Facette

MAGAZINE

INTERNATIONAL ISSUE NO.20, JANUARY 2013

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SSEF
SCHWEIZERISCHES GEMMOLOGISCHES INSTITUT
SWISS GEMMOLOGICAL INSTITUTE
INSTITUT SUISSE DE GEMMOLOGIE

Dear Reader

It is always a pleasure for me to present you the SSEF Facette, our annual magazine. This time, I am especially proud as it is already issue No. 20, which means that since 20 years, we have informed you, our clients, about our services and activities and most importantly, our latest achievements and findings in gemstone and pearl research.

When looking back at the first issues, we can see that our Facette has changed from a very basic summary of SSEF activities written in black and white on a few pages, to what since last year is a magazine with a very attractive design and plenty of scientific information. This progress of the Facette comes along with some important developments in the SSEF structure, especially in 2012. Looking back at the last few months, we can say that it has been a very successful year, with the integration of new gemmological experts into our team and also some new state-of-the-art instruments at SSEF. In this context, I would just like to mention our new X-ray microtomography system from Swiss producer Scanco, which is a highly versatile and powerful tool for pearl analysis.

In the last year, we have seen many outstanding gems and pearls, many of them sold at auctions. Having a report from SSEF - especially for natural pearls - nowadays means trust and reliability and often results in a premium price when sold. This reputation is our most valuable asset. But it is also a constant incentive as we strive to offer you services at the highest level of scientific accuracy and integrity to remain your gemmological laboratory of choice in future. With new gemstone mines and pearl products constantly pushing into the market, we can assure you that we take our mission for research very seriously and accordingly focus our research activities on these challenges.

I would also like to announce two important new service options. Firstly, shipping of your goods with our new SSEF-Ferrari shuttle service is now easier than ever before and also much less expensive (see News section in this Facette). We are proud to have found in Ferrari Express Inc. a highly reliable and effective shipping company and together we can now offer you door-to door service at unbeatable prices. Secondly, we have developed a new high-end format to present SSEF reports, the SSEF Premium Appendix. This is only available for exceptional items for which we have chosen to issue an appendix letter. Hand-made and leather-bound, this folio in a box includes not only the SSEF report and an appendix letter, but also an enlarged high-resolution image of the item to present its beauty at its best. I am convinced that both these new options are very attractive, and I would be pleased to give you more information and answer all your questions you may have regarding this.

For 2013, we are looking forward to many new projects and possibilities to meet you at SSEF or on-site during our worldwide presences and wish you a very successful year with lots of exciting opportunities.

Dr. Michael S. Krzemnicki
Director SSEF

COVER PHOTO ▷

Local miner showing corundum and other rough gems in Elahera, Sri Lanka.

Photo © M.S. Krzemnicki, SSEF

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IMPRINT
Annual publication by **Swiss Gemmological Institute SSEF** Falknerstrasse 9 CH-4001 Basel SWITZERLAND
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ISSN : 2296-214X | All images ©SSEF unless otherwise stated | Layout: Archibald Studio

KASHMIR SAPPHIRE

By **Dr. M.S. Krzemnicki, SSEF**

Nowadays, sapphires from Kashmir are among the most expensive and sought-after gems on the market. Just to highlight this, a Kashmir sapphire of 8.91 ct in a ring was sold in December 2012 at Christie's in New York for a record-breaking US$ 154,000 per carat. This trend is reflected in increased demand for gemstone origin reports from reputed gemmological laboratories such as SSEF.

△ **Figure 1:** The Star of Kashmir, a magnificent sapphire of 19.88 cts, certified by SSEF and to be auctioned at the May 2013 Christie's sales in Geneva.

There are several aspects that explain the appreciation for these sapphires in the market. Firstly, there is their apparent beauty (when we consider the stones of highest quality), composed of not only a vivid and well-saturated blue colour - poetically also described as cornflower blue – but also their slightly velvety appearance, which adds to the beauty of the colour of Kashmir sapphires. Secondly, there is a factor of rarity. The deposit near the village Sumjam on the southwestern slopes of the rugged Zanskar Range in Kashmir with its sapphires of high quality was only productive during a short period at the end of the 19th century (Mallet 1882, La Touche 1890, Atkinson & Kothavala 1983). Therefore, supply in the market is nowadays very limited (Hughes 1997). Take these two factors and add the often adventurous historical accounts of the discovery and mining of sapphires together with the descriptions of the Maharajas' fabulous gem collections from Kashmir, then you have the best ingredients to create high demand for this material in the market and a type of "luxury brand" for gem- and jewellery collectors.

Kashmir as a brand

Although Kashmir sapphires can be of truly exceptional quality and beauty, it has to be stressed that this "perfect image" of Kashmir sapphires is based on a rather small number of stones. As with any other gemstone deposit, we know that also this famed mining locality has produced a much larger amount of stones of lower quality. Therefore, the "origin label" Kashmir does not implicitly correspond to a high quality. It is the opinion of the author that it is still the apparent beauty of a stone that should remain the foremost criteria for valuation regardless of its origin.

However, it is a fact that new consumers, especially from emerging markets, are very much attracted to well-established brand names. Kashmir, along with a few other historic gem deposits (such as Burma for ruby and sapphire, and Colombia for emeralds, to name a few) have certainly become some sort of "brands" for consumers in the last few years. This is then reflected in the increase in price when well-documented stones from these sources are offered at auction or in the market, especially when supported by a report from a reputed laboratory.

Origin determination versus gambling

The Swiss Gemmological Institute SSEF has been at the forefront of origin determination of gemstones since nearly 40 years (Hänni 1990, Hänni 1994, Krzemnicki 2007). We have certified some of the most important Kashmir sapphires, including the "Star of Kashmir", which

will be auctioned at the upcoming Christie's sales in Geneva in May 2013. As origin determination has become such a price-sensitive issue for the trade today, we at the SSEF invest much time and effort to constantly update our scientific knowledge about these gems and to study all possible criteria for origin determination. There are two main fields of research. Firstly, the detailed characterisation of the Kashmir material itself. Secondly, by comparing Kashmir sapphires with material from other sources, such as Madagascar (Ilakaka, Andranondambo, Didy) or Sri Lanka (Elahera, Pelmadulla, Kataragama) to name but a few.

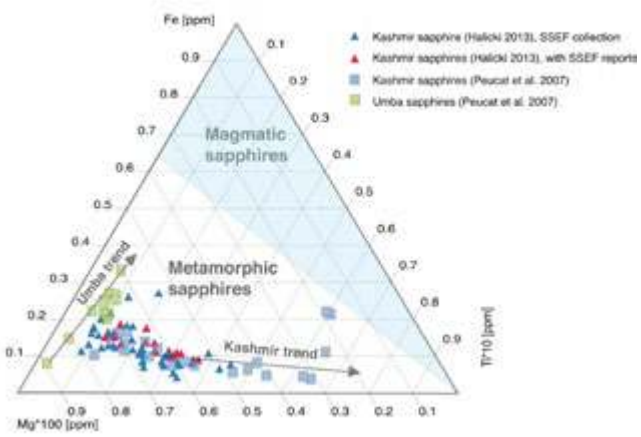
△ **Figure 2:** The Maharaja of Jammu and Kashmir, ca. 1900. © www.kashmirphotos.org/history.html

Even though many gem dealers have quite a good visual "feeling" to recognize Kashmir sapphires, it has to be said that many deposits produce sapphires of excellent quality which may resemble Kashmir sapphires in colour and velvety aspect. Thus, origin labelling based on these "soft" personal criteria is nowadays quite a gamble.

Inclusions in Kashmir sapphires

In the following, we present an insight into microscopic, spectroscopic and chemical criteria, which in combination, are used for origin determination of Kashmir sapphires at SSEF.

We can generally say that Kashmir sapphires are included. But, as many of these inclusions are very subtle and soft in appearance, they may even contribute to the visual beauty of these stones. The most marked feature is a distinct growth zoning, which usually results in a pattern of alternating transparent and slightly "milky" growth bands. These "milky" bands in fact contain numerous dispersed nanoparticles (Fe-Ti-oxides), which scatter the incoming light (Tyndall effect), thus resulting in a slightly bluish "sheen" adding to the blue colour produced by the colouring elements iron and titanium. This physical effect is in fact the same as when sunlight is scattered in the atmosphere, thus resulting in our blue sky. In minerals, this bluish sheen effect is better known from moonstones, where light is scattered on feldspar exsolutions and from blue quartz that contains asbestos-like fine tourmaline fibres.



△ **Figure 3:** Mg-Fe-Ti triplot showing the rather well-defined population field for Kashmir sapphires. For clarity reasons, the data of Sri Lankan, East-African and Madagascar sapphires have not been plotted. It has to be underlined that they do overlap the presented population field to some extent. Illustration adapted from Peucat et al. (2007) and Halicki (2013).

Apart from this, Kashmir sapphires may contain a large number of quite specific inclusions such as pargasite needles, short-prismatic dravite (tourmaline), corroded zircons, resorbed feldspars, and very fine patterns of crossing dust-tracks, dust clouds, and dust veils similar to the strokes of a brush (Gübelin & Koivula 1986, Hänni 1990, Krzemnicki & Halicki 2012). Although some of these inclusions are also known from sapphires from Sri Lanka or Madagascar, meticulous microscopic observations will show subtle differences in shape and clustering, thus providing valuable evidence for a formation outside of Kashmir. Even though microscopy is the most traditional approach for gemstone testing and origin determination, it is still nowadays one of the most powerful methods available. Inclusions are very sensitive markers for different geological settings, and in many aspects much more specific than some of the cutting-edge scientific methods (e.g. LAICPMS, UV-Vis, FTIR, EDXRF) that we have at hand today.

Chemical and spectroscopic properties

For sapphires, chemical trace element analysis (EDXRF, LAICPMS) will provide mostly supporting evidence for origin determination. In contrast to minerals such as beryl or tourmaline that have numerous structural sites of various sizes, corundum offers only restricted possibilities (most importantly a six-fold coordinated Al-site) for the incorporation of chemical impurities. This is mainly due to the dense crystal structure of corundum. From above, it is not astonishing that for emerald (variety of beryl) stemming from different geological settings, we know quite distinct chemical criteria for origin determination (e.g. V, Fe, Cr, Sc, Cs, Rb, Na, Mg), whereas in sapphires, the variability of possible trace elements is much more limited (due to size restrictions of the Al-site) and their concentrations are much more overlapping for stones from different sources (Peucat et al. 2007, Schwarz et al. 2008, Krzemnicki & Halicki 2012, Halicki 2013).

Nevertheless, we can say that Kashmir sapphires are generally characterised by low iron concentration and plot in a rather well-defined population field in the Mg-Ti-Fe triplot (see figure 3, adapted from Halicki 2013), as has already been stated by Peucat et al. (2007) and Schwarz et al. (2008).

Interestingly, the iron traces in sapphires from Kashmir is nearly fully ferrous (Fe^{2+}), with only very minor amounts of ferric iron (Fe^{3+}). This can be best observed in UV-Vis absorption spectra, where the peaks for Fe^{3+} at 450 nm and the doublet at 374 and 387 nm are nearly absent in Kashmir sapphires, compared to many other sources (see also Hänni 1994).

Raman spectra of inclusions are a further approach at SSEF to get valuable data for origin determination. For sapphires from Kashmir, there are several inclusions which are highly specific (pargasite, tourmaline, zircon), and which are analysed as a standard routine with our Raman system.

The Kashmir – Madagascar challenge

The supply of sapphires from new sources can be challenging, as they may strongly resemble the appearance of material from classic sources such as Kashmir. This is especially the case for sapphires from Madagascar, which may visually have a very similar velvety blue colour to that of material from Kashmir, and are thus sometimes mistakenly labelled as such in the trade. Other stones come with appropriate origin tags, but are further described as "Kashmir-type" on reports, a term which we at SSEF do not support, as we think it only causes confusion for the customer. Using this fancy term actually mixes two completely different concepts: 1) the geographical (and geological) origin of a material and 2) the perceived and subjective visual appearance.

Whenever we receive a sapphire for testing at SSEF, a first microscopic investigation is carried out to gather indications for possible origins as early as possible. Luckily, a comparison of internal characteristics between sapphires from Kashmir and similar looking sapphires from Madagascar often reveals subtle but nevertheless valuable differences. This is especially the case when comparing the arrangement of fine exsolution particles ("dust") in sapphires from these two sources. In sapphires from Madagascar these "dust" patches and tracks are quite distinct with a well-defined (rhombic) outline and (rhombohedral) arrangement, compared to a much looser and softer roundish pattern in Kashmir sapphires. Furthermore, in comparison to stones from Kashmir, Madagascar sapphires show much denser colour- and growth zoning that often dominates the stone along one direction.

The photos presented here should give an impression of the subtle differences in sapphires from these two origins. It also underlines the importance, still nowadays, of internal features for origin determination. However, one requires more than a simple loupe to be able to see and correctly describe these features. Interested readers are referred to our Advanced Training Course on Coloured Stones (4-8th November 2013), where such subtle internal features are presented and their relevance for origin determination are discussed in depth.

This article is an extended version of a lecture that was presented at the Seminar of the Gemmological Association of Hong Kong GAHK during the Jewellery Show in Hong Kong in June 2012 (see also SSEF website for a pdf download). ✶

REFERENCES

Atkinson D. & Kothavala R.Z. (1983) Kashmir sapphires. *Gems & Gemology, Vol. 19, No. 2, pp. 64-76*

Gübelin E.L. & Koivula J.I. (1986) Photoatlas of inclusions in gemstones. *ABC Edition, Zurich, pp. 342-343.*

Halicki P. (2013) Chemical characterisation of gem-quality sapphires from metamorphic and magmatic host rocks: LA-ICP-MS study. *Unpublished Master thesis, Mineralogical Institute of the University Basel, Switzerland.*

Hänni H. (1990) A contribution to the distinguishing characteristics of sapphire from Kashmir. *Journal of Gemmology, Vol. 22, No. 2, pp. 67-75.*

Hänni H. (1994) Origin determination of gemstones: Possibilities, restrictions and reliability. *Journal of Gemmology, Vol. 24, No. 3, pp. 139-148.*

Hughes R. (1997) Ruby and Sapphire. RWH Publishing, Boulder, CO.

Krzemnicki M.S. (2007) Origin determination of gemstones: Challenges and perspectives. *InColor, Winter Issue, pp. 6-11.*

Krzemnicki M.S. & Halicki P. (2012) Kashmir sapphires: Potential and limitations of origin determination by chemical fingerprinting with LA ICP mass spectrometry. *Presentation at the GAHK Seminar 23th June 2012, Hong Kong. Pdf file at: www.ssef.ch*

La Touche T.D. (1890) The sapphire mines of Kashmir. *Records of the Geological Survey of India, Vol. 23, pp. 59-69.*

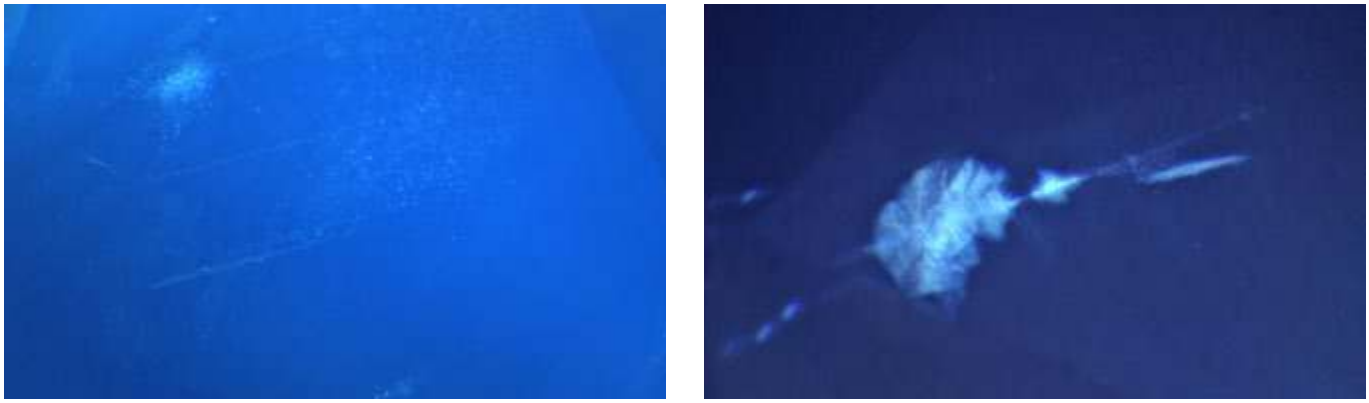
Mallett F.R. (1882) On sapphires recently discovered in the northwest Himalaya. *Records of the Geological Survey of India, Vol. 15, pp. 138-141.*

Peucat J.J., Ruffault P., Fritsch E., Bouhnik-Le Coz M., Simonet C., Lasnier B. (2007) Ga/Mg ratio as a new geochemical tool to differentiate magmatic from metamorphic blue sapphires. *Lithos, Vol. 98, pp. 261–274.*

Schwarz D., Pardieu V., Saul J.M., Schmetzer K., Laurs B.M., Giuliani G., Klemm L., Malsy A-K., Erel E., Hauzenberger C., Du Toit G., Fallick A.E., and Ohnenstetter D. (2008) Rubies and sapphires from Winza, Central Tanzania. *Gems & Gemology, Vol. 44, No. 4, pp. 322–347.*

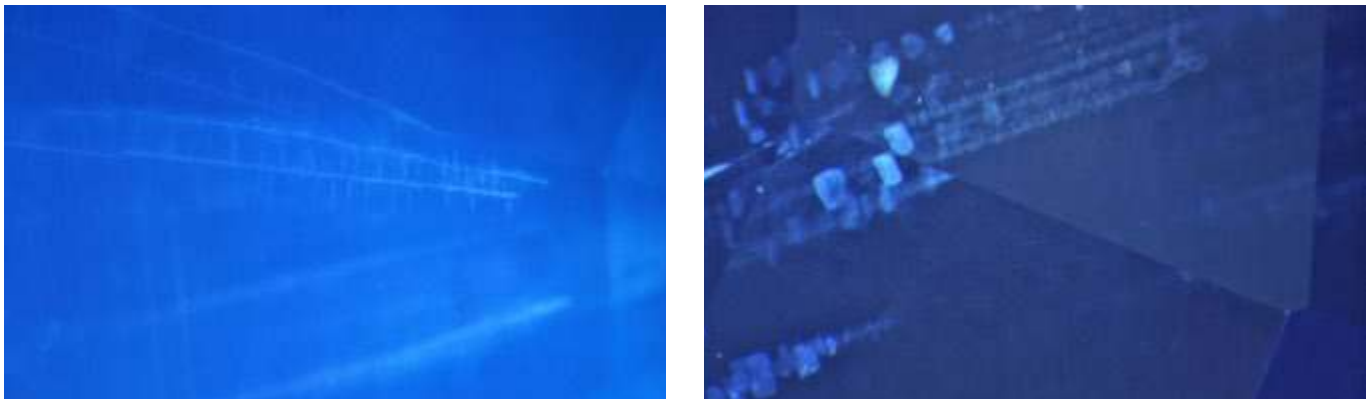
Deer W. A., Howie R.A., Zussman J. (1992) An introduction to the rock forming minerals. *Longman Scientific & Technical, 696 pages*

Comparison of internal features from Kashmir sapphires (left) and Madagascar sapphires (right).
Photos by M.S. Krzemnicki unless otherwise stated

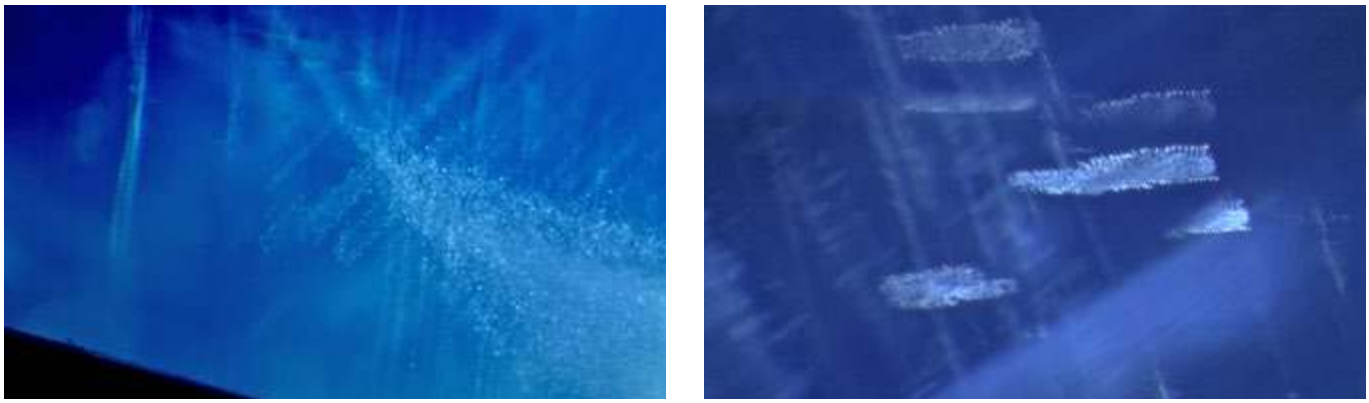


△ **Figure 4a**: Roundish loose patches of "dust" in Kashmir sapphires compared to well-defined rhombic patterns in Madagascar stones (left photo by H.A. Hänni, SSEF).

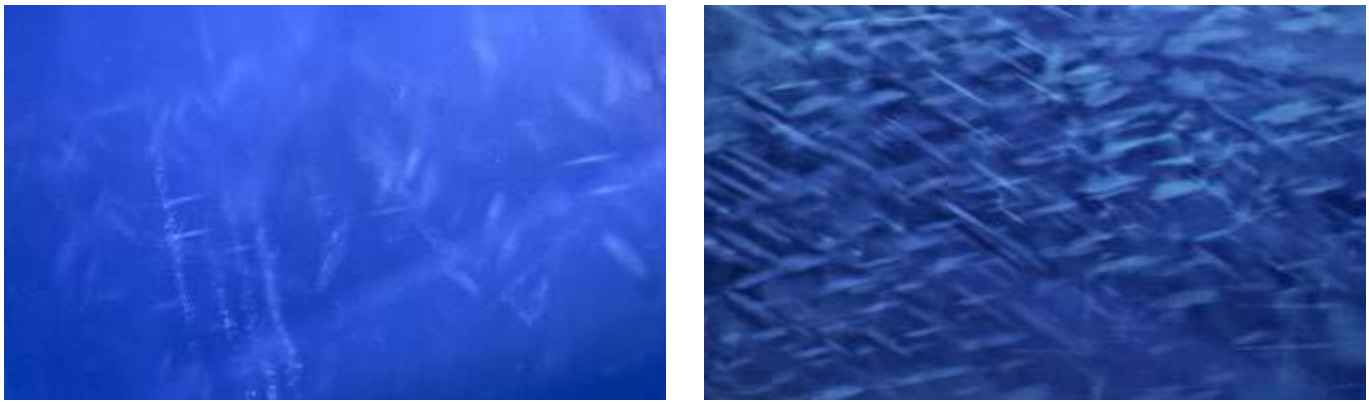
△ **Figure 4b**: Blocky "milky" zoning in Kashmir sapphire, compared to very dense zoning with a dark (nearly black) colour zone in a sapphire from Madagascar (left photo by H.A. Hänni, SSEF).



△ **Figure 4c**: Fine "dust" lines with brush-strokes in Kashmir sapphires compared to straight dust lines with defined patches in Madagascar stones (left photo by H.A. Hänni, SSEF).



△ **Figure 4d**: Crossing exsolution particles tracks and slightly curved dust lines in Kashmir sapphires compared to "millipede"-like structures and patches in Madagascar stones.



△ **Figure 4e**: Whereas the arrangement of these patches seems quite soft in Kashmir sapphires, it tends to be very much oriented along rhombohedral faces in stones from Madagascar (left photo by H.A. Hänni, SSEF).

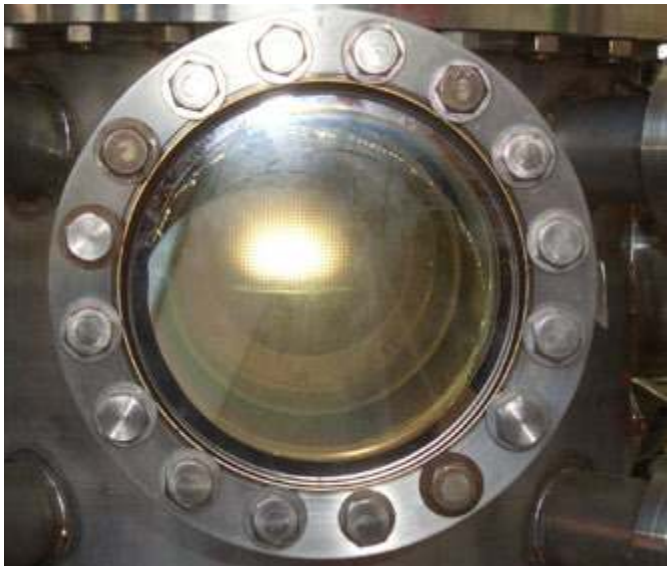
CVD SYNTHETIC DIAMONDS AND TESTING AT SSEF

Synthetic diamonds have been present in the gem trade for over two decades. Recent financial investments and advances in technology have now made them more affordable both in terms of price and availability. The SSEF has been following synthetic diamond developments very closely over the past few decades.

On the 18th of May, as most other major diamond grading laboratories, SSEF received a trade-alert from IGI - International Gemmological Institute. this gemmological alert pointed out that «... a few hundreds of CVD synthetic diamonds were submitted to IGI laboratories in Antwerp and Mumbai, with the clear aim to have these man-made diamonds certified as natural diamonds». This alert was followed by a review on the 21st of May by «DIB» (www.diamondintelligence.com) entitled: «Synthetics specifically 'made to defraud'».

CVD synthetic diamond growth

The first CVD synthetic diamonds were grown in the early 1950's in conjunction with the first HPHT synthetic diamonds. While this latter method involves high pressure and high temperature (HPHT), the chemical vapour deposition (CVD) technique does not require any high-pressure technology thus making it apparently easier to master. Paradoxically though, the first CVD synthetic diamonds reached the gem trade more than a decade after HPHT products. The reason for this is that originally deposited on a metallic substrate, these first CVD synthetic diamonds were polycrystalline and could therefore not be polished. Later, CVD synthetic diamonds could be grown on a diamond substrate and have now been found in the gem trade for more than a decade.



△ **Plasma in which a CVD synthetic diamond is growing inside a microwave reactor at CNRS laboratories (LIMHP). Photo: SSEF.**

The growth of a CVD synthetic diamond commonly takes place in a microwave reactor with a flux of hydrogen-doped carbon-rich gas. This gas is transformed into plasma that will deposit its carbon atoms layer-by- layer onto the surface of a diamond seed. After a few hours, the CVD layer formed at the surface of the seed is thick enough to be cut off and polished.

Unless doped by certain chemicals (e.g. B, N, etc.), CVD synthetic diamonds are of type IIa and ideally colourless. When the growth rate is chosen to privilege purity, then the resulting CVD crystals are brownish-grey. Only by a subsequent post HPHT treatment may they be transformed into colourless treated CVD synthetic diamonds.

Testing synthetic diamonds at SSEF

For more than a decade, SSEF has studied, published and reported on CVD synthetic diamonds (see e.g. Facette 2008). CVD synthetic diamonds show specific features using advanced analytical equipment. Unlike other laboratories, it is the SSEF's policy not to grade synthetic diamonds.

At SSEF, the methodology for screening CVD synthetic diamonds is part of the screening for all synthetic diamonds (CVD & HPHT, treated or not): (1) any diamond is checked for its type (type I vs. type II) by infrared spectrometry and (2) any type II diamond is checked for its low temperature photoluminescence properties enabling us to separate synthetic CVDs (treated or not), synthetic HPHTs (treated or not) and HPHT-treated natural diamonds.

For small diamonds submitted in lots of melees, SSEF and the Physics Department of Basel University have together developed, tested and validated an Automatized Spectral Diamond Inspection Machine that can routinely check 4000 stones per hour. This unique industrial machine will be available on the market later this year.

Conclusion

SSEF permanently checks for possible new synthetic diamonds. Aside from this recent CVD synthetic diamond alert, we have also been observing developments in HPHT technology. This includes the recent achievement of Sumitomo Electric to grow HPHT synthetic diamonds of extremely high quality. It has to be noted that these are presently only used for industrial applications.

Although the announcement of a large quantity of CVD synthetic diamonds shook the diamond trade, international diamond grading laboratories such as SSEF are careful observers of the situation. But, these synthetic diamonds do not present a new identification challenge.
✶ **J-P. Chalain.**

PASPALEY EXCURSION

End of July, Dr. Michael S. Krzemnicki had the opportunity to visit the Paspaley pearling operations along the northern coast of Australia. During five days, Michael and Peter Bracher from Paspaley showed him all the steps involved in pearling, starting from the collection of wild shells (Pinctada maxima) along the Eighty Miles Beach near Broome, to the grafting process, the pearl harvesting and finally the quality sorting/grading at their Darwin headquarters.

△ Sunrise at Kuri Bay (Kimberley), where the Paspaley pearl farming started some 40 years ago. The Mallard plane connects the Paspaley operations which nowadays are widespread along the coast from Darwin to Broome.

Unlike to many other cultured pearl producers who use shells grown in oyster spat hatcheries, the Paspaley production, at least partially, still relies on wild shell stocks. They are collected by shell divers following a strict quota system introduced by the Australian Government aimed at preserving the natural resources found in the coastal waters of northern Australia.

Being so close to production, it was very interesting for Dr. Krzemnicki to see how Paspaley – known globally for its white South Sea cultured pearls – has set up a highly specialised working procedure to manage its huge production.

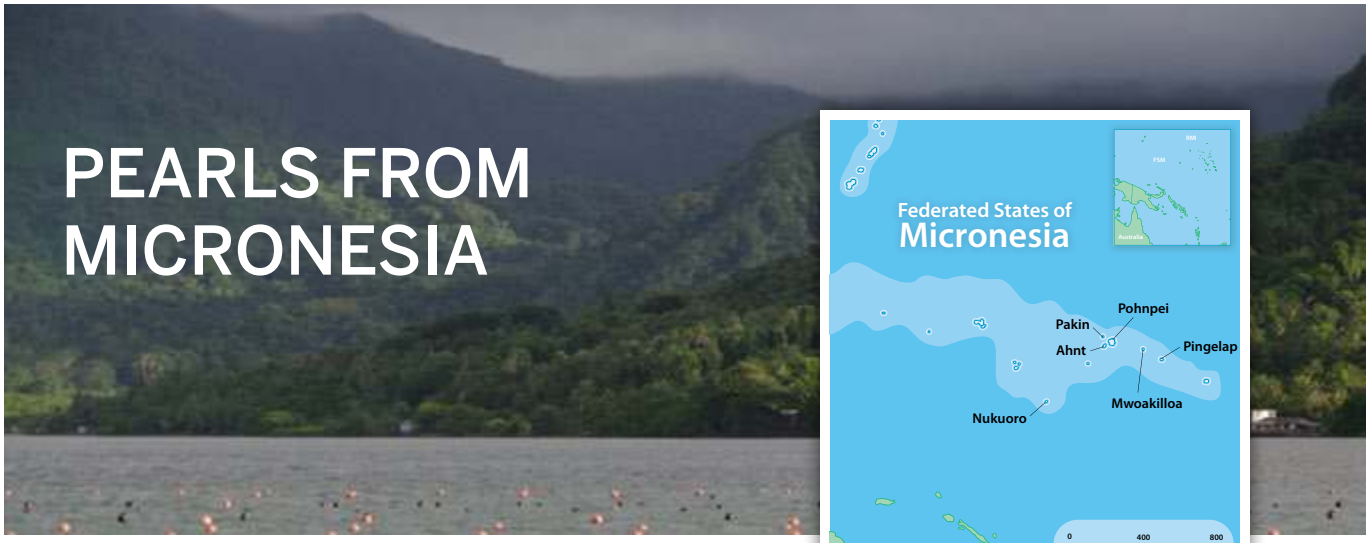
Apart from taking detailed notes and information about their pearl farming from Michael and Peter, it was also a great moment to share thoughts on pearl formation and pearl origin determination and to learn more about the fascination and enthusiasm of the Paspaley family for their business. In this regard, I would like to thank the Paspaley family for their generous hospitality and support.

A more detailed article on this Paspaley tour is in preparation for 2013.
✶ **Dr. M.S. Krzemnicki.**

△ Dr. Michael S. Krzemnicki harvesting two small natural pearls from a wild shell, just collected off shore of the Eighty Miles Beach.

△ Divers getting back to the Paspaley II near Eighty Miles Beach. They are collecting wild shell from the sandy ground, following a strict quota system to protect the natural resources.

PEARLS FROM MICRONESIA



△ Pearl farm on Pohnpei island, FSM. Photo: L. E. Cartier

△ Map of the Federated States of Micronesia (FSM). Map courtesy of Augustin Hiebel

Although Micronesian cultured pearls are only beginning to appear on the market, the pearl history of Micronesia is much older. Pinctada margaritifera oyster shells were already used and sold by local populations locally or to itinerant traders in the 18th and 19th century in the region. It is reported that in the 1800s German divers took 50 tonnes of oysters from Chuuk lagoon. The Japanese occupation of Micronesia (1914-1944) led to an increased interest in the valuable pearl oyster resource. Shells were fished and a trial cultured pearl farm was set up in nearby Palau. However, it is only in 1987 that serious efforts to develop a cultured pearl farming industry in the Federated States of Micronesia (FSM) began.

Although production in FSM is currently limited, it is set to expand in the near future. The farms were projected to yield 6,500 cultured blister pearls and 2,000 loose bead-cultured pearls in 2012. The pearls in FSM are produced by the same oyster (Pinctada margaritifera) as in French Polynesia and Fiji, and these different geographic origins cannot be distinguished using gemmological methods. The range in colours is similar to Tahitian cultured pearls. However, the emphasis has been put on trying to produce and market pearls of blue colours so that the country can offer a niche product to the international market.

At present, the cultivation of pearl oysters takes place on six of FSM's 607 islands: Mwoakilloa, Nukuoro, Pakin, Pingelap, Pohnpei and Pweniou. At present, the most promising efforts are around a project at the College of Micronesia, which supplies hatchery-produced juvenile oysters and technical assistance to demonstration pearl farming operations on Pakin, Pingelap and Pweniou islands.

In recent decades, a number of developing Pacific countries – through government-funded and private projects- have attempted to emulate the successes of French Polynesian in farming pearl oysters and producing Tahitian cultured pearls. FSM is an ideal candidate for pearl farming projects because it has similar ecological conditions to the islands of French Polynesia and the country hopes to find economic development opportunities through high-value cultured pearls.

Unlike in French Polynesia where the industry relies on the collection of wild juvenile oysters, the emerging FSM pearl sector relies on hatchery production of oysters. At age 42 - 46 days, the baby oysters can be transferred from the hatchery tanks into baskets that are taken out to the lagoon. These oysters are nursed until their shell size is deemed sufficient (ca. 10 - 12 cm in diameter), so that the oyster can be grafted and seeded to induce the formation of a cultured pearl. The oysters require regular care; biofouling -the settling and growth of animals and plants on the oysters- must be removed in 1 - 2 month intervals to ensure the good health and growth of pearl oysters.

An oyster is dependent on a healthy environment. The healthier the oyster, the lower the probability of disease, mortality or complications and the higher the probability of harvesting high-quality cultured pearls. Whereas the donor oyster is chosen for the quality of its mantle, which is subsequently sacrificed, the host oyster is chosen for its vigour and healthiness. Typically, the first generation operation is carried out to induce the production of a loose cultured pearl. In FSM, mabé (half-pearls) cultured pearls are sought in older generations of pearl oysters, when oysters can be re-grafted following the harvest of a first or second generation. A number of FSM locals are currently being trained in grafting and the aim is that by 2013 they can meet the requirements of a

△ Micronesian cultured pearls from Pinctada margaritifera come in a range of colours and shapes. Photo: M. S. Krzemnicki

nascent FSM cultured pearl industry. Rarely before has a donor-funded project reached a stage of creating highly skilled half- pearl grafting technicians from local communities, who have pearl farming and pearl grading skills and are capable of training other local people.

A number of studies have been carried out at the College of Micronesia on understanding circled pearl formation. If formation mechanisms of circled pearls can be better understood, practices can be adapted to favour the formation of more valuable cultured pearl shapes and surface conditions. There is a surprising lack of collaboration between gemmologists, scientists researching biomineralisation and those working on oyster genetics. And yet all these subjects are linked. Greater synergy between such research projects would certainly increase knowledge about how to further improve cultured pearl production and quality.

In Micronesia, loose cultured pearls and mabé products are harvested a number of times a year, depending on the work cycles and location. Mabé products are crafted into jewellery by trained locals and have, up to now, been sold on the local market. Two charity sales in Pohnpei led to sales of $6,000 and $13,500 in 2010. However, if the sector is to grow it must look beyond the local market to sell its products, for example to expand marketing to nearby Guam that is an important tourism destination. The local market in FSM is about $100,000 per year and the country is not a major tourist destination (20,000 tourists in 2010).

For FSM cultured pearls to become viable an emphasis is being placed on maximizing revenue from the pearl oyster resource, producing and marketing only high-quality cultured pearls and adopting a clear market differentiation strategy. Different marketing strategies are currently being examined to avoid the failures of numerous donor-funded projects set up in the past three decades in different Pacific countries that sought to promote community-based pearl farming.

Although not yet for free sale on the international market, Micronesian pearls are being sold at charity sales and being used in two Japanese jewellery collections at present. They are marketed as "Micronesian Blue" pearls. They are also being marketed as 'development' pearls, because of their contribution to community development and marine conservation on different islands of FSM. Through the careful selection of suitable brood stock, "Micronesian Blue" cultured pearls may become a high-value niche product on the international market. With an emphasis on quality and limited production, the FSM pearl sector has a chance of economic success without foreign aid.

This is a summary of the article in the Summer 2012 issue of Gems & Gemology by Laurent E. Cartier, Masahiro Ito and Michael S. Krzemnicki. ✶

◁ **Especially blue colours of Micronesian cultured pearls are being produced and put on the market. Photo courtesy of Natsuko Shiraki, Hasuna Co. Ltd., Tokyo**

△ **Regular cleaning of oysters, as shown here on Pakin Island, is vital to maintaining their health. This step also creates jobs for local villagers. Photo by L. E. Cartier.**

HISTORICAL PAIR OF NATURAL PEARLS SOLD AT AUCTION IN UK

The SSEF -as the leading pearl testing laboratory worldwide– regularly receives important and outstanding pearls for testing. Many of them are then sold for record-breaking prices at auction, as for example the Peregrina Pearl, which was tested and sold in 2011.

Among the important natural pearls we analysed and certified in 2012, a perfectly matching pair of large drop-shaped pearls (34 and 33 ct respectively) of outstanding quality stood out. They were sold together with an SSEF report and appendix letter at a Woolley & Wallis auction in Salisbury at the end of April for £ 1.4 million.

Apart from their beauty, it was the background "history of these pearls" which caught the interest of the public. Described as being a gift from the former Crown Prince Carol (later King Carol II) of Romania to his mistress, Elena 'Magda' Lupescu (c.1895-1977) in the early 1920s, they were later given by Elena upon her death to an English lady who served her through the last years of her life. The pearls were later inherited by her nephew and his wife. But being too large and not in the style of that time, they remained locked in a drawer for more than three decades. Not astonishingly, this story, blending best royal provenance with treasure hunting and unexpected wealth was covered by all major British media at large. ✶

△ **The pair of natural pearls sold at auction in April 2012. Photo courtesy of Wooley & Wallis**

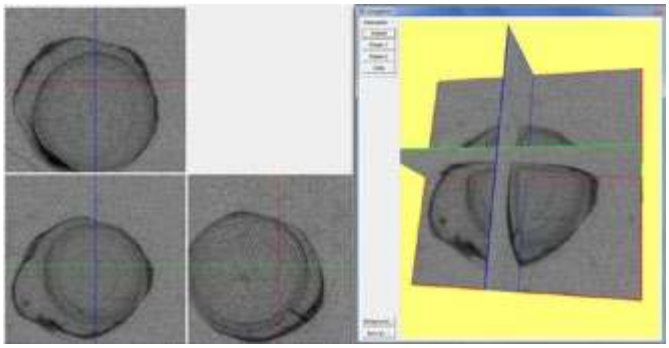
FISH HEAD PEARL

We recently received an outstanding pearl brooch for testing. A hollow natural pearl had been carefully designed as the head of a mystic fish. With its astute smile and the two red glowing ruby eyes, it is a perfect example combining a large and somehow baroque-shaped hollow pearl (so-called soufflure) with an artistic jewellery design. ✶

◁ **A hollow natural saltwater pearl brooch courtesy of the Faerber Collection, Geneva.**

X-RAY COMPUTED MICRO-TOMOGRAPHY AT SSEF

△ Our Scanco µCT 40 Scanner at work: The blue "box" is the actual scanner with some sample holders on top, and right to it is the screen of the computer. This computer is a HP workstation running the reliable VMS-operating system, that allows for very comfortable batch job handling.



△ Example of a CT-scanned natural pearl shown as a 3D-picture, within a tool where grey-values can be modified for greater contrast. The interior of the pearl can be visualized in three planes (XY, XZ, YZ) and the whole object can be rotated into the best position for the observation of a specific feature.

For the last few years SSEF has seen increased demand for analysis of pearls. This is not astonishing. On the one hand, the supply of natural pearls that grow or were grown without any human intervention is limited. On the other hand, the process of culturing pearls is getting more and more sophisticated such that the end products are sometimes very hard to distinguish from their truly natural counterparts. For a gemmological laboratory it is therefore absolutely essential to have equipment that can resolve any ambiguities in the field of pearl origin (not in the geographical sense) as the price differences between these categories are substantial.

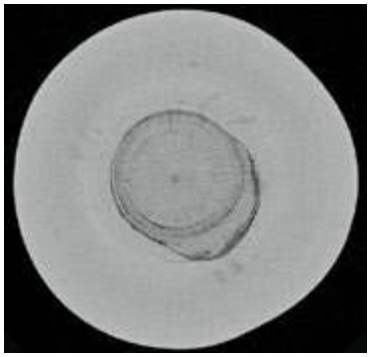
It is well known that pearl analysis is mainly based on two-dimensional X-ray radiographies, where growth-structures can be made visible and a separation of cultured from natural pearls is in many cases possible. These radiographies are two-dimensional projections and this alone may lead to ambiguities in their interpretation, as the position of a certain feature cannot be attributed to a certain depth along the projection path. To eliminate this ambiguity X-ray computed micro-tomography (µ-CT) was proposed as a method in 2009 by several authors, and was integrated that same year into our SSEF pearl testing procedures (Krzemnicki et al. 2010). Digital geometry processing is used to generate a three-dimensional image of the inside of an object on the basis of a large series of two-dimensional X-ray images taken around a single axis of rotation. SSEF has closely followed these developments in technology and applied them to the testing of pearls when ambiguous growth structurest were seen in radiographies. Our tomography service comes at an additional cost but is well appreciated by our customers.

After having tested a number of instruments from different producers, we have decided to collaborate with Scanco Medical AG (www.scanco.ch), a Swiss high-tech company which not only provided us with a state-of the art instrument, but also with very scientific and professional support. Founded in 1988 as a spin-off of the Swiss Federal Institute of Technology (ETH) in Zurich, their systems integrate high-quality imaging with powerful 3D analysis tools, which perfectly meets our requirements for pearl analysis.

We are proud to have added their Specimen µ-CT 40 scanner, pictured in Figure 1 to our lab. Some of its characteristics:

• X-ray source	Sealed, air-cooled: 30-70 kVp/20-50 keV (160 µA)
• detector	2048 x 256 elements, 24 µm pitch
• resolution	3 - 72 µm nominal isotropic (pixel size)
• image matrix	512 x 512 to 4096 x 4096 pix
• max. specimen size	36.9 x 80 mm (ØxL)

For ease and consistency, methods (so called profiles) have been developed for medium and high resolution CT-scans and for different pearl sizes. Our gemmologists commonly work with short movies generated from the virtual tomographic slices in the three independent planes (XY, XZ, YZ). In these movies, they can dynamically check any suspicious three-dimensional feature, indicating either natural formation or a possible human intervention in the pearl-growing process. ✶ **Dr. F. Herzog & Dr. M.S. Krzemnicki.**



◁ A high-resolution µ-tomographical slice of the above described natural pearl (Pinctada radiata) showing a distinct roundish central part with radial texture (calcite columns wrapped by organic matter) surrounded by a thick aragonite layer (nacre) with few drying fissures and very fine onion-like ring structures.

REFERENCES

Krzemnicki M.S., Friess S.D., Chalus P., Hänni H.A., Karampelas S. (2010) X-ray computed microtomography: Distinguishing natural pearls from beaded and non-beaded cultured pearls. *Gems & Gemology Vol. 46, No. 2, 128-134.*

RADIOCARBON AGE DATING OF PEARLS

Apart from constantly updating our equipment for our scientific pearl testing procedure, we also invest much effort evaluating new scientific approaches for pearl characterisation and testing.

In this context, we started a research project a few years ago in collaboration with Dr. Irka Hajdas (ETH Zurich) to investigate the possibilities of radiocarbon age dating of pearls. This method uses naturally occurring isotope ^{14}C to determine the age of carbonaceous materials up to 60'000 years.

Last year saw some interesting developments, as we were able to analyse a batch of pearls that spanned from the 18th century to today. The results of this research were presented by M.S. Krzemnicki at the 21st International Radiocarbon Conference, held in the prestigious UNESCO building in Paris (9-13th July 2012).

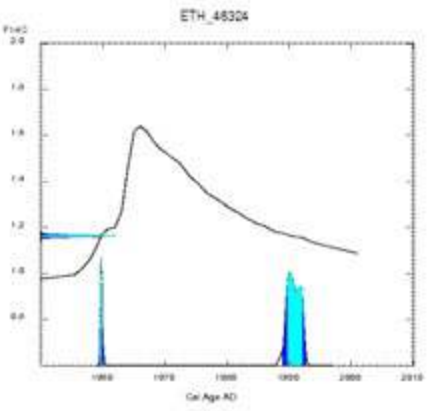
△ **La Peregrina pearl, a historic natural pearl found in the 16th century and which has been depicted on several historic paintings (inset: painting by Hans Eworth (ca. 1520-1574) of Queen Mary I of England and Ireland, wearing a pendant with the La Peregrina pearl). This pearl was not tested using radiocarbon age dating, but we hope to be able to date historic pearls in future.**

Pearls - being calcium carbonate ($CaCO_3$) concretions formed by biomineralization in molluscs - contain traces of radiogenic ^{14}C. Similar to age dating of bones or tissues or other artefacts, a tiny amount of pearl nacre (ca. 8 mg) was scratched/peeled off from the surface of the pearls and investigated using the ultra-sensitive Accelerator Mass Spectrometry (AMS) technique at the Laboratory of Ion Beam Physics, Swiss Federal Institute of Technology (ETH Zurich) in Zurich. A general problem of our data is that marine reservoir ages may strongly affect the resulting radiocarbon ages of shells, and consequently also pearls, especially in areas with upwelling of "old" seawater. As could be shown, it is usually not possible to gain a reasonable radiocarbon age for freshwater pearls (and shells). This is due to the incorporation of sedimentary limestone into the biomineralized calcium carbonate (so-called "hard-water effect"), which then may strongly affect the resulting data (Bezzerra et al. 2000). However, for suspension-feeding saltwater molluscs (e.g. oysters), such as our studied samples from Pinctada maxima and Pinctada radiata, which live in coastal marine habitats with known upwelling and carbon isotope ratios, the analyses should result in more or less reliable radiocarbon ages (Taylor & Slota 1979, Bezzerra et al. 2000, Rick et al. 2005).

The most important feature for pearl age testing is the so-called bomb peak calibration curve, a major and sudden increase in ^{14}C ratio around 1965, followed by an exponential decreasing tail, as a consequence of the atmospheric nuclear bomb testing in the 50s and 60s of the 20th century. By superposing the bomb peak to the progress of the cultured pearl industry, we were able to separate our saltwater pearl samples into two main categories: pearls which are distinctly older than the bomb peak (before 20th century), and which therefore are most likely to be natural pearls, and pearls whose age is close to or later than the bomb peak. Pearls from the second category are either natural or cultured. Finally, an identification of the nature (natural vs. cultured) of these pearls is still based on the "classical" approach using radiography and µ-tomography.

Based on these promising results, a further study with more pearls is planned for the near future. Although there are many factors which may influence radiocarbon data of pearls and which are not well understood so far, it will be of strong interest for us to study further well-documented pearls of historic or recent age. This will give us a better picture about possibilities and restrictions of this method. Though this is so far not intended as a commercial service fo our clients, we will inform our members as soon as such a testing service is feasible.

Any reader who would like to contribute to this research by supplying well-documented pearls is highly welcome to contact Dr. Michael S. Krzemnicki at SSEF. An article about our findings has been submitted to the Radiocarbon Journal and will be published soon. ✶



◁ **The ^{14}C intercept with the bomb-peak of Pinctada maxima (Palawan, Philippines) sample which was collected by H.A. Hänni (SSEF) in the early 1990s. The intercept fits well with a two-sigma probability of 88% to the declared age in the interval 1989-1992.**

ACKNOWLEDGEMENTS

The authors would like to thank the following persons for donations and loans: Thomas Faerber (Faerber Collection, Geneva), José Casares (Shanghai Gems, Geneva), Henry A. Hänni (GemExpert, Basel), Jeremy Norris (Oasis Pearl, Albion CA, USA), Imura Daiji & Abdulla Rashed Al-Suwaidi (RAK Pearls, Ras-Al-Khaimah, UAE), Dr. A. Puschnig from the Natural History Museum (Basel, Switzerland).

KESHI CULTURED PEARLS STILL IN THE MARKET

Beadless cultured pearls, also known as „Keshi“ cultured pearls in the trade, are still regularly found among the pearls sent to SSEF for testing. After a first wave of such pearls entering the market (see SSEF trade alert in May 2010) these cultured pearls are now found mostly in necklaces mixed with natural pearls or mounted in antique jewellery settings, attempting to resemble a historic and „natural“ age. As in 2010, these beadless cultured pearls are mostly from Pinctada maxima and margaritifera, and come in white to yellow and grey colours.

We test all pearls using latest technology for pearl identification and combine this with our experience and research background. The SSEF is facing this challenge with utmost care but also with confidence in identifying these cultured pearls and as such protecting the trade in natural pearls. ✶

△ An important part of these pearls are beadless cultured pearls (“keshi”) from Pinctada maxima (gold-lipped pearl oyster), mixed with few natural pearls from Pinctada radiata and small seed pearls. © SSEF

△ Beadless cultured pearl (“Keshi”) from Pinctada maxima (silver-lipped pearl oyster) set as a pendant in art deco-style. © SSEF

STRANGE MUSHROOM PEARL

In 2012, we again received a number of pearls with strange shapes for testing. The most extravagant and intriguing of these curiosities of nature was a non-nacreous brownish natural pearl from a marine mollusc, which closely resembled a mushroom (see photos). The pearl showed some flame structures, as it is known from various gastropods such as Melo Melo, Strombus Gigas (Queen Conch), Cassis Cornuta, and clams (Tridacna). X-ray microtomography analysis showed a complex structure of growth layers surrounding a central cavity, rather uncommon for such non-nacreous natural pearls. ✶

◁ The studied non-nacreous natural pearl.

△ This non-nacreous natural pearl resembled a mushroom.

CORRODED PEARLS

Although pearls, as organic gems, are commonly less stable than polished gemstones, we don't often see pearls with obvious features of surface damage as a result of unfortunate care.

A few months ago, however, we received for testing a very spectacular case of such damage. The item was a pearl tiara, containing numerous natural and cultured pearls with heavily corroded surfaces. Based on the position of these corroded pearls on the tiara, the best explanation is that this damage was the result of careless use of hairspray, most probably used to fix the tiara on an extravagant hairstyle. Especially the propellant gas found in such sprays may be very effective in dissolving calcium carbonate. Unfortunately, due to the careless and excessive use of such a hairspray, the said pearls have now lost considerable lustre and surface smoothness, and thus also value. ✶

▽ **A close-up of the effects of corrosion on these pearls.**

△ **Hairsprays, for example, can have unfortunate effects on the surface of organic gems as seen here on a pearl tiara.**

BLUE CO-BEARING ZIRCONIA SOLD AS SAPPHIRE

Cubic zirconia (also known as CZ) is an artificial zirconium oxide, produced by the so-called induction skull melting process. By this, the starting zirconium oxide powder is heated and molten up by radio-frequency induction using a coil wrapped around the system. To crystallize in a cubic structural lattice, magnesium, calcium (e.g. so called "djevalite" from Djeva SA, Switzerland) or yttrium is added. The use of CZ is widespread and especially colourless "zirconia" is produced in large quantities as diamond imitations (e.g. Swarovski). By adding further colouring elements, it is possible to produce CZ in all colours.

Recently, the Swiss Gemmological Institute SSEF received an attractive blue stone set in a ring for testing. Although sold as a sapphire to our client, the look of the stone, i.e. the high lustre and brilliance, together with the „too good to be true„ vivid blue colour made this a very doubtful case and made further testing necessary. The results of our testing made it evident, that in fact the stone was blue CZ and not sapphire. The stone showed a characteristic UV-Vis spectrum, with distinct absorption lines well-known for yttrium (rare earth element) in cubic zirconia. Energy-dispersive X-ray fluorescence analyses (EDXRF) revealed a significant amount of cobalt, apart from yttrium and zirconium as main elements, thus explaining the colour of our specimen (see also Nassau 1981).

We have seen cubic zirconia in a wide range of colours over the years, but this is the most saturated and attractive blue colour variety yet. ✶ **Dr. M.S. Krzemnicki.**

COLOUR-CHANGING ZIRCON

After studying and describing colour-changing bastnäsite in the last Facette (Herzog 2011 & Herzog 2012), we have this year focussed research on colour-changing zircon from Burma in collaboration with Mr. O. Waldis, who kindly lent us a number of samples for this study.

Colour changing zircon from Burma is known since some years in the market, in rather small quantities. These zircons show a colour change from greyish blue to slightly purplish blue in daylight, and green to greyish green in incandescent light. This colour change was already described by Bosshart & Balmer (2006).

△ **Two impressive zircons from Burma (56 and 13 ct) show a colour change from greyish blue to slightly purplish blue in daylight to green and greyish green in incandescent light. Their colour change is the result of a heating process.**

UV-Vis absorption spectra and chemical analysis (ED-XRF and LAICPMS) have shown that this attractive effect is due to the presence of rare earth elements (REE). In the studied zircons, we see a distinct enrichment of cerium and heavy REEs (HREE), i.e. erbium, thulium, ytterbium and lutetium, when compared to green and blue zircons with no colour change from Tanzania and Cambodia, respectively.

Due to the complex nature of REE absorption bands, it is presently not possible to identify the bands in detail, because complex interactions with metal ions may also play an important role (Bosshart & Balmer 2006).

However, as could be shown with our specimens, this colour change effect is only visible after a heat treatment process, using rather unattractive brownish green starting material. Having access to samples before and after heating, we could demonstrate the effect the oxidising heating has on the absorption spectrum and consequently results in a colour change. As further evidence of such heating, we could observe minute disc-like expansion cracks and partly dissolved inclusion features, commonly known from heat-treated stones such as corundum, chrysoberyl, and demantoid.

A more detailed article on this topic will be published in the next few months in an international gemmological journal.
✶ **Dr. M.S. Krzemnicki.**

△ **Two fragments split from one brownish green zircon from Burma before (left) and after (right) heating.**

TOURMALINES FROM PEGMATITES

We would like to congratulate Ms. Valerie de Sanctis for the completion of her Master thesis on tourmalines from pegmatites from Brazil and Namibia. She studied at the Mineralogical Department of the University Geneva under the supervision of Dr Susanne Schmidt, and in collaboration with the Swiss Gemmological Institute SSEF. Regarding this research project, the SSEF would also like to thank Mr. Mikola Kukharuk (www.gemsbynomads.com), who has donated a great number of tourmaline samples to the SSEF and for this research project. ✶

PARAIBA TOURMALINE INTERGROWN WITH LEPIDOLITE MICA

△ Necklace with thirty-three polished beads, sold as Paraiba-tourmaline proved to be a complex intergrowth of Paraiba-tourmaline with lepidolite. About a third of the beads were identified as lepidolite only, showing purple colour and rather dull lustre. © M.S. Krzemnicki, SSEF.

The Swiss Gemmological Institute SSEF recently received a necklace for testing that consisted of thirty-three slightly polished light blue to greenish blue and purple beads. It had originally been sold as Paraiba tourmaline to our client. The beads were all cut to resemble the typical shape of prismatic tourmalines with a slightly triangular curved outline simulating a series of prism faces. A comparison with our reference samples and literature showed that low-quality material of similar colours is well-known from Paraiba in Brazil, and is generally sold as Paraiba tourmaline. However, our client got suspicious, as she noticed a distinct difference in hardness and toughness of some of these beads and decided to have them tested at the SSEF.

Careful visual observation revealed that the purple beads showed mostly a dull lustre compared to the vitreous lustre known for tourmaline. Furthermore, part of these purple beads showed crushed and pressed edges, as would be expected for materials much softer than tourmaline. Whereas the blue beads were easily identified as Paraiba tourmaline by refractive index, EDXRF and Raman analysis, the purple part of the beads were found to be lepidolite, a lithium bearing mica (phyllosilicate). Raman analyses, in fact, showed that the dull purple beads consisted entirely of polycrystalline lepidolite, whereas a number of blue beads with purple zones were actually intergrowths of Paraiba tourmaline with lepidolite. This mica is a common late retrograde replacement of Li-bearing minerals such as Paraiba tourmaline (elbaite) in pegmatites.

To conclude, the described necklace actually represents a mix of Paraiba tourmaline and lepidolite (mica), partially intensely intergrown, and should also be accordingly sold as such. Selling this item as just a Paraiba tourmaline necklace is not appropriate.

See also the publication about this topic in the latest issue of the Journal of the Gemmological Association of Hong Kong GAHK, pages 56-58.
✶ **Dr. M.S. Krzemnicki.**

DYED ETHIOPIAN OPAL

The recent finding of a huge deposit of opal in Wollo (Ethiopia) has brought large quantities of this attractive gem into the market (Rondeau et al. 2010). Characteristic for these opals is their hydrophane nature, which is their ability to absorb and resorb water or any other liquid on the basis of their microporosity. This hydrophane property is very marked and has various consequences. Firstly, it is impossible to precisely determine the weight of such opal, as its weight may change just due to different atmospheric humidity conditions. In the case of immersing an opal in a liquid (e.g. for SG measurements), this intake of water can be quite important, resulting in a slow and steady release of water. From this, it is evident that dyeing of such opals with coloured liquids is very easy, although the stability of the treatment is rather doubtful. In some cases, even an unwanted "treatment" may occur if such opal comes into contact with dyed sweaters...

As similar treatments have been known since many years for opals, it has also been recently applied in large quantities to this material. In 2012, the SSEF received several specimens for testing and as donations (kindly donated by A. Leuenberger, Switzerland), including black treated opal and pink treated opal. The black treated opal shows distinct small black patches, well-known for samples which have been modified by a "smoke treatment" (Williams & Williams 2011). The pink-violet treated opal has been recently described by Renfro & McClure (2011). Similar to our samples, their material was said to come from a new source in Mexico, but was in fact just dyed opal from Wollo, Ethiopia.

We are convinced that more of this material will enter the market in future, and if dyed with more natural looking colours (e.g. orange to mimic Mexican fire opal), may be more challenging to detect. ✶

△ Some examples of dyed opal.

EXCEPTIONAL STRAND OF CHRYSOPRASE

The SSEF recently received an outstanding strand of green chrysoprase for testing. Chalcedony, the cryptocrystalline variety of quartz, is coloured green naturally by nanosize aggregates of nickel-bearing phyllosilicates, that occur predominantly around silica (sub)grains (Sachanbinski et al. 2001, Sojka et al. 2004). With addition of Fe^{3+}, the colour shifts slightly to yellowish green, whereas the bluish hues are the result of light scattering in the chalcedony matrix (Sachanbinski et al. 2001), an effect which is also responsible for the blue colour of our atmosphere.

The studied strand was composed of 61 slightly graduated chrysoprase beads that were outstanding in their matching soft green colour, combined with an outstanding homogeneity in texture. Only minute botryoidal structures of chalcedony could be observed, and no artificial colour concentrations along microfissures or within the drill-holes were seen. Chemical analyses confirmed the natural colouration with significant Ni concentration, and only minor Fe. Chromium, which is characteristic for artificially coloured green chalcedony (stained by Cr-salts), but also as a colouring element for naturally green chalcedony e.g. from Turkey (Lule-Wipp, 2006), Australia (Willing & Stocklmayer, 2003) or Zimbabwe ("Mtorolite": Phillips & Brown, 1989) was not detected in these beads. ✶

▷ The described chrysoprase beads together with samples from Ząbkowice Śląskie, Poland (left) and Marlborough, Rockhampton in Queensland, Australia (right).

SSEF COURSES
in 2013

2012 was a busy year for the SSEF Education Department. Our courses have a high international reputation and we see more and more gemmologists, jewellers and gemstone professionals from very different countries attending our courses. It's interesting to have participants from so many different gemmological and international backgrounds.

The course calendar for 2013 is now set. The SSEF Basic Training Course (3 June - 18 June) and the SSEF Basic Diamond Course (21 - 25 October) offer good introductions, and participants can graduate with a diploma after taking theoretical and practical examinations. For more in-depth courses we offer Advanced Training Courses on coloured gemstones (4 - 8 November), pearls (18 - 20 March and 25 - 27 November) and small diamonds (25 - 27 March and 11 - 13 November). SSEF remains the only institution that offers training for laboratory gemmologists with its Scientific Gemmology Course (11 - 15 February and 3 - 7 February 2014) and Scientific Diamond Course (27 – 31 January 2014). This is an opportunity for advanced gemmologists to learn how to use sophisticated gemstone testing methods. The participants (not more than 4) learn, during the week of this applied course, how spectrometry (FTIR, UV-Vis-NIR, Raman, EDXRF, LIBS) and methods such as SEM, X-ray luminescence, and X-ray radiography can be used for gemstone identification, treatment detection and origin determination.

Pearl Courses

This three day pearl course takes place twice a year (18 - 20 March and 25 - 27 November). It is ideally suited for participants (max. 6) who want to know more about how pearls are formed, about possible treatments, and how natural and cultured pearls can be identified and separated. SSEF's important collection of shells and pearls offer a good opportunity for practising and expanding your skills and knowledge of pearls. The course also offers an introduction into the use of UV-visible spectrometry, EDXRF, X-ray radiography and luminescence for pearl testing in a scientific laboratory.

Small Diamond Courses

The SSEF small diamond course, which focuses on diamonds of a diameter between 0.7 and 4 mm, mainly used in the watch industry, enables participants to themselves perform the quality control of such small diamonds. These courses are aimed at people working in the jewellery and watch industry, and can be tailored to your company's specific needs. Previous gemmological experience is welcome but not a requirement.

Scientific Gemmology Courses

In 2013, the one-week Scientific Gemmological course will take place 11 - 15 February and early 2014 from 03 - 07 February. During this course, participants learn about techniques and applications of instruments like X-Ray fluorescence spectrometry, UV-Visible-NIR spectroscopy, LIBS (Laser Induced Breakdown Spectroscopy), Raman and FTIR spectrometry in the field of gemmology, as performed at the SSEF Swiss Gemmological Institute. Advanced gemmological education is a requirement.

Scientific Diamond Courses

The one-week SSEF Scientific Diamond Course (SDC) brings participants to the forefront of synthetic diamond and treatment identification. Modern analytical equipment is demonstrated and the participants practice the various techniques themselves on interesting samples. The studied methods include infrared spectroscopy (FTIR), absorption spectroscopy in visible and ultraviolet (UV-Vis) at low temperature (-120°C), and photoluminescence spectroscopy (PL) at low temperature. In 2013, this expert course will take place from 6 - 10 July with a maximum of 4 participants. They will receive the course manual that contains numerous spectra and also two valuable tables, which summarise the "Defect Induced Vibrational Bands" and the "Optical Bands". A list of reference books is also given.

SSEF "à la carte" Courses

The SSEF Swiss Gemmological Institute can personalise a course based on your or your company's specific requirements. This course format is especially suited for companies that need specific gemmological training for their employees. In 2012, several companies and authorities, such as Cartier, Chanel, Piaget, Sothebys and the Hong Kong watch industry benefited from such courses that were tailored to specific topics such as small diamond quality control, diamond treatments or learning to identify coloured gemstones from different origins.

If you or your company are interested, please contact us to discuss how a gemmological course can be tailored to your needs. ✶

CONGRATULATIONS

SSEF Swiss Gemmological Institute wants to express its congratulations to the following persons for graduating from the following courses:

SSEF Basic Gemmologist Certificate:

- Mya Mya Kywe, Yangon, Myanmar (Burma)
- Jennifer Brenner, Basel
- Monika Siegemund Rong, Zürich
- Ute Blasche, Zollikofen
- Ashraf Ibrahim, Versoix
- Patrick Scherrer, Basel

SSEF Basic Diamond Certificate:

- Rogger Ueli, Zürich
- Sarah Tombez, Neuchâtel

Only participants that pass the final exam receive the SSEF Basic Gemmologist or Basic Diamond Certificate. The qualification requires theoretical knowledge as well as practical skills in gemstone testing or diamond grading.

Advanced Gemmologist Certificate:

COURSES ON PEARLS

- Priyanka Shah, Hyderabad, India
- Patrick Cervantes, Paris, France
- Judith Braun, Basel
- Alexandre Cottet, France
- Vikas Tongya, New York, USA
- Marie-Louise Grappe, France
- Farah Alsuhaily, Stockholm, Sweden
- Carlo Natalino, Italy

COURSES ON TREATMENT AND ORIGIN OF COLOURED STONES

- Carlo Mutschler, Beyer Chronometrie, Zürich
- Ilya Klyev, Russia
- Myint Myat Phyo, Yangon, Myanmar (Burma)
- Daniel Cau, Rolex SA, Switzerland
- Sylvia Mardini, Switzerland
- Pascal Cartier, Rolex SA, Switzerland
- Sergio Valceschini, Rolex SA, Switzerland
- Nilwan Napawongsuwan, Thailand

COURSES ON DIAMONDS

- Carlo Mutschler, Beyer Chronometrie, Zürich
- Sylvia Mardini, Switzerland
- Armando Pantoni, Luxury Timepiece International, Switzerland
- Jean Marc Vogt, Luxury Timepiece International, Switzerland
- Floriane Hoceini, Luxury Timepiece International, Switzerland
- Bruno Doriguzzi, Luxury Timepiece International, Switzerland

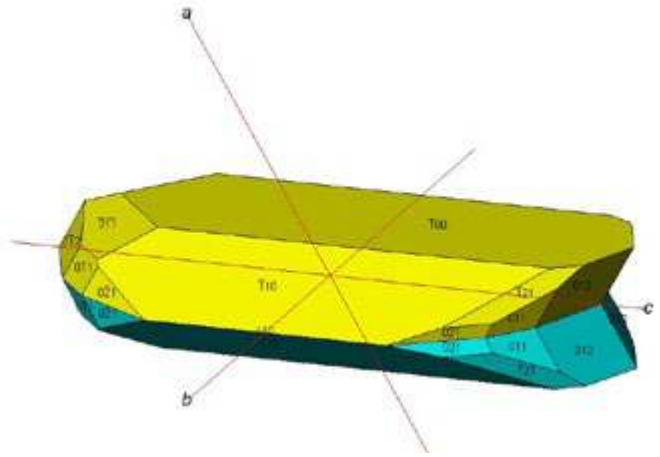
COURSES ON SMALL DIAMONDS

- Carlo Mutschler, Beyer Chronometrie, Zürich
- Yann Maquinion, Piaget, Switzerland
- Pedro Serodio, Piaget, Switzerland
- Armando Pantoni, Luxury Timepiece International, Switzerland
- Jean Marc Vogt, Luxury Timepiece International, Switzerland
- Floriane Hoceini, Luxury Timepiece International, Switzerland
- Bruno Doriguzzi, Luxury Timepiece International, Switzerland

An educational example:

TWINNING IN SPHENE PRETENDS A DOUBLET

The author recently had a sphene (titanite) crystal cut by Swiss lapidary Hans-Ruedi Wiedmer. The faceted gem is of yellowish brown colour, with adamantine luster and splendid dispersion; its shape is round with a brilliant cut. Examining this gem under magnification, an obvious doublet-like plane can be seen: the two parts divided by this plane show a different colour (yellowish brown to greenish brown) and this effect is stronger or lighter, depending on the direction of observation. The twinning of the original crystal given to the cutter, as depicted in Fig. 1, is the reason for this observation. It also explains why no lustre difference between the top and the bottom parts can be detected. In addition, there are no obvious mineral inclusions visible along this plane. The observed colour difference is due to the pleochroism of sphene, a monoclinic and thus biaxial mineral.

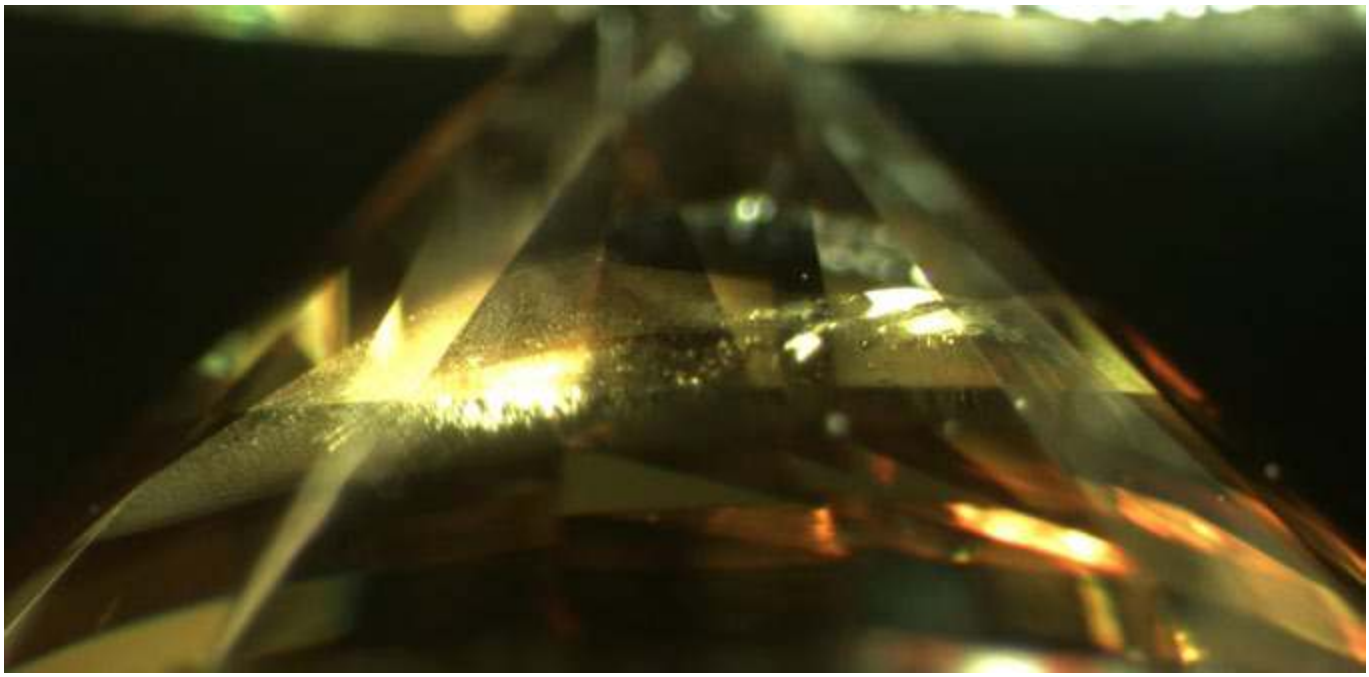


△ **Figure 1: Twin crystal of sphene. The two members of the twin are coloured differently and the re-entrant angles are obvious. The twin plane is the (100)-plane - the table facet of the gem under consideration is parallel to it.**

In Fig. 2 the twin plane in the pavilion region is shown. The inclusion crossing this plane is a clear indication that this feature is of natural origin – in a real doublet such a crossing would not occur as the materials making up the doublet are of different origin.

This educational example shows that a non-experienced observer may confuse the visual effect of twinning with a doublet, especially in a case where the orientation of the twin-plane is along the table facet and no inclusions are found crossing this feature.

This is just one example of what can be learnt in the SSEF basic training course in gemmology: hands-on practical exercises with explanations of what can be observed. ✶ **Dr. F. Herzog**



△ **Figure 2: Twin plane as seen in the pavilion region: this plane, approximately in the middle of the image, is clearly visible as the colours of the two parts are distinctly different. A fingerprint inclusion (healed fissure) runs from the middle of the upper part to the left corner of the counterpart, thereby crossing the twin plane. Photo by Dr. M.Krzemnicki.**

SSEF AT SGG

The Swiss Gemmological Institute SSEF is since many years closely involved in the Swiss Gemmological Society SGS (www.gemmologie.ch).

As in all the previous years, SSEF experts provided insight in their research at the annual SGS conference, to update association members (mainly goldsmiths, retailers, and gemstone dealers) about the newest trends and challenges in the gemmological field.

In May 2012, we were invited to present four talks, including a talk on new developments in pearl testing (M.S. Krzemnicki), trace element analysis of sapphires from different origins (P. Halicki), pearl farming in Micronesia (L. Cartier), introduction and identification of organic gems (Prof. H.A. Hänni, former director of SSEF), and a round-up about exotic and outstanding items tested in the past year (M.S. Krzemnicki).

SCHWEIZERISCHE GEMMOLOGISCHE GESELLSCHAFT
SOCIÉTÉ SUISSE DE GEMMOLOGIE
SOCIETÀ SVIZZERA DI GEMMOLOGIA

We strongly recommend interested persons to join SGS, as it provides unique possibilities for gemmological education but mostly also an ideal platform for networking in the Swiss jewellery trade. Interested persons can apply to be guest at the upcoming SGS conference in 15-16 April 2013 in Thun, Switzerland. Please contact the SGS at www.gemmologie.ch. ✶

25%

PROFIT FROM REDUCED TARIFFS FOR SSEF REPORTS

The Swiss Gemmological Institute SSEF offers a 25% reduction on listed tariffs for SSEF members (see also www.ssef.ch). You will also receive the annual SSEF Facette.

Apply to become a member of SSEF (Swiss Foundation for the Research of Gemstones) and pay the annual membership fee of 550.- Swiss Francs and you are already taking full advantage of our member tariff for a whole year.

For more information, please contact our administration by phone +41 61 262 06 40 or e-mail admin@ssef.ch.

NEW SSEF - FERRARI SHUTTLE SERVICE

New attractive worldwide shuttle services: SSEF collaboration with Ferrari Express Inc.

We are glad to offer our clients a new and worldwide network of shuttles, connecting the SSEF to all major international trading hubs since February 2013. Now, the shipping of goods to the SSEF has become more easy and cheaper than ever before.

This network has been set up in collaboration with Ferrari Express Inc., our premium partner for transportation. Ferrari Express Inc. - with more than 50 years of experience in the jewellery business - guarantees you a fast, smooth, and safe shipping service door-to door for all your valuable goods. Whether you send one item or several does not matter, you will only be charged one round-trip fee and possibly a liability fee depending on the total declared value (for details see next page). Shipping (and liability) for goods is invoiced by SSEF.

The service includes pick-up at your office – temporary export/import in your country and Switzerland; airfreight cargo for valuable items; Swiss customs fees; delivery to SSEF – and return transport with delivery to your office. The goods have to be insured by the client. If required, then Ferrari Express can offer you a customized insurance for 0.08% of the value. Please specify this when you order the shuttle.

Your advantages using the SSEF shuttle:

- Easy ordering: just dial one of the below indicated Ferrari phone numbers.
- Personalized service: speak to our contact person at your local Ferrari office.
- Smooth transportation: fast and safe door-to-door delivery.
- Simple accounting: SSEF testing and shipment charges, all on just one invoice.

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INSTITUT SUISSE DE GEMMOLOGIE

Currently, the shuttle network is as follows:

Daily shuttle between Geneva – SSEF

(call Ferrari Geneva office +41 22 798 82 60)

Costs: 80.- Swiss Francs per round trip.
For values > 500'000 Swiss Francs, an additional liability fee of 0.025% is charged for the amount exceeding this limit, based on the declared value.

Example 1: declared 100'000 SFr ▷ shipping costs: 80 SFr
Example 2: declared 1'000'000 SFr ▷ shipping costs: 205 SFr

Twice-a-week shuttle between New York, Hong Kong – SSEF

(call Ferrari New York office +1 212 764 06 76)
(call Ferrari Hong Kong office +852 2 264 20 01)

Costs: 160.- Swiss Francs per round trip and an additional liability fee of 0.025%

Example 1: declared 100'000 SFr ▷ shipping costs: 185 SFr
Example 2: declared 1'000'000 SFr ▷ shipping costs: 410 SFr

Weekly shuttle between London, Paris – SSEF

(call Ferrari contractor London office +44 1753 28 78 00)
(call Ferrari Paris office +33 1 499 66 060)

Costs: 160.- Swiss Francs per round trip and an additional liability fee of 0.025%

Example 1: declared 100'000 SFr ▷ shipping costs: 185 SFr
Example 2: declared 1'000'000 SFr > shipping costs: 410 SFr

Twice-a-month shuttle between Italy, Bangkok, Mumbai, Jaipur, Taipei – SSEF

(call Ferrari Italy office +39 0131 208520)
(call Ferrari Bangkok office +6622674755 to 8)
(call Ferrari contractor Mumbai office +91 222 3873659 / 60)
(call Ferrari contractor Jaipur office +91 141 2561002)
(call Ferrari Taipei office +886 2 25098511 310)

Costs: 160.- Swiss Francs per round trip and an additional liability fee of 0.025%

Example 1: declared 100'000 SFr ▷ shipping costs: 185 SFr
Example 2: declared 1'000'000 SFr ▷ shipping costs: 410 SFr

On demand shuttle between Doha, Dubai (UAE), Bahrain, Singapore – SSEF

(call Ferrari contractor Doha office +974 44074777)
(call Ferrari contractor Dubai office +971 4 2183211)
(call Ferrari contractor Bahrain office +973 1782 8631)
(call Ferrari Singapore office +65 6547 5560)

Costs: 600.- Swiss Francs per round trip and an additional liability fee of 0.05%

Example 1: declared 100'000 SFr ▷ shipping costs: 650 SFr
Example 2: declared 1'000'000 SFr ▷ shipping costs: 1100 SFr

For all details about the new SSEF shuttle with Ferrari Express Inc., including departure days, round-trip schedules, contact person, order information: please check our website http://www.ssef.ch/services/shipping-shuttles/ or call the SSEF +41 61 262 06 40 or send an email to admin@ssef.ch. ✶

SSEF PREMIUM APPENDIX

We are pleased to announce the launch of the SSEF Premium Appendix, a new product that we have added to our services. For items that pass our rigid criteria of quality and that we consider exceptional, the SSEF may issue a letter of appendix. Appendix letters are decided upon and issued on a case by case basis. Such an appendix is attached to the SSEF report, and highlights in a short but concise way the outstanding properties, which make the gemstone, pearl or jewellery an exceptional item.

We have now developed a new, and very prestigious presentation for such exceptional items: the SSEF Premium Appendix. Hand-made and in leather, this folio includes not only the report and the appendix, but also a high-resolution image of the item to present its beauty at its best. Each SSEF Premium Appendix is unique and comes in a leather-bound box, with a photo of the item on the front and the name of the item engraved on the spine of the casing. As this is a hand-made product, delivery time is about 6 weeks.

It is also possible to order such an SSEF Premium Appendix for an item we already certified in the past, as long as it has already received an appendix letter attached to the original SSEF report.

We are convinced that this new product is a highly attractive format to present your most prestigious jewels to your private customers, and we would be pleased to give you more information should you have any questions. ✶

SSEF

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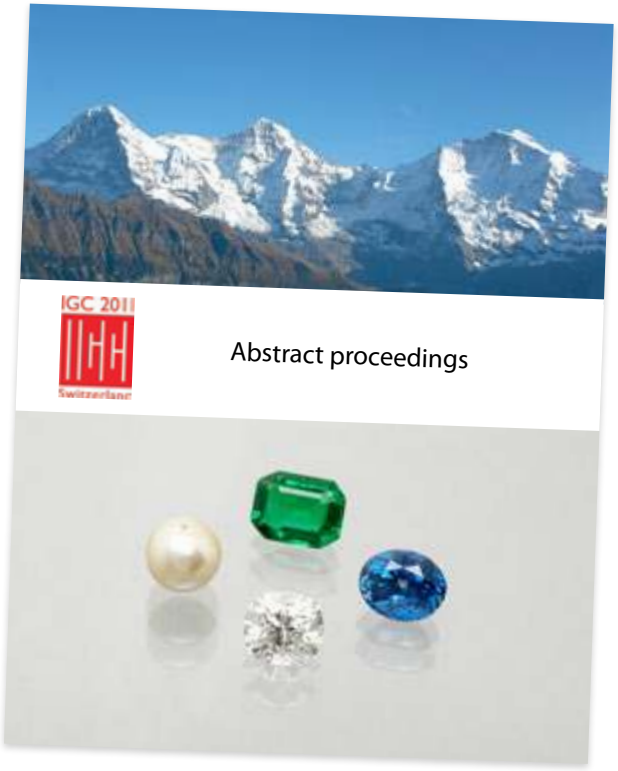
Falknerstrasse 9 CH-4001 Basel Switzerland Tel. +41 61 262 06 40 Fax + 41 61 262 06 41 admin@ssef.ch www.ssef.ch

GIT 2012

The 3rd International Gem and Jewelry Conference GIT conference was held 12-13 December 2012 in Bangkok, Thailand, and was hosted by the Gem and Jewellery Institute of Thailand. The conference opened with a keynote speech by Dr. Gaetano Cavalieri of CIBJO.

The two-day conference consisted of numerous oral and poster presentations on a diverse range of gemmological themes. The talks also included two talks by the Swiss Gemmological Institute SSEF. Jean-Pierre Chalain gave a talk about treated type IIa synthetic diamonds. Laurent Cartier presented a paper on challenges and opportunities in the Tahitian cultured pearl industry. The conference was very well organised and provided us with an opportunity to share and discuss current research with other members of the gemmological community. ✶



IGC 2013

The International Gemmological Conference (IGC) took place in Interlaken, Switzerland from 13 - 17 July 2011 and was organized in collaboration with the Swiss Gemmological Institute SSEF (see Facette 2012).

The next conference will take place in Hanoi, Vietnam in October 2013. The conference is organized by the University of Hanoi and DOJI Gold & Gem Corp. SSEF gemmologists continue to be involved in IGC activities and will also travel to this leading international conference for gemmology.

Information about the 2011 conference and the upcoming conference in Vietnam can be found at www.igc-gemmology.org. ✶

△ **Photos**: The upcoming IGC conference will take place in Vietnam with an excursion to Halong Bay pearl farms. Photos: Luc Phan

LIBRARY OF SSEF PUBLICATIONS

A collection of over 320 publications from the SSEF has now been put online, available in pdf format. This library contains most of our research that has been published since 1974 and will be continuously updated.

This resource goes hand in hand with our mission to share our gemmological knowledge and findings with the public and the trade. Some publications are not in English language but may include an abstract in English.

SSEF has been central to a number of important discoveries and developments in gemmological research in the past four decades. A selection of related important publications now available online. For example:

- Contribution to Kashmir sapphire identification (1990)
- Identification of Douros synthetic rubies (1994)
- Identification of artificial resin in emeralds (1999)
- Detection of HPHT treatments in diamonds (2001)
- Identification of Be-treatment in sapphires (2004)
- Micro X-ray computerized tomography of pearls (2009)

This vast resource should be useful for gemmologists and other members of the trade, providing information on a diverse range of topics in coloured gemstones, diamond and pearl issues. ✶

CIBJO & LMHC

In 2012, the CIBJO Congress was organized in Vicenza from the 17th to the 20th of June. The pre-congress during which meetings, commissions and committees are prepared took place 14-16 June. On the 17th of June, Dr. Cavalieri opened the congress. Apart from the General Assembly, the Board of directors and several steering committees, the following meetings took place: Presidential Council, Executive committee, Diamond commission, Coloured Stone commission, Pearl commission, Gemmological commission, Precious metal commission, Association Executives Networking Commission, Marketing commission, Sectors 1, 2 & 3.

More information and important trade documents are available on the CIBJO website (www.cibjo.org). Among these documents, there are the 'Diamond, Coloured Stone and Pearl Blue Books'; the 'Ruby, Sapphire and Emerald Guides'; the 'Retailer's Guide To Trust' and the 'Retailer's Guide To Marketing'.

A harmonisation of the blue books was accepted and these new versions will soon be available. Subsequent to the congress, a gemmological information day dedicated to tourmalines was organized by the Gemmological commission.

From the 9th to the 11th of December 2012, the LMHC - Laboratory Manual Harmonization Committee- met in Bangkok. The committee now consists of representatives from seven different laboratories: CGL – the Central Gem Laboratory of Japan, CISGEM (Italy), GIA (USA), GIT (Thailand), DSEF – the German Gem Lab, Gübelin Gem Lab (Switzerland) and the Swiss Gemmological Institute SSEF. The meeting was organised by GIT in conjunction with the 3rd International Gem and Jewelry Conference. The meeting welcomed two new members: CGL and DSEF.

During the meeting, Information Sheet No. 5 (IS5), IS6 and IS12 were slightly amended mainly for harmonization purposes. Although hydrophane opals, and the separation between green beryl and emerald was discussed, no specific agreement was released in the form of a new IS. In order to reduce their meeting costs, LMHC members will soon begin testing videoconferencing solutions. ✶

SSEF RENOVATIONS

We have added more space to the SSEF laboratory in recent months to accommodate our growing team.

We now have a considerably larger office for the new administration with Alexandra Kokkinopulos as head of administration (see also Close up – page 36). We are confident that this new working situation, in combination with a new and powerful internal IT-network will also provide better possibilities for future expansion of services and customer support. ✶

NEW EICKHORST GEMMASTER MICROSCOPES AT SSEF

Last year, the SSEF again updated and expanded its equipment. Following very good experiences and a long-time collaboration with System Eickhorst (www.eickhorst.com), we have again installed a number of their GemMaster microscopes, using Zeiss optics.

In our daily operation, this microscope has proven to be a perfect tool for gemmologists and with its new and innovative high contrast LED system, it has now even improved its performance.

At the same time, we also equipped all our SSEF course microscopes (System Eickhorst) with the new and powerful LED illumination. This now enables very comfortable working with a so-called cool touch base, avoiding strong heating of fingers as is common with systems using halogen lamps. ✶

SSEF FACETTE NOW WITH ISSN NUMBER

We are pleased to announce that our SSEF Facette magazine, which we have published for the past twenty years now has its own ISSN number. This is a unique number that allows the identification of a periodical/magazine and is awarded by the Swiss ISSN Centre in Berne. The ISSN number is 2296-214X. ✶

GEM*EXPLORER*

A guide to the world's major sources of coloured gemstones, diamonds and pearls.

www.gemexplorer.org

SSEF IN PARIS FOR LECTURE

On 13th of July 2012, Dr. Michael S. Krzemnicki was invited for a talk at the 21st International Radiocarbon Conference, held in the prestigious UNESCO building in Paris. The interdisciplinary nature of UNESCO provided an ideal platform for this conference that is organised every three years. The conference covers numerous aspects of age determination, bringing together different scientific disciplines as well as cultural aspects. Radiocarbon ^{14}C, after long being used as a "chronometer" only, is increasingly used as a powerful technique to trace life and earth system processes.

Our specific contribution to this conference was on age determination of pearls. We presented first results and the possibilities of this method in providing indications for the separation of natural from cultured pearls (page 16). Based on this research in collaboration with Dr. Irka Hajdas from the Laboratory of Ion Beam Physics, Swiss Federal Institute of Technology ETH-Zurich, we have submitted a research paper to the Radiocarbon Journal, that will be published in the coming months. ✶

SSEF GIVES CHRISTIES LECTURES IN HONG KONG

End of May 2012, Dr. Michael S. Krzemnicki was invited to give two lectures during the Christie's auctions in Hong Kong.

The first lecture was entitled „Colourful Treasures of Nature: Ruby, Sapphire, Emerald & Pearls" and was part of Christie's Education program, consisting of multiple lectures, lunches, and additional events. An international group of students participated in this event which had various lectures on gem related topics.

A second lecture entitled: „Jade – stone of gods, appreciation and certification of Fei Cui (Jadeite-Jade)" was part of Christie's Hong Kong free lecture series, open to the public. This lecture – based on an article published in the last SSEF Facette No. 19 (www.ssef.ch/research-publications/facette)- gave a summary of nomenclature issues regarding jade and jadeite including a historical overview on jade in different ancient cultures, and also addressed how different treatments are detected at the SSEF.

Both lectures received a very positive response from attendees. The presentations can be downloaded as pdf files from our website www.ssef.ch/research-publications/presentations/coloured-gemstones. ✶

SSEF ON-SITE IN 2013

In 2013 we will be exhibiting and/or offering our on-site testing services as follows :

Paris	18 - 22 February
Hong Kong	01 - 09 March
Paris	08 - 12 April
BaselWorld	25 April - 02 May
Geneva	13 - 14 May
Bangkok	20 - 24 May
Paris	03 - 07 June
Hong Kong	17 - 23 June
Bangkok	12 - 16 August
Hong Kong	05 - 17 September
Paris	30 September - 04 October
Geneva	18 - 19 November
Paris	02 - 06 December

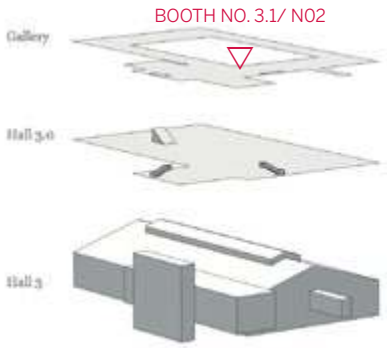
Further on-site services will be communicated through our website and in newsletters. Please subscribe to our newsletter on our website www.ssef.ch to be updated regularly about our on-site schedules, other services and news. ✶

BASELWORLD 2013

During BaselWorld 2013 (April 25 – May 02), the SSEF will be once again offering its convenient gemstone testing services.

Following the renovation of the whole BaselWorld we are now at a new location. You can find us in the first floor of Hall 3 at booth No. 3.1/ N02, close to the moving stairways. The phone number at our booth (+41 61 699 51 29) remains the same, as does our high-quality express service, which may even include a nice cup of coffee and some Swiss chocolate.

We are looking forward to meeting you at our booth and to testing your stones and pearls (48h for testing) during the Basel Show. If you would like to have a number of items analysed, we suggest you call us in advance at the SSEF office (tel. +41 61 262 06 40) to fix an appointment. This is also strongly suggested if you would like to have your items tested shortly before the show. ✶



△ Photo copyright BaselWorld 2013.

SSEF PRESENCE IN ASIA

Our presence in Asia has been very successful in 2012, as our services have gained importance for clients in the Far East and South East Asia, who ask for accurate and internationally renowned reports.

In 2012, the Swiss Gemmological Institute will again offer its services at two locations in Asia:

Bangkok

In Bangkok, we will be testing your prestigious gemstones in our Bangkok office at the Silom road on 20 - 24 May, 12 - 16 August. Please check our website regularly or subscribe to receive our electronic newsletter to be updated regularly about our on-site schedules (www.ssef.ch/newsletter-signup).

Bangkok
dates
to remember!

Hong Kong

The last year has again shown how important Hong Kong has become as a major hub for the gemstone and jewellery trade. Since many years the SSEF is offering its services in Hong Kong for the local and international trade of prestigious gemstones and jewellery. In 2012, we will again be very active in Hong Kong, offering services at the three main Jewellery Shows in March, June and September (at AsiaWorld and at Convention Centre), but also at our location in Central during several pre-show periods. This pre-show service is only by appointment, so please contact us (phone +41 61 262 06 40, admin@ssef.ch) if you need further information about our Hong Kong services or to confirm an appointment.

Hong Kong
dates
to remember!

Apart from offering our on-site services regularly in Hong Kong, you may also use the new Ferrari shuttle services to send us your gemstones, pearls or jewellery smoothly to the SSEF (for details, see shipping instructions on the services section of our website www.ssef.ch). ✶

Close up:

ALEXANDRA KOKKINOPULOS

Following major renovations and reorganisation of the SSEF administration in 2012, Alexandra has taken over as head of administration, working together with Roxane Grieder and Véronique Amer.

Alexandra has been with SSEF for about 2 years now, and she has gained lots of experience in all our administration operations. With her professional but very custom-oriented approach, Alexandra manages the administration team with great care and has been vital to our growing business worldwide. Backed by her education in business administration, she fits perfectly into our team.

With her family originally from a small island in Greece, we are more than lucky to have her in our multicultural team, as we often enjoy the famous Kalamata olives or her not less famous sweet Greek deli food. ✶

TEAM EVENT AND VISIT TO SIK

In November 2012, we organised our first SSEF team excursion with a combination of learning and leisure.

On the first day, we visited the Swiss Institute of Art Research SIK in Zurich (www.sik-isea.ch), which is internationally known as a leading documentation institution for Swiss artists, mostly painters. In many aspects, this foundation works similarly to the SSEF, as it combines analytical methods such as Raman, FTIR, radiography and chemical analysis with the subtle and experienced interpretation of rather „soft" criteria, such as the style and painting techniques, which are characteristic for an artist. Their research activities are widespread, and include iconic Swiss painters Ferdinand Hodler, Felix Vallotton and many others.

We were very warmly welcomed at the SIK by Dr. Matthias Oberli (director) and Nadine Forster (assistant) at their historic headquarter in the Villa Bleuler (built from 1885 – 1888) in Zurich. Dr. Ester Ferreira, head of the Analytical Laboratory then gave us a very interesting insight into their restoration work, and how they distinguish between original and fake artwork. They also showed us, how tracing a painting to an artist's oeuvre is a form of „origin determination". We were astonished to see that their work and scientific approach is in many aspects quite similar to what we do with gemstones at SSEF. We hope that this first visit will be the beginning of a future collaboration with this Swiss institution and would like to thank the SIK for their kind hospitality.

During the second day, we learnt the „high art of cheese making" in Appenzell, a pretty and rural area in eastern Switzerland world-famous for its Appenzeller cheese, and finished the day with a great Cheese Fondue. ✶

The SSEF Team wishes all friends and customers a succesful year 2013 and would like to thank you for your continued support of the SSEF laboratory.

PUBLICATIONS

Cartier L.E., Krzemnicki M.S., Ito M. (2012) Cultured pearl farming and the production in the Federal States of Micronesia. *Gems & Gemology, Vol. 48, No. 2, pp. 108–122*

Cartier L.E., (2012) Challenges and opportunities in the black cultured pearl industry. *Abstract Proceedings of the 3th International Gem & Jewelry Conference (GIT2012), Bangkok, 312-316.*

Chalain J-P., Lefèvre P., Krzemnicki M.S. (2012) A treated synthetic diamond of slightly pinkish orange colour. *Abstract Proceedings of the 3th International Gem & Jewelry Conference (GIT2012), Bangkok, 290-294.*

Krzemnicki M.S., Hajdas I., Bonani G., Wacker L. (2012) Radiocarbon 14C dating of pearls. *Abstract volume of the 21st International Radiocarbon Conference, Paris.*

Schmetzer K., Krzemnicki M., Hodgkinson A. (2012) Treated ruby. *Gems & Jewellery, Vol. 21, No. 3, pp. 14-17.*

Krzemnicki M.S., Hajdas I., Bonani G., Wacker L. (2013) Age determination of pearls: A new approach for pearl testing and identification. *Radiocarbon Journal (submitted).*

Krzemnicki M.S. (2012) Paraiba tourmaline intergrown with lepidolite mica. *Journal of the Gemmological Association of Hong Kong, 33, 56-58.*

Krzemnicki M.S. (2012) Focus Farbsteine: Ungewöhniche Farbsteine liegen im Trend, *Gold'or No. 6, Juli/Aug p. 50-51*

Krzemnicki M.S. (2012) Jade, der Stein der „Götter" Begriffe, Konzepte & gemmologische Bestimmung, Teil 1: *Gold'or (in German), Oct. 2012, pp. 74-75.*

Krzemnicki M.S. (2012) Jade, der Stein der „Götter" Begriffe, Konzepte & gemmologische Bestimmung, *Teil 2: Gold'or, No. 10, Dec. 2012, pp- 62-63*

Krzemnicki M.S. (2012) Fancy coloured sapphires: classical gemstones with a rich colour spectrum. *Jewellery Info (Chinese) No. 46, June, pp. 66-67*

Hänni, H.A. (2012) Natural pearls and cultured pearls: A basic concept and its variations. *Australian Gemmologist, 24, 11, 256-266.*

DONATIONS

As in previous years, we are grateful for numerous donations we received in 2012 from many pearl and gemstone dealers around the world. These donations not only support our research but also add to our collection of specimens to be used in our courses, with the aim to educate the participants and to give them the opportunity to learn gemstone & pearl testing on a wide variety of untreated and treated materials.

We would like to especially thank the following persons and companies:

FOR PEARL DONATIONS:

Thomas Faerber (Geneva), José Casares (Shanghai Gems, Geneva), Rak Pearls LLC (Ras Al-Kaimah), Andy Muller (Hinata Trading Co., Japan), Jörg Gellner (Gellner GmbH, Germany), Ronny Totah (Geneva), H.A. Hänni (GemExpert, Basel), Alberto Boghossian (Geneva).

FOR GEMSTONE DONATIONS:

Emerald Mines Ltd (Hong Kong), Joseph Belmont (KV Gems, Bangkok), Mrs. ThinThut (Silkeneast, Bangkok), Marie Muller-Bastos (Switzerland), Horst Edenhofer (Switzerland), Henry A. Hänni (GemExpert, Basel), Jörg Hänni (Basel, Switzerland), Belfont (Geneva), Alexander Leuenberger (Aline GmbH, Switzerland), Nikolai Kouznetsov (Hong Kong), Bekhruz Gulruzov (Pamir Gems, Bangkok), Michael S. Krzemnicki (Basel), Philippe Honegger (Switzerland). ✶

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