GÜBELIN

GEMMOLOGICAL PROFILE

41.92 CT

SRI LANKAN SAPPHIRE

COMPLEMENTING
GEMMOLOGICAL REPORT

No. Specimen 10

ABOUT THIS DOCUMENT

This Gemmological Profile is complementing a Gemmological Report issued by the Gübelin Gem Lab. The Gemmological Profile has been issued upon request of a client, on the basis of data collected for the described stone at the time of the analysis as stated on the Gübelin Gem Lab Gemmological Report. The Gemmological Profile is only valid if presented together with the original Gübelin Gem Lab Gemmological Report.

Gemmological Profiles provide a more detailed description of a gemstone than the concentrated wording used in Gübelin Gem Lab Gemmological Reports. While Gemmological Reports primarily address the professional traders, Gemmological Profiles attempt to cater the needs of the jeweller and the layperson, who might be interested in getting explanations and background information about gems in general, and their gemstone in specific.

Gemmological Profiles are issued on request, and are available for a broad range of gemstone qualities. Hence, the existence of a Gemmological Profile does not imply any level of quality or rarity of the gemstone it describes. The language used in Gemmological Profiles is more extensive and informal. Statements about certain quality traits of the stone in the Gemmological Profile might be more detailed, and go beyond the sober scientific language deployed in the Gemmological Report. In contrast to the Gemmological Report, whose content is based exclusively on data that Gübelin staff has collected directly from the stone, the Gemmological Profile considers and contains also external, possibly uncorroborated data and information.

We refer to the information stated in the Notes and Limitations section on the backside of the Gemmological Report, and to the General Terms & Conditions. See also www.gubelingemlab.com.

CONTENT

INTRODUCTION

Gemstones are true products of nature, grown millions of years ago in the earth's crust, brought up to the surface by geological processes and eventually found by man who brings out their colour and brilliance by cutting and polishing.

The gemmologist's eye looks beyond the sparkling outer appearance of the stone, attempting to understand how it has formed. Minute crystals, fluid inclusions and subtle growth features trapped in its interior are witnesses of its formation ages ago and in tens or even hundreds of kilometres depths in the earth. This inner life allows us to detect its identity, authenticity and even its geographic origin.

This Gemmological Profile complements the Gübelin Gem Lab Gemmological Report No. SPECIMEN 10. In this Profile, we present our insights and findings for the 41.92 ct Sri Lankan sapphire, disclosing some of its microscopic, chemical and structural characteristics and providing valuable information about its genesis and origin.

We intend to share with you a bit of the story that your gemstone tells us on its very individual history and personality.

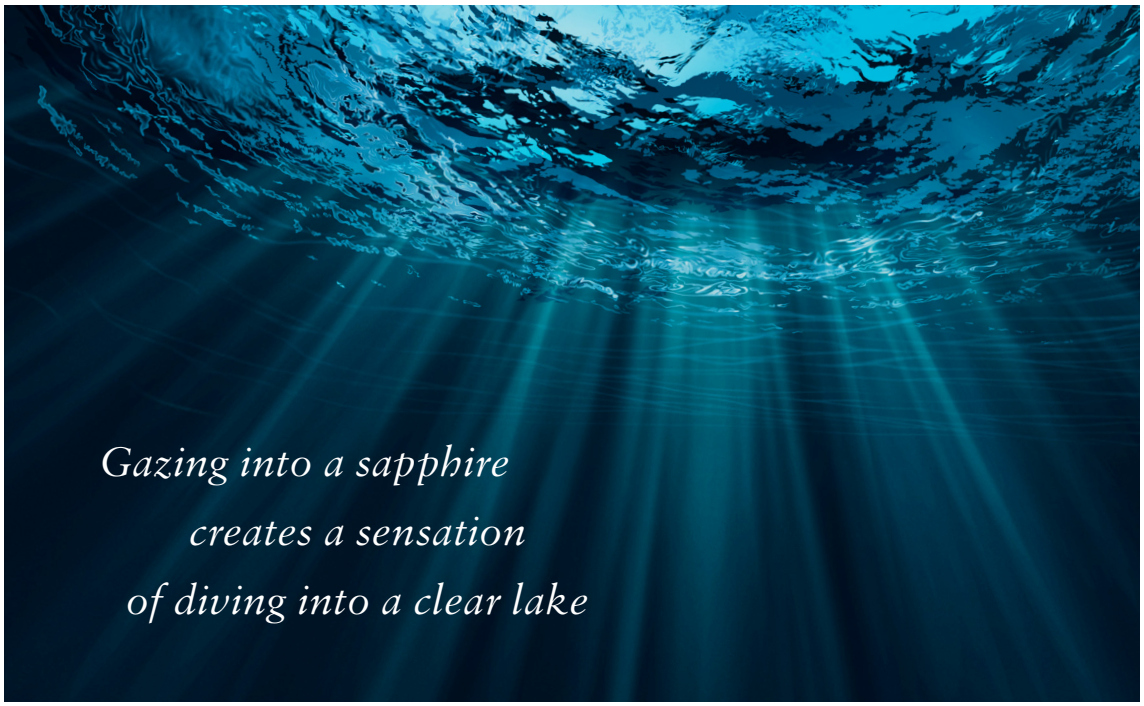
On June 24, 2018, the Gübelin Gem Lab in Lucerne has been entrusted with testing the 41.92 ct gemstone presented here. The careful assessment and detailed analytical studies performed on this gemstone revealed the results provided in the Gemmological Report No. SPECIMEN 10 and are described in more detail in this Gemmological Profile.

HISTORY & SYMBOLISM OF SAPPHIRE

The word 'sapphire' is thought to be derived from the Latin 'sappirus', itself coming from the ancient Greek 'σαπφειρος' or 'sappheiros', meaning 'dark blue stone'. Other sources point towards a Sanskrit origin 'sauriratna' ('beloved of Saturn') and even associations with the gem-producing island of Saphirine in the Arabian Sea have been made. The ultimate root is most likely Semitic, with the Hebrew word 'saffir', meaning 'most beautiful', or 'perfect' [ACA]. Many mystical connections and magical properties have been ascribed to sapphire. The Greeks associated sapphire with prophetic qualities, while Buddhists regard it as bringing spiritual light. In India and Arabia it was worn as a protective amulet against the Evil Eye, plague and pestilence, to name just a few healing and spiritual qualities. The sapphire has often been given a noble, eminent, even heavenly position. An early celestial association was the Persian belief that the world was founded upon a sapphire whose colour was the cause of the blue of the sky, while the ten commandments given to Moses were supposedly engraved upon tablets of sapphire [ACA].

Sapphire owes its appreciation to its deep, often fathomless blue colour, gazing into it creating a sensation of diving into a clear lake or a rising up into the blue sky. It is this pure, saturated blue hue that instils a sensation of endlessness. The depth and the high transparency of fine sapphires transcend honesty, purity and loyalty. By the Middle Ages, the colours of blue and purple had become representative of royal and religious power, and bishops, princes and kings adopted sapphire as the ideal symbol of their earthly and heavenly power, but also as a sign of purity and to protect them from unclean thoughts.

ACA This abbreviation refers to specific contents of the Coloured Gem Professional classes provided by Gübelin Academy. For detailed information visit gubelinacademy.com



DESCRIPTION

Weight

Sapphires are minerals forming deep in the earth, under specific geologic conditions of high pressures and temperatures. A delicate balance of the right chemical elements is required to supply the growing crystal with the ingredients that finally lend it an appealing blue colour. Crystal growth is usually a slow process extending over several tens of thousands years at least and rarely the required balance of availability of the just right chemical constituents is maintained throughout the growth of a sapphire. Skilful cutting is needed to bring out the best part of the rough crystal, further reducing the weight of the gemstone typically to less than 50 percent [ACA] and resulting in a final weight of 41.92 ct for this stone.

Large, unheated specimens of sapphire displaying a saturated, equally distributed blue colour, such as shown in this 41.92 ct sapphire, are considered rare.

Shape & cut

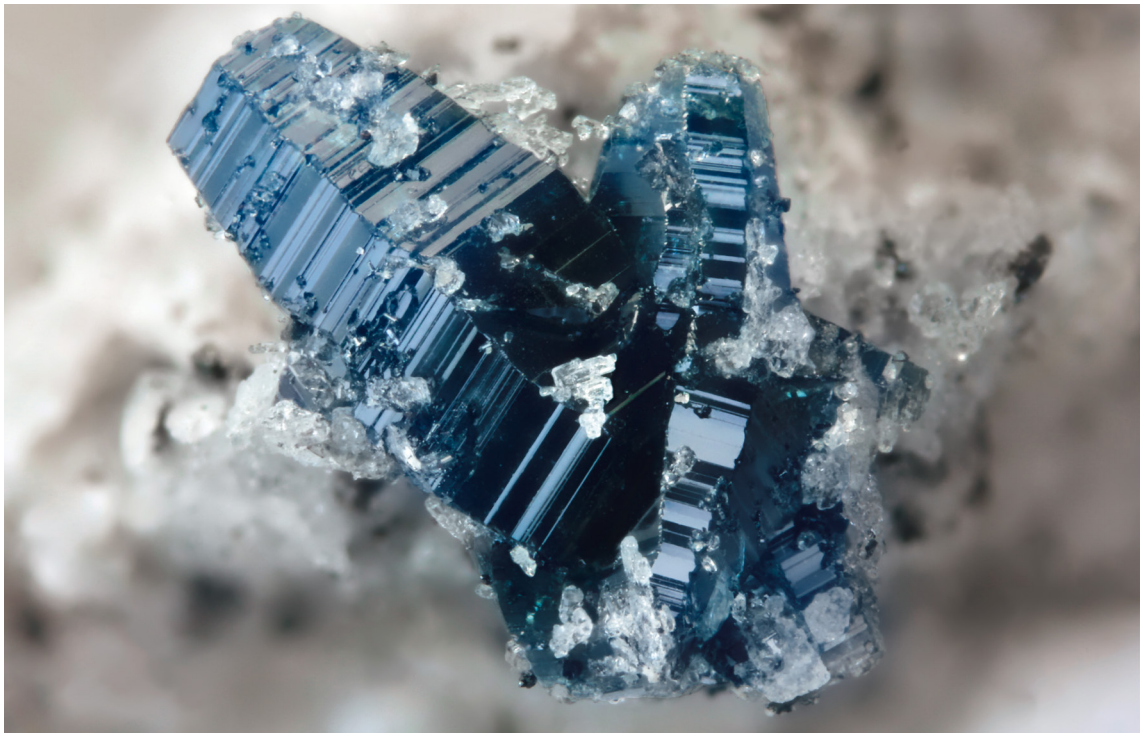
The final shape and cut of the gemstone is the result of a highly complex decision taken by the cutter and mainly defined by the shape and the quality of the rough crystal. The cutter tries to find a balance between maximising the colour, brilliance and transparency, while retaining as much weight of the crystal as possible. Special attention is given to the appearance of the colour, the key property in all coloured gemstones [ACA]. Sapphires grow in an oriented manner, resulting in differences of colour – sometimes subtle, sometimes distinct – when viewed from different directions. This effect, called pleochroism [ACA], is carefully considered by the cutter and plays a pivotal role in getting the best out of a piece of rough crystal. These considerations were also applied on the present crystal. It was fashioned into a cushion shape, using a cutting style that combines features of both the brilliant cut and the step cut. The di-

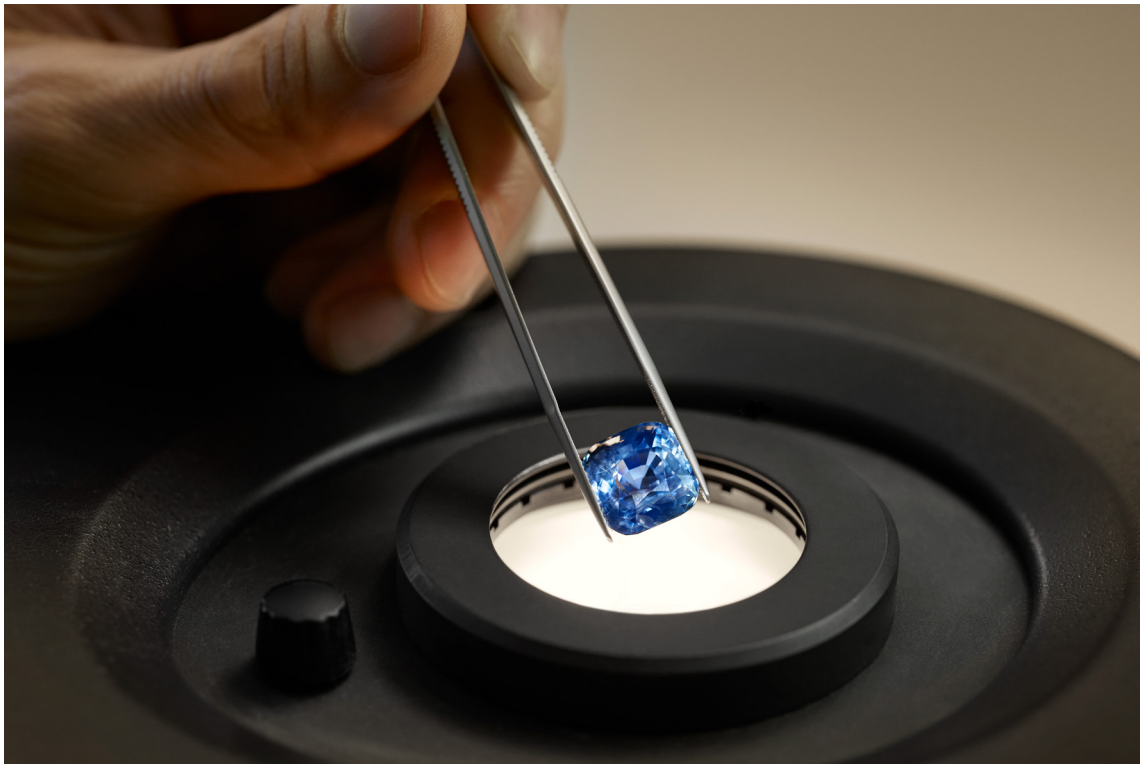
mensions of the gemstone are 18.14 mm in length, 15.62 mm in width and 12.09 mm in depth.

Colour & transparency

The single most important criterion of a gemstone's quality is its colour. Sapphires cover a broad range of different shades and nuances of blue, often with a subtle contribution of a secondary colour such as purple, exhibiting a variety of saturation and tones. While all combinations have their own charm and legitimacy, a pure, saturated blue colour is the most coveted amongst connoisseurs. The colour of the present gem is exceptional, characterised by an intense, saturated blue colour, free of any secondary colour. As a rule of thumb, the transparency of gemstones usually follows the same logic as in diamonds: the cleaner – i.e. showing not or few internal features only – the better. Tiny, usually microscopically small inclusions are a common and welcome feature in coloured gemstones. Ideally, however they should not affect the transparency of the stone. As a rule of thumb, the transparency of gemstones usually follows the same logic as in diamonds: the cleaner – i.e. showing not or few internal features only – the better. Tiny, usually microscopically small inclusions are a common and welcome feature in coloured gemstones. Ideally, however they should not affect the transparency of the stone.

One very peculiar type of microscopic inclusions of Sri Lankan sapphires – also found in the 41.92 ct sapphire – are needles. Usually made up of rutile crystals, needles strictly follow the atomic structure of the corundum crystal. These minute needles slightly scatter the incoming light and contribute to the softness of appearance highly treasured by sapphire connoisseurs [ACA]. Hence, the presence of a certain extent of needles is considered an enhancement of a sapphire's beauty.





Identity & authenticity

One most fundamental information any gem lab report has to provide is the identity of the stone. Sapphire is defined as crystalline aluminium oxide Al_2O_3, called corundum, with traces of the chemical elements iron and titanium. In gems, such trace elements are most commonly the agents responsible for adding colour. Despite their small contribution to the overall chemical composition of the gemstone, trace elements play a key role in determining whether a mineral is just a standard stone or a rare and coveted gemstone. Merely by replacing a few aluminium ions in the atomic structure of corundum with iron and titanium, common, colourless corundum gets turned into a sapphire of an attractive blue colour [ACA].

Different types of minerals and other materials might be used to fake sapphire, i.e. act as so-called simulants. Clearly, the value of a simulant is a fraction only of the true sapphire.

As sapphire can also be grown synthetically, the authenticityneeds be addressed; is the sapphire indeed of natural provenance, i.e. grown millions of years ago in the depth of the earth, or if it is a synthetic sapphire, i.e. a man-made crystal? Synthetic sapphires are known for more than a hundred years and possess chemical and physical properties almost identical to natural sapphires. But the production and hence the supply of synthetic sapphires is virtually unlimited, which reduces their value dramatically compared to a pristine, naturally grown sapphire.

The 41.92 ct gemstone has proven to be of the blue variety of natural corundum, called sapphire.

Overall quality assessment
The 41.92 ct sapphire described in Gübelin Gemmological Report No. SPECIMEN 10 is of exceptional visual quality.

Royal Blue
This stone further qualifies for the term royal blue, a term coined by the trade many centuries ago to describe a deeply saturated, intensively blue colour in high-quality sapphires. Historically, the term royal blue was used for the best types of sapphires originating from Burma, but is meanwhile also known to be found in other sources. Dr. Eduard Gübelin described this colour as deep, luscious, and unfathomable. The Gübelin Gem Lab reserves this term for the small number of sapphires that fulfil a very comprehensive set of quality features, including the correct hue, tone and saturation, the complete absence of any treatment and a very good transparency.

Many famous stones, such as the Rockefeller Sapphire are of this intriguing shade of blue, adding to the fame of royal blue sapphires [ACA].

ORIGIN

The country of origin of the present 41.92 ct sapphire has been determined to be Sri Lanka, most likely the very first source of blue sapphires worldwide. The rich history of Sri Lanka, also referred to as Ceylon, Lanka, Serendip, Taprobane, or Eelam, spans over a period more than 5,000 years. Etruscan, Indian, Greek and Roman sources refer to gemstones originating from Sri Lanka, giving evidence that the island in the Indian Ocean is the oldest and most sustainable supplier of sapphires to mankind.

Among the many myths behind the beginnings of Sri Lanka's wealth of gemstones, an ancient Indian Vedic text describes the deity of Garuda Purana, vanquished in battle, and parts of his body scattered from the sky all over the Indian subcontinent. These bodyparts laid the source of various gem deposits; the bones transformed into the diamonds of India, his blood became the rubies of Burma, his teeth the pearls of the seas, and his eyes are now the sapphires of Sri Lanka. Along with blue sapphires, virtually all other colour varieties of gem corundum are found in Sri Lanka, predominantly yellow sapphire, pink and purple sapphire. Padparadscha sapphire, sporting a subtle blend of orange and pink hues, light in saturation and tone, is a colour variety of gem corundum that deserves special mention. It derives from the term 'Padmaraga', and describes a colour when sunlight is reflected off from the petal leaves of a lotus flower in a particular way.

The island of Sri Lanka is the source of an abundance of other types of gemstones, some of them found nowhere else on earth. This spectrum and density of gems explains the Sanskrit name 'Ratna Dweepa' - Island of Gems'.

Determination of Origin

The geographic origin of this sapphire has been determined in comparison with sapphires from the gemstone reference collection of the Gübelin Gem Lab. With more than 27,000 stones, it is probably the world's most complete collection of gemstones gathered from all the commercially relevant mines worldwide. The collection has been started in the 1930s and is maintained up to this day. It hence also encompasses mines which are exhausted or closed decades ago. This unique reference collection, combined with the most sophisticated analytical techniques, allows the scientists of the Gübelin Gem Lab to determine the origin of most sapphires, solely based on the observations and data they collect on the stone.

Leading gemmological laboratories, such as the Gübelin Gem Lab determine the origin, i.e. the geographic provenance of a gem by comparing its microscopic, chemical and spectroscopic properties with the properties of gems from secured origins. If the pattern of properties gathered from the unknown stone matches the one from the reference stones, an origin can be determined. However, this is sometimes not a straightforward process, as the properties of sapphires from different deposits might overlap.

Although today they might lie thousands of kilometres apart, their geologic setting might be similar, or the host rocks were even adjacent to each other millions of years ago when the gem grew. Hence, despite skilful assessment and evaluation of carefully collected analytical data, the determination of the origin is not feasible for any stone. The trustworthiness of the final opinion is – among other factors – defined and limited by the completeness and quality of the lab's knowledge database and reference collection.

This is why the Gübelin Gem Lab continuously invests a significant share of its revenues in research and development, both in-house as well as in joint projects with universities and other external scientific research institutions[1].

[1] The annual 'Dr. Eduard Gübelin Research Scholarship' is another key engagement of Gübelin to contribute to the advancement of gemmological knowledge. For more information visit www.gubelingemlab.com/scholarship.

GEOLOGY & AGE

Although geographically belonging to the Asian continent, the genesis of sapphires in Sri Lanka is directly related to the rubies and sapphires in East Africa. Almost all sapphires and rubies of Eastern Africa were formed some 600 million years ago. At that time, rubies and sapphires formed in great depths of at least 17 kilometres and at temperatures of more than 600 degrees Celsius. Over the millions of years that passed by since then, the rocks containing these crystals were slowly uplifted to the earth's surface. In the case of Sri Lanka, the host rocks were weathered and eroded and the sapphires brought downstreams, deposited in riverbeds, forming so-called secondary or placer deposits. The erosional process of weathering, transportation, and deposition also resulted in a separation and removal of the better, less fractured qualities of sapphires. Consequently, sapphires found in such secondary deposits are usually of a higher quality than their precursor, the primary host rock.

Major sapphire deposits

TREATMENT

Traditional blow-pipe heat treatment

Heating has been applied for centuries and even millennia, to improve both the colour and clarity in corundum. References in Pliny show a diverse knowledge of various mineral treatments in the Roman period and explicit literary references to the heat treatment of sapphire are found in early mediaeval Arabian and Renaissance European texts [ACA].

Generally, heat treatment offers a way of turning sapphires of less desired quality into highly attractive gems. Treatment is thus an important way of overcoming the enduring undersupply of aesthetically appealing gemstones. However, each treatment must be properly and accurately disclosed, as the presence and the type of treatment influences the value of a sapphire significantly.

By far the largest share of the gem-quality sapphires from Sri Lanka is subjected to some type of heating. Heat can intensify colour, lighten or darken the stone, and even induce blue colour in corundum that lack colour completely. The white, colourless or yellowish sapphires from Sri Lanka that react to heat by turning into an attractive blue colour are referred to as Geuda.

The small number of natural, unheated sapphires of good colour and transparency, compared with their heated and otherwise treated counterparts, underlines their rarity. The 41.92 ct sapphire presented here is one such rare example of unheated sapphire, gifted naturally with an attractive colour and transparency.

WITHIN SAPPHIRE

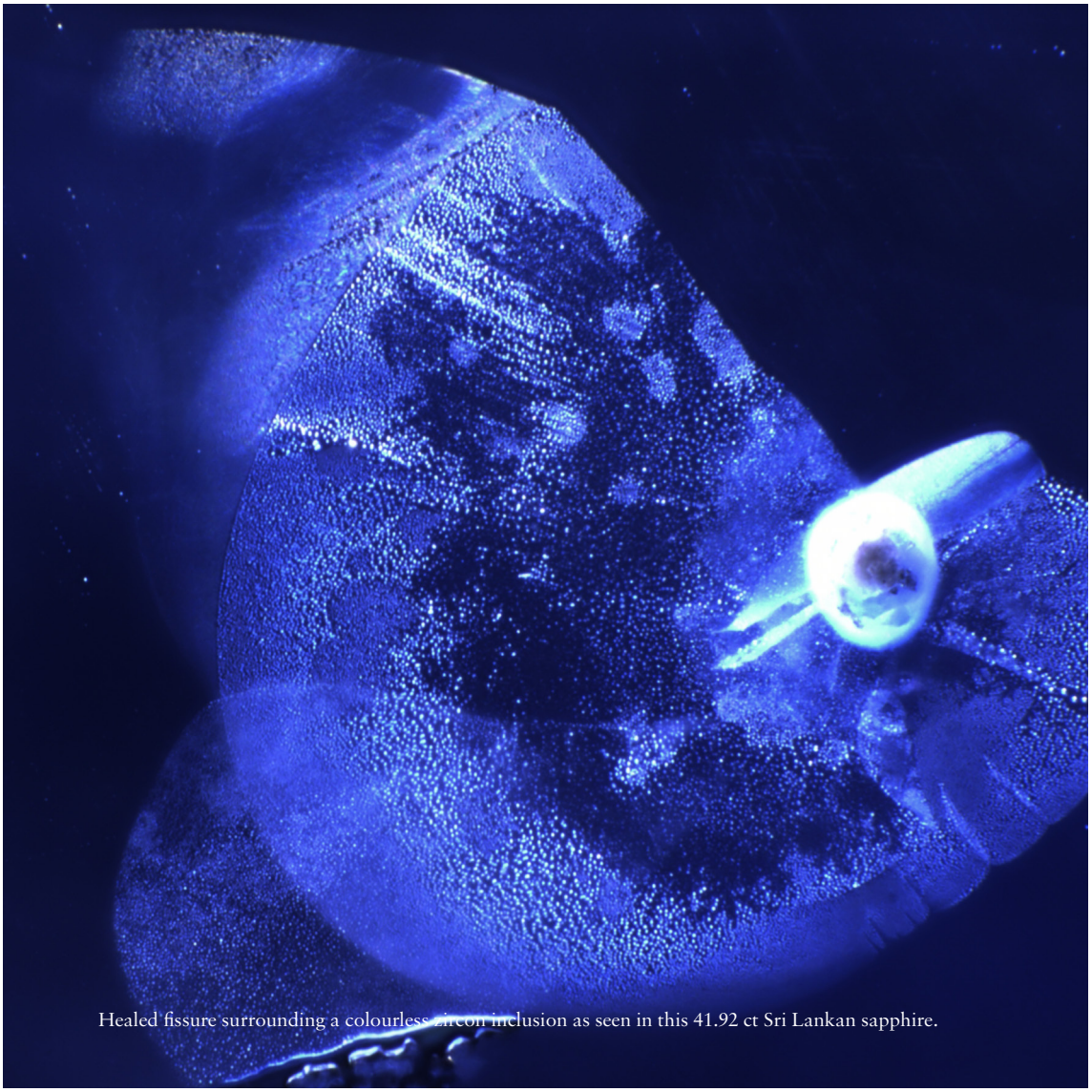
Careful study of the internal features and properties gives valuable insights into the identity, authenticity and sometimes the origin of a gemstone. All these characteristics are the result of the individual history of this specific gemstone, providing a patchy and fragmented – but very personal – diary from its growth in the inner of the earth, its uplift to the surface, to the mining process and finally the processing by man. The first chapter of this diary, on the growth of the crystal, reveals insights to the geological setting in which the mineral formed, the pressure and temperature conditions and the specific chemical environment prevailing at that time. To unravel these secrets from this 41.92 ct sapphire, the scientists at the Gübelin Gem Lab have scrutinised its microscopic features, analysed its detailed chemical composition and its physical-structural properties.

Microscopic features
In combination with the magnifying aid of a microscope, the experienced human eye provides an extremely sensitive, powerful and versatile analytical tool. The determination and description of the microscopic characteristics found in a gem – ranging from tiny crystals, fluid inclusions and particles, to growth features and minute fissures – provide a comprehensive qualitative survey indispensable for any gemmological conclusion.

Some of the internal features recorded in this sapphire include long and thin rutile needles, geometric patterns on healed fissures also known as city map structure and elongated negative crystals. These inclusions are regularly observed in Sri Lankan sapphires, and are potentially helpful indicators to determine its authenticity and origin[2].

Further to these characteristic inclusions colourless zircon inclusions and iron staining are other internal features present in this 41.92 ct sapphire.

2 For more information about the inclusions in gemstones contact the Gübelin Academy or consult 'Photoatlas of Inclusions in Gemstones' (see chapter 'Addendum')



Healed fissure surrounding a colourless zircon inclusion as seen in this 41.92 ct Sri Lankan sapphire.

Chemical features

In addition to microscopic features, a number of technologically advanced analytical methods are deployed to contribute to a secure determination of a gemstone's authenticity and origin. These more sophisticated methods can be grouped into spectroscopic and chemical methods. Both types give hints to the type of rock in which the gem formed and might also reflect alterations imposed by a possible treatment process.

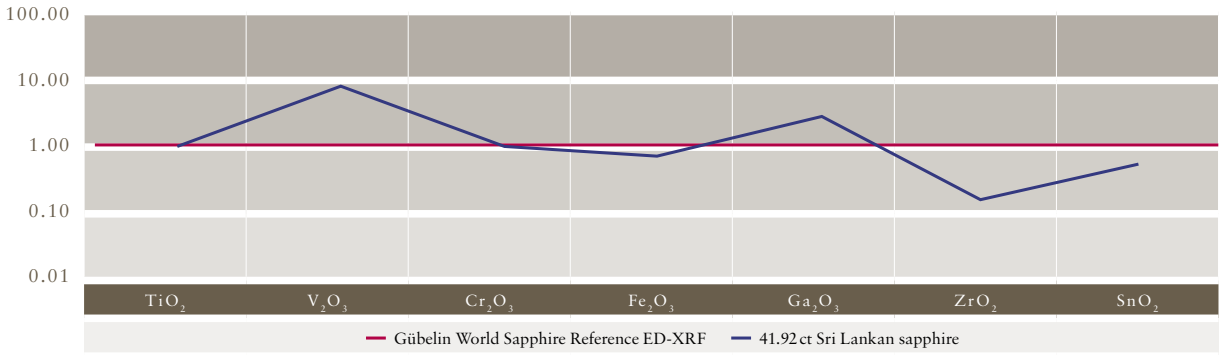
Sophisticated analytical techniques[3] measure the concentration of chemical elements in gems. Aside from the main and minor elements, gemstones also contain other elements present in even smaller concentrations of a few parts per million.

These trace elements typically do not have any significant influence on the appearance of the gemstone, but they shed light on the environment in which it grew thousands, millions or even billions of years ago. The type and amount of these elements in a gemstone are often indicative of a specific location and are used by gem labs to determine its country of origin.

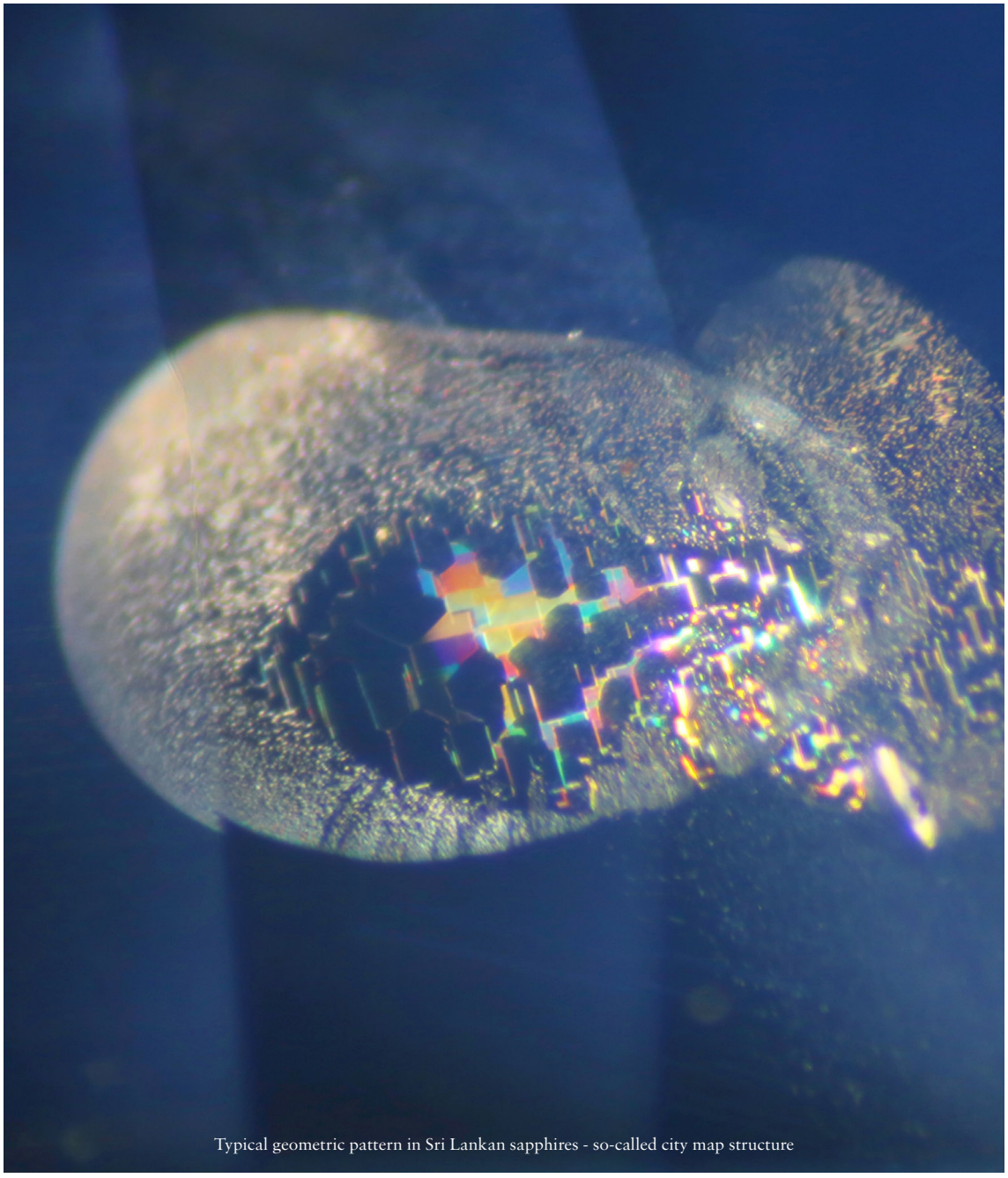
The trace element concentrations of this 41.92 ct sapphire vary slightly to the Gübelin World Sapphire Reference[4], as shown in the trace element diagram. The chemical fingerprint measured in the present gemstone displays the characteristic deviations we expect for a sapphire from Sri Lanka. This chemical fingerprint is individual and unique for this 41.92 ct sapphire, exactly like the genetic DNA is individual and unique for a specific creature.

[3] For more information about the applied analytical methods visit www.gubelingemlab.com

[4] The Gübelin World Reference Sapphire is an empirical trace elemental composition of an assumed sapphire with the averaged and weighted concentration of potentially indicative elements, comprising all commercially relevant deposits worldwide.



Trace element pattern for the 41.92 ct Sri Lankan sapphire, gathered by energy dispersive X-ray fluorescence (ED-XRF) spectrometry. The blue line shows the deviations of a selection of trace element concentrations in comparison to the normalised Gübelin World Sapphire Reference, shown in red.



Typical geometric pattern in Sri Lankan sapphires - so-called city map structure

Cutting-edge chemical analysis: 193 nm Laser-Ablation ICPMS unit, operated at the Gübelin Gem Lab in Lucerne

Spectroscopic features

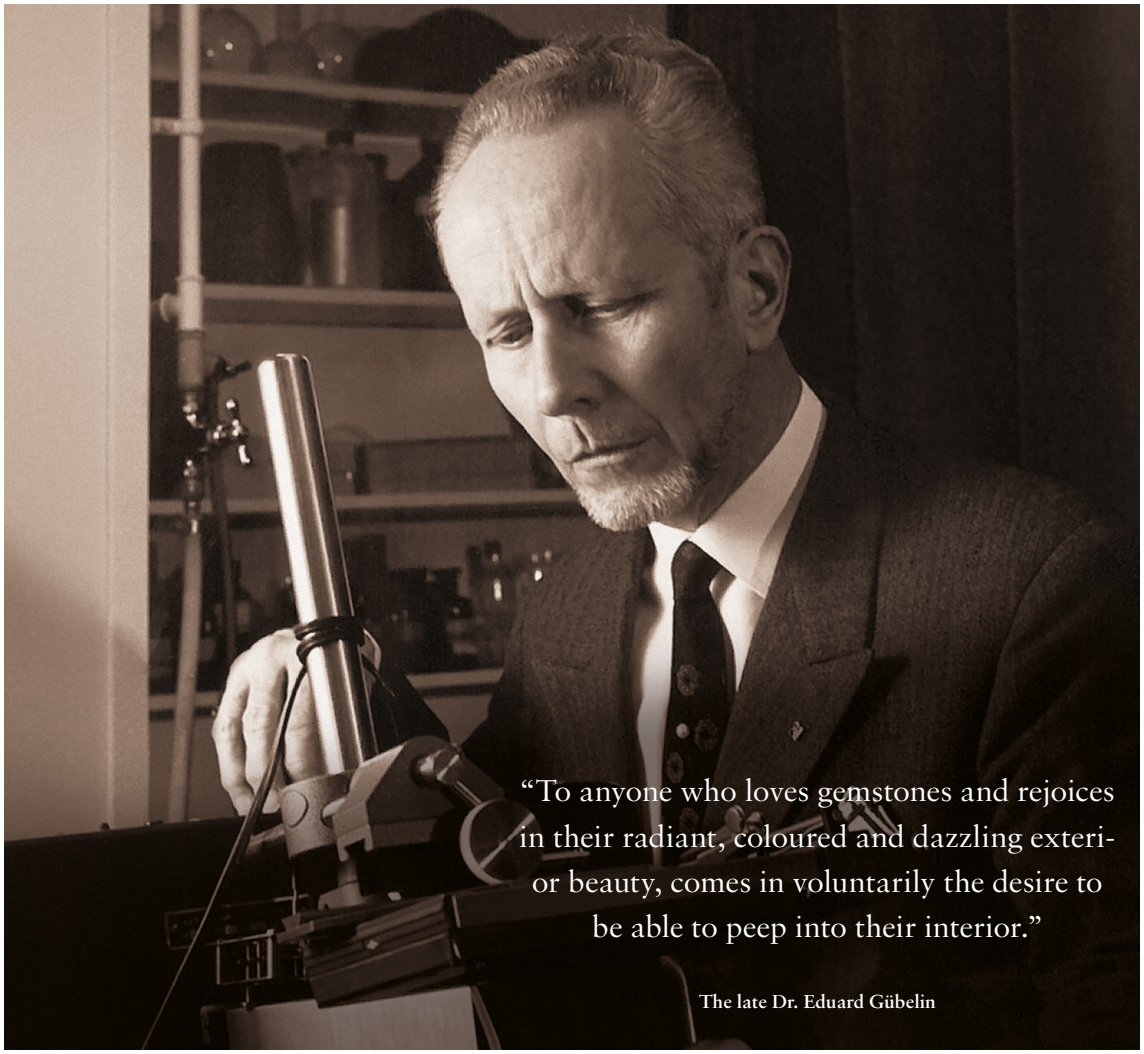
Different methods of spectrometry are applied to help determining possible treatments and the origin of a gemstone. These analytical techniques apply electromagnetic radiation that interacts with the gemstone, providing information about its chemical and structural constituents (i.e. elements, molecules, crystallographic properties) through the characteristic absorbance of visible, infrared and/or ultraviolet light.

Spectroscopy applying ultraviolet to visible light can provide clues on the geological environment in which sapphire formed in the earth's crust.

The present 41.92 ct sapphire shows spectroscopic features typical for sapphires formed in rocks that crystallised during a major geologic event referred to as regional metamorphism.

ABOUT GÜBELIN GEM LAB

The roots of the Gübelin Gem Lab go back to the 1920s. The laboratory's standard of excellence and tireless devotion to the science of gemmology, pioneered by the late Dr. Eduard Gübelin, soon came to be rewarded with international esteem and recognition. Today, the team of the Gübelin Gem Lab is composed of highly trained and experienced professionals who share a passion for the treasures released by the earth and entrusted to our hands by our clients. We combine state-of-the-art analytical techniques, expertise and extensive practical skills when it comes to interpreting gemmological and geological data and rendering a professional opinion on diamonds, coloured stones and pearls. We are committed to maintain the integrity and reliable service that our clients have come to expect from the Gübelin Gem Lab.



ADDENDUM

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Gübelin Academy

Gübelin Academy was established in 2013 to offer unique, fast-track training into the wonderful world of coloured gems. Designed for professionals as well as enthusiasts and connoisseurs, courses cover the basics as well as the advanced history, gemmology and psychology behind the most precious and colourful commodities in the world.

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