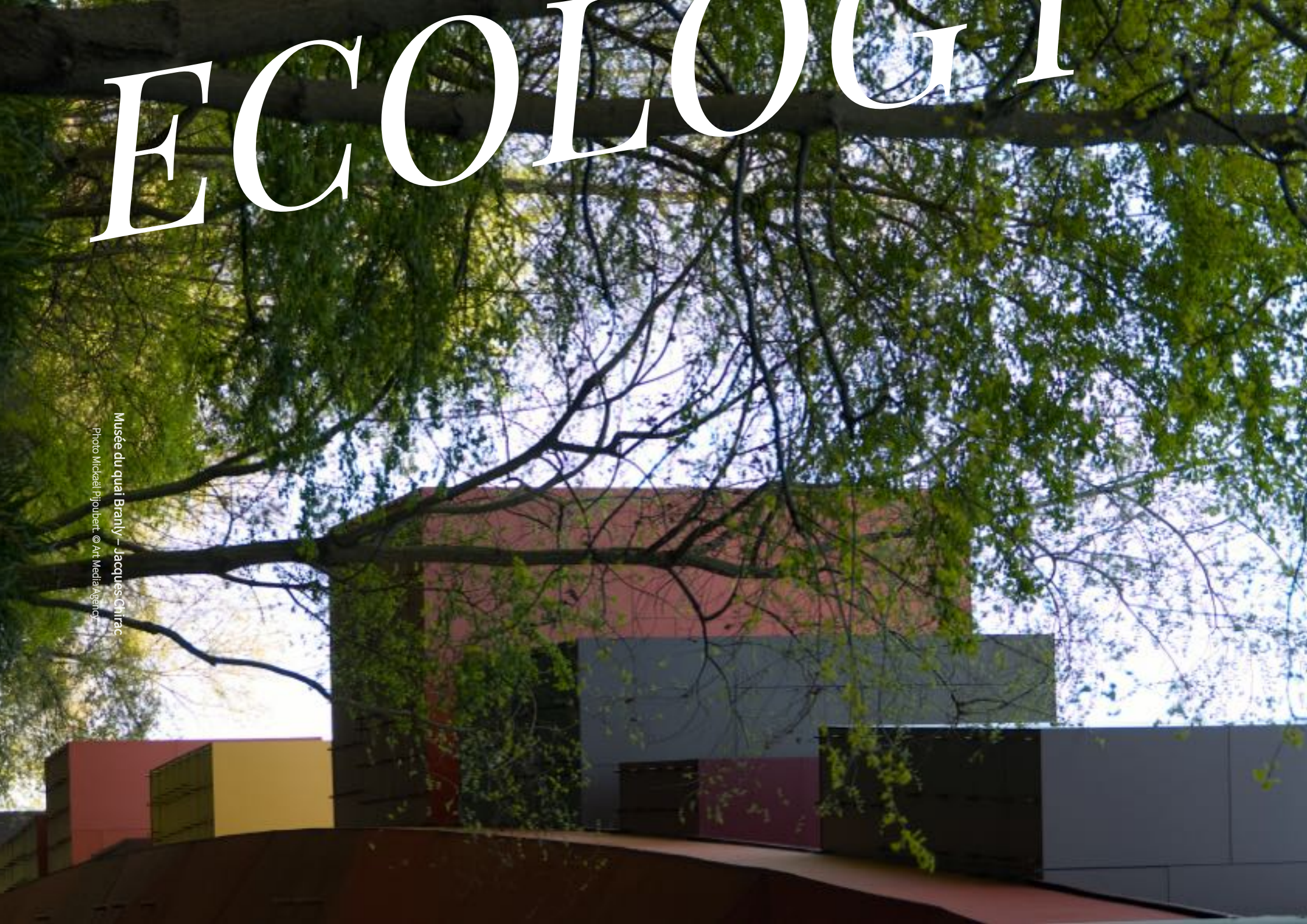

Musée du quai Branly – Jacques Chirac

Photo Mickaël Pijoubert. © Art Media Agency

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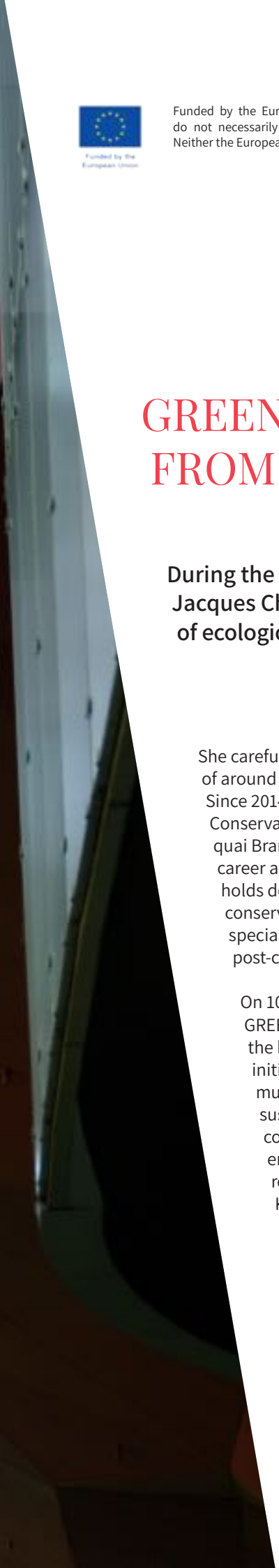


GREENART PUBLIC TRAINING: FROM THEORY TO PRACTICE

During the GREENART Public Training held at the Musée du quai Branly – Jacques Chirac on 10 and 11 April 2025, Éléonore Kissel discusses the challenges of ecological conservation in the art world and the evolution of practices in this field.

She carefully oversees the museum's impressive collection of around 370,000 archaeological and ethnographic objects. Since 2014, Canadian-born Éléonore Kissel has led the Conservation-Restoration department at the Musée du quai Branly – Jacques Chirac in Paris. With a long-standing career as a consultant in cultural heritage preservation, she holds degrees in conservation-restoration and preventive conservation from Paris 1 Panthéon-Sorbonne University, specialising in graphic arts. Her doctoral thesis focused on post-colonial material conservation practices at the museum.

On 10 and 11 April 2025, her institution hosted the GREENART Public Training, an event designed to share the latest developments from this European project. The initiative brings together a consortium of universities, museums and professionals, all working towards sustainable solutions for restoration and preventive conservation. Their aim: to develop low-impact, environmentally friendly materials sourced from renewable natural resources or recycled waste. Éléonore Kissel reflects on two intensive days of conferences and practical workshops dedicated to researching and implementing new materials, technologies and solutions for "green" cultural heritage conservation.

How did you organise this event presenting the outcomes of the GREENART European project?

This training continues the partnership the museum had already established with the European Apache project, which included Antonio Mirabile. Nearly two years ago, Antonio suggested I do something similar for GREENART. What I particularly appreciate about these European projects is their commitment to sharing knowledge freely and openly. I began by formally seeking permission to involve the museum in this venture, to make our facilities and technical resources available. After that, I had to manage every aspect of the organisation: finding dates when the Lévi-Strauss Theatre would be free, handling logistics, preparing the programme, arranging moderation and ensuring communication through the museum's website and social media channels. Compared to the scale of the GREENART project, this commitment remains limited in time, but I accepted it willingly. Organising a day of presentations followed by practical workshops poses a real challenge in a venue like ours, which was never designed for such events. We had to equip the theatre foyer with screens and a dedicated Wi-Fi network, and the security team needed to approve the introduction of external materials into a public building of this size.

— Pierre Naquin and Carine Claude

Did you follow the progress of the GREENART project or did you only get involved for the public presentation?

I focused on outreach and promoting the project to professionals. My discussions with Antonio began about eighteen months ago and I gradually saw the programme take shape. I kept an eye on GREENART's research, but I did not take part directly, as the Musée du quai Branly is not, strictly speaking, a member of the GREENART consortium.

Social Responsibility (CSR) position at the start of 2022, with a full-time staff member coordinating efforts across all teams to adopt more environmentally responsible practices.

For example, my team is deeply involved in a green alternatives project led by the Ministry of Culture, which questions environmental guidelines: should we stick to the traditional standard of a stable climate at 18 degrees and 50% humidity all year round, or can we allow for some flexibility?

and practice. I can give you a concrete example. We are currently launching a project at the museum focused on the conservation-restoration of metal objects, specifically looking at the shine and brilliance of ornaments, ceremonial weapons and jewellery. In this context, several members of my team attended Gabriella Di Carlo's workshop on innovative and eco-friendly materials for protecting metal surfaces. The timing of this training could not be better and it may offer us a real opportunity for practical application.

> Material conservation borrows a great deal of knowledge and expertise from other disciplines, and innovations developed specifically for our field remain the exception rather than the rule.
> — *Eleonore Kissel*

Would it have been beneficial for the museum to take a more active role in this project, as other institutions have done?

To join a major European research project, you need to ensure you have enough people to commit. Our team consists of just six members: four in conservation-restoration, one in conservation science and one in preventive conservation. We are already involved in various research projects, usually on a smaller scale. I am not sure we would have had the time to take on more. That said, the Musée du quai Branly team has taken a proactive approach to ecological transition in material conservation for several years now. We have organised public talks and workshops on these issues, and secured funding to work on bio-based packing materials. More broadly, the museum created a Corporate

Meanwhile, the Collections Management team is working on a European project to replace wooden crates for transporting artworks with recyclable cardboard alternatives.

Do you think there is now enough information available on ecological practices in conservation-restoration?

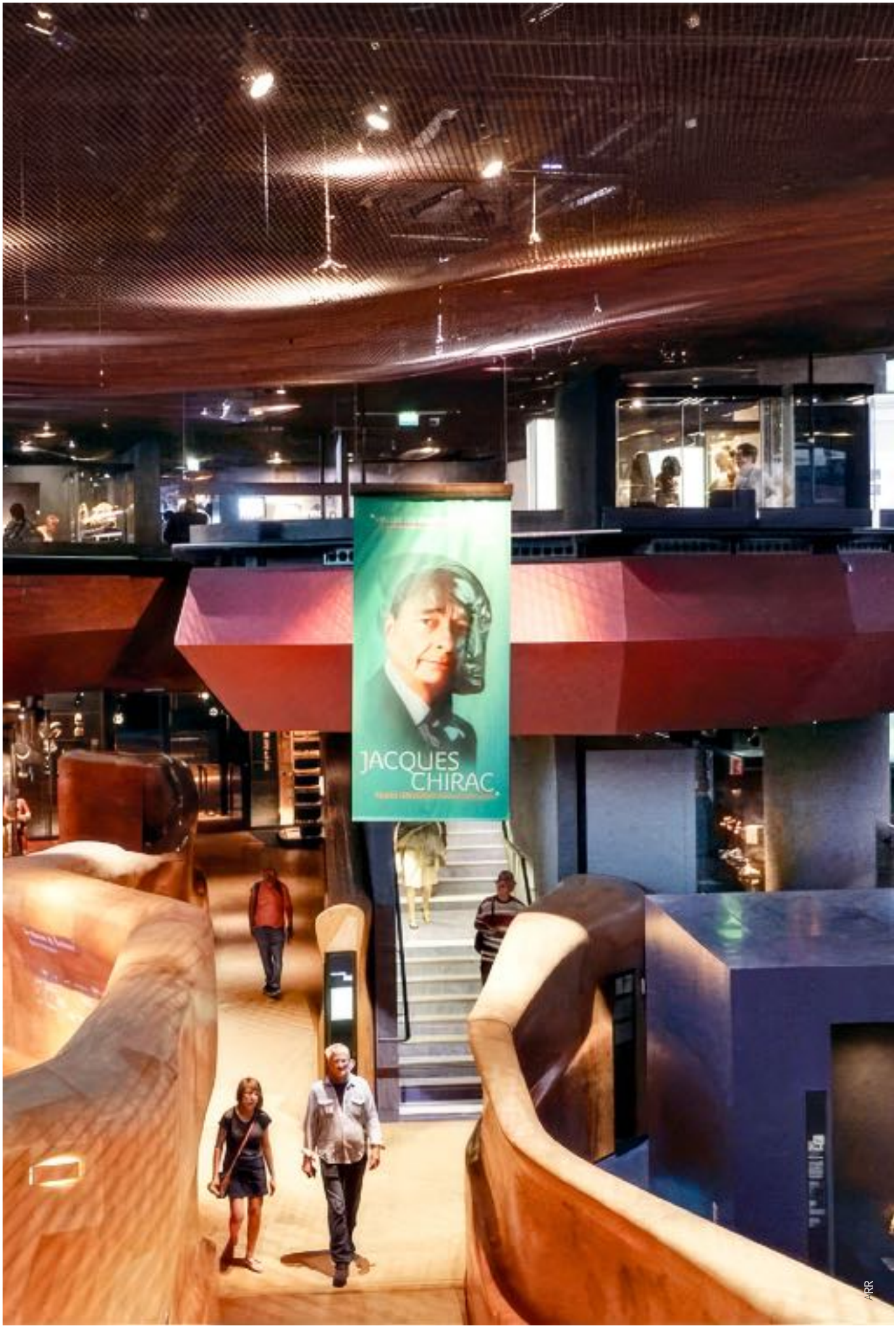
At the end of 2019 or the beginning of 2020, I carried out a literature review on the ecological approach to material conservation, organising the references by theme — climate control, transport and conservation-restoration treatments. Even then, there were already several hundred references and since then, the field has grown exponentially. It has now reached a point where it is difficult to keep up with all the new initiatives and publications. This is precisely where projects like GREENART prove their worth: they help bridge the gap between theory

We are still in the testing phase, but we are considering scaling up what GREENART has developed and applying it to specific collections. Gabriella Di Carlo's team has worked extensively with the bronzes at the Vedova Museum in Venice and we could use their methods on North African jewellery to observe, over the long term, how these materials perform.

GREENART covers a wide range of areas, from transport boxes to cleaning and various types of protective coatings. Were you aware of all these aspects?

I was fairly aware of the different strands of the project: one part focused on conservation-restoration, with both cleaning and protective treatments, and another part on preventive conservation, covering monitoring, storage and pollutant absorption.

I am not sure this structure was as


JACQUES
CHIRAC

clear to all participants in the presentations and workshops, as GREENART is indeed a project with multiple objectives, underpinned by analytical sciences. Personally, because I followed the development of the programme, I had a fairly clear understanding of the different directions.

Had you already tested any of the products developed as part of GREENART?

Not those from GREENART specifically, but we had tried some materials from Nanorestore and exchanged ideas with speakers who led workshops as part of the Apache project — some of whom are also involved in GREENART. For example, Gabriella Di Carlo ran a workshop with us and we also discussed conservation box solutions with Manfred Anders [see p.80].
We were aware of ongoing developments and knew that some aspects of GREENART are entirely new compared to Apache, such as the creation of polyurethane foams from bio-based materials or the focus on the ecological assessment of materials. Others seem more like a continuation or deepening of developments first explored in Apache.

Was there products that particularly interested you during these two days of training?

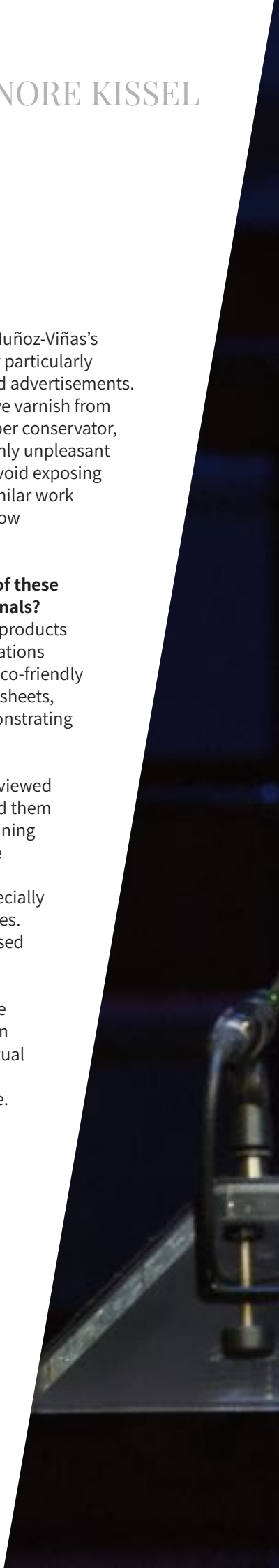
I was especially impressed by the coatings for metal objects that can be reversed using very low-toxicity solvents like water or ethanol. The nanocellulose-based coatings also caught our attention. On the other hand, dispersions for consolidating encaustic paintings are less relevant for our collections.
Each participant found different aspects appealing, depending on the specificities of their collections. Some of my colleagues, for instance, found Salvador Muñoz-Viñas's presentation on mounting systems for works on paper particularly interesting as they work with collections of posters and advertisements. Pénélope Banou's presentation on using gels to remove varnish from works on paper also stood out for me. As a trained paper conservator, I remember having to treat a varnished print using highly unpleasant solvent baths, which meant working at weekends to avoid exposing colleagues to toxic fumes. If we ever need to treat a similar work among the museum's 10,000 graphic pieces, I would now consider the solution presented by Pénélope Banou.

What steps are necessary between the development of these products and their widespread adoption by professionals?

A combination of factors needs to come together. The products must be developed and supported by scientific publications that explain their properties. If a manufacturer offers eco-friendly consolidants but refuses to provide full technical data sheets, or if there are no comparative laboratory studies demonstrating their effectiveness, penetration and reversibility, it becomes difficult for us to adopt them.
Ideally, these products should be published in peer-reviewed journals (A-grade), ensuring that experts have assessed them and can highlight any methodological flaws. Then, training sessions like the GREENART workshops allow us to see these materials in practical use on sample objects.
Then comes the question of product accessibility, especially for public institutions bound by strict procurement rules. It is much easier to purchase a product from a recognised supplier in the conservation-restoration sector than directly from a university laboratory.
Finally, you need a motivated team willing to test these innovations and a project that allows you to move from the laboratory context to real-world application on actual objects. This requires a certain level of trust, as well as the ability to monitor how treatments evolve over time. For example, we are considering testing the coatings developed by Gabriella Di Carlo's team on five North African jewellery pieces that will go on display, alongside more traditional techniques. This will allow us to observe their behaviour on a daily basis.

Is it common to test new products in your field?

It is relatively rare. Conservation-restoration is a niche market, with few scientific developments dedicated exclusively to this sector. Most of the products we use — resins, boxes, pollutant sensors, insect traps, disinfectants — were originally developed for other fields, such as medicine, the food industry, or manufacturing. The first vibration sensors, for example, came from the construction industry.



Éléonore Kissel

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