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**SPECIAL REPORT**  
GEMMOLOGICAL COMMISSION

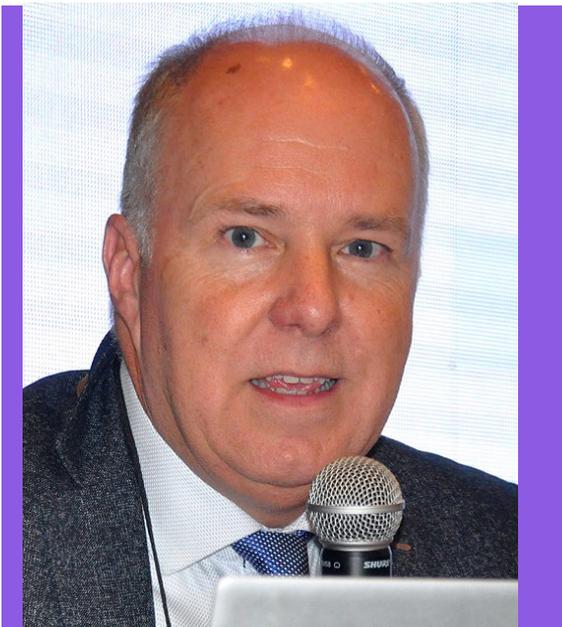
**Separating science from commercial interests  
and empirical facts from opinions**

**By Hanco Zwaan, President  
CIBJO Gemmological Commission**

**M**any of the issues to be covered by the CIBJO Gemmological Commission at this year's congress in Bahrain concern coloured gemstones. Consequently, the main topics to be focused upon will be

discussed partly or wholly in conjunction with the Coloured Stone Commission.

Subjects on the agenda of the Gemmological Commission in 2019 include the standardising of descriptive terms, such as variety and/or trade names and colour terms, and the ways in which key information on individual gemstones or parcels of gemstones is disseminated. In this respect, we



*Hanco Zwaan, President of the CIBJO Gemmological Commission.*

refer not only to reports issued by gem laboratories, but also how the information relating to gemstones is passed down the full chain of distribution.

### **INFORMATIVE DOCUMENT ABOUT COLOUR-TERMS**

During the 2019 CIBJO Congress in Bogota, Colombia, speakers stressed the need for harmonising the use of colour terms. On earlier occasions, laboratories had expressed their willingness to compare results, but it is clear that this is taking time. Furthermore, as will be discussed, it is not the only area in which agreement on harmonised standards is required.



*Thanong Leelawatanasuk, Vice President of the CIBJO Gemmological Commission.*

At the upcoming CIBJO Congress in Bahrain, an improved draft of an informative document on terms used to describe certain colours of ruby and sapphire will be presented for discussion. It reflects the positions of a number of important laboratories on this issue.

The document also includes an attempt to show where the respective colours approximately lie on the Munsell colour charts.

Because a universal standard still does not exist, it is hoped that this draft can be used to improve transparency on this subject. Nonetheless, it will need to be adjusted further and improved with time.

The call for standards and harmonisation is being echoed worldwide. At the most recent Hong Kong Jewellery and Gem Fair, the first Emerald Harmonisation Seminar took place. It gathered experts from China, India, Thailand and Colombia, among them people involved in the treating, cutting and marketing of emeralds. They discussed standards for nomenclature and the types of treatments and fillers used.

### **EASILY COMPREHENSIBLE LAB REPORTS FOR CONSUMERS**

At the 2018 CIBJO Congress in Bogota, a discussion took place as to whether it would be possible for laboratories to provide guarantees on the results reported.

Essentially, this is not possible. Naturally, reputable laboratories will do what they can to keep errors or mistakes to a minimum, but the results presented on any report may change because of new insights and improved knowledge. This was the case with pezzottaite, which was first defined as a variety of beryl and later identified as a new mineral.

More commonly, reported results will no longer be valid



*Claudio Milisenda, Vice President of the CIBJO Gemmological Commission.*



*Pezzotaite, which was first defined as a new variety of beryl, but later on was identified as a new mineral, is an example of improved knowledge requiring changes to be made to the results presented on laboratory reports. Photo by Hanco Zwaan © Netherlands Gemmological Laboratory / Naturalis Biodiversity Center.*

because something may have been done to a stone after it has left the laboratory.

The debate went further, looking at the possibility of separating empirical test results from professional opinions on laboratory reports, especially when referring to colour terms and statements about country of origin.

But the truth is that there may be a number of other judgements that are made with some degree of subjectivity, such as estimating the amount of filler used in an emerald and the use of variety or trade names.



*Beryl shows many shades of green, but what defines an emerald? On the left are three three smaller emeralds from Zimbabwe and one larger emerald from Nigeria. On the right is an old green beryl, reportedly from Siberia. Photos by Hanco Zwaan © Netherlands Gemmological Laboratory / Naturalis Biodiversity Center.*

Dividing the report so that there is a section with test results and a section with interpretations or opinions may cause even more confusion. The more prudent policy could well be what some laboratories already do, and that is clearly stating on their report that specific results – such as those dealing with origin—are in fact opinions.

It ultimately was agreed that reports need to be easily comprehensible for the end consumer. Preparing an information sheet on how to read a gemstone report could help in achieving this, and this is on the agenda of the upcoming congress.

### **PROPERLY DEFINING GEM VARIETIES**

At the 2018 CIBJO Congress in Colombia, it was agreed that a working group would be formed from members of the Coloured Stone Commission and the Gemmological Commission, whose role it would be to propose a list of acceptable variety names. At the same time, it would provide as precise a definition as possible for each of the variety names listed.

As indicated above, the approach and feasibility of such an endeavour is complex, and the future agenda of this working group will be an important topic at the congress in Bahrain.

Although the names of mineral species have been defined by the Commission on New Minerals, Nomenclature and Classification (CNMNC) of the International Mineralogical Association (IMA), the IMA has never addressed the subject of names of mineral varieties. Furthermore, in specific cases the validity of variety names and also the difference between variety names and trade names are unclear.

Varieties of a particular mineral may have different colours, caused by slight differences in chemical composition and/or



*Spinel comes in beautiful shades of mainly red and blue. What defines a so-called “cobalt spinel” and what would be a blue spinel? It is the type question that the working group of CIBJO’s Gemmological and Coloured Stone Commissions will be charged with. Photos by Hanco Zwaan © Netherlands Gemmological Laboratory / Naturalis Biodiversity Center.*

structure. Appearance may also be affected by crystallinity (coarsely crystalline versus micro- and crypto-crystalline; compare for example quartz and chalcedony varieties), by different degrees of porosity (as is the case with agate), or by inclusions (such as with rutilated quartz).

### LOGICAL AND COMMERCIAL CONFLICTS

Loosely defined variety names most often have been used in the trade with commercial interests in mind. The general attitude has been that, as long as new variety names were not in conflict with science, logic, or other, already given names, they could be accepted.

“Pink sapphire” is one example of variety name where a logical inconsistency could be said to exist. It is essentially a light red variety of corundum and red corundum by definition is ruby. So logically, should not a “pink sapphire” actually be defined as a pink ruby? In fact, only when the commercial story behind this name is told, does one begin to understand why the term “pink sapphire” came into use.

Conflict with commercial interests are fraught with problems. Paraiba tourmaline is most commonly recognised by its distinctive colour. Some parties insist that the stones also need to have been sourced in the Brazilian state of Paraiba, meaning that similarly coloured tourmaline from Mozambique and Nigeria cannot share the same variety name. Does that make Paraiba tourmaline a variety or brand?

What we do know is that, historically, once a brand or trading name becomes widely accepted in the public sphere,

it is more likely to be used as a variety name. This in itself is a compelling enough reason to define variety names precisely.

But our attention should first go to the most pressing cases. These include defining the borders between ruby and pink sapphire, the difference between padparadscha and pink or orange sapphire, and the difference between aquamarine, green beryl and emerald, to name but a few.

To come up with viable solutions, guidelines will be needed in the research areas of colour analysis, including the technical specifications of light sources being used, spectroscopy and chemical analysis.

### SAPPHIRES HEATED UNDER PRESSURE

Earlier this year, the organisations associated with the Laboratory Manual Harmonisation Committee (LMHC) and a number of other laboratories cooperated in an extensive international study that looked at sapphires heated under pressure to enhance their colour.

The group of participating laboratories included the CGL Central Gem Lab, Japan; CISGEM, Italy; DSEF German Gem Lab, Germany; the Gemmological Institute of America (GIA), USA; GIT Gem and Jewelry Institute of Thailand; Gübelin Gem Lab, Switzerland; SSEF Swiss Gemmological Institute, Switzerland; Lotus Gemology, Thailand; ICA Lab, Thailand; Dunaigre Consulting, Switzerland; GJEPC-GTL, India; and Hanmi Gemological Institute, South Korea. Many are members of CIBJO.

Early testing results published by GemResearch Swisslab

(GRS) had appeared to indicate that heating sapphires under pressure could actually affect their durability, creating more brittle material. However, in-depth testing carried out by the team of laboratories did not substantiate any specific durability issue.

The key results from their durability and stability study indicated there was no damage when the material was exposed to an ultrasonic bath, no alteration when the treated material was exposed to acids. There was no damage when tested with a paperclip or knife blade, and no damage when dropped to the ground. There was no colour alteration when exposed to a jeweller's torch, and no unusual behaviour when the treated gems were cut. The latter finding was confirmed independently by several experienced gem cutters.

However, there were indications that lower-quality and heavily included sapphires may develop fissures and cracks, regardless of the heating method ("traditional" or "new") applied.

The study indicated no diffusion of colouring elements from an external source (with the exception of hydrogen),

which is similar to what would be expected with traditional heating.

As far as detecting the heating under pressure treatments, infrared spectroscopy (FTIR) is only partially successful. Indeed, quite a number of stones may pass as "heated" only by gemmological testing. Additionally, FTIR peaks considered characteristic of heating under pressure can be removed easily by a simple and short period of reheating.

It can therefore be concluded that, in many cases, it will be impractical to attempt to distinguish between sapphires that have been heat treated under pressure and those that have been heat-treated without pressure.

Based on these findings, there is a good argument to be made to consider the heating of sapphires under pressure, as one of the wide range of heating processes available, among them "Punsiri" heating. They would be simply disclosed as "heated." This would seem all the more appropriate, since it turns out that sapphires treated by heating under pressure have been available in the market since 2009.

#### PHOTO CREDITS

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