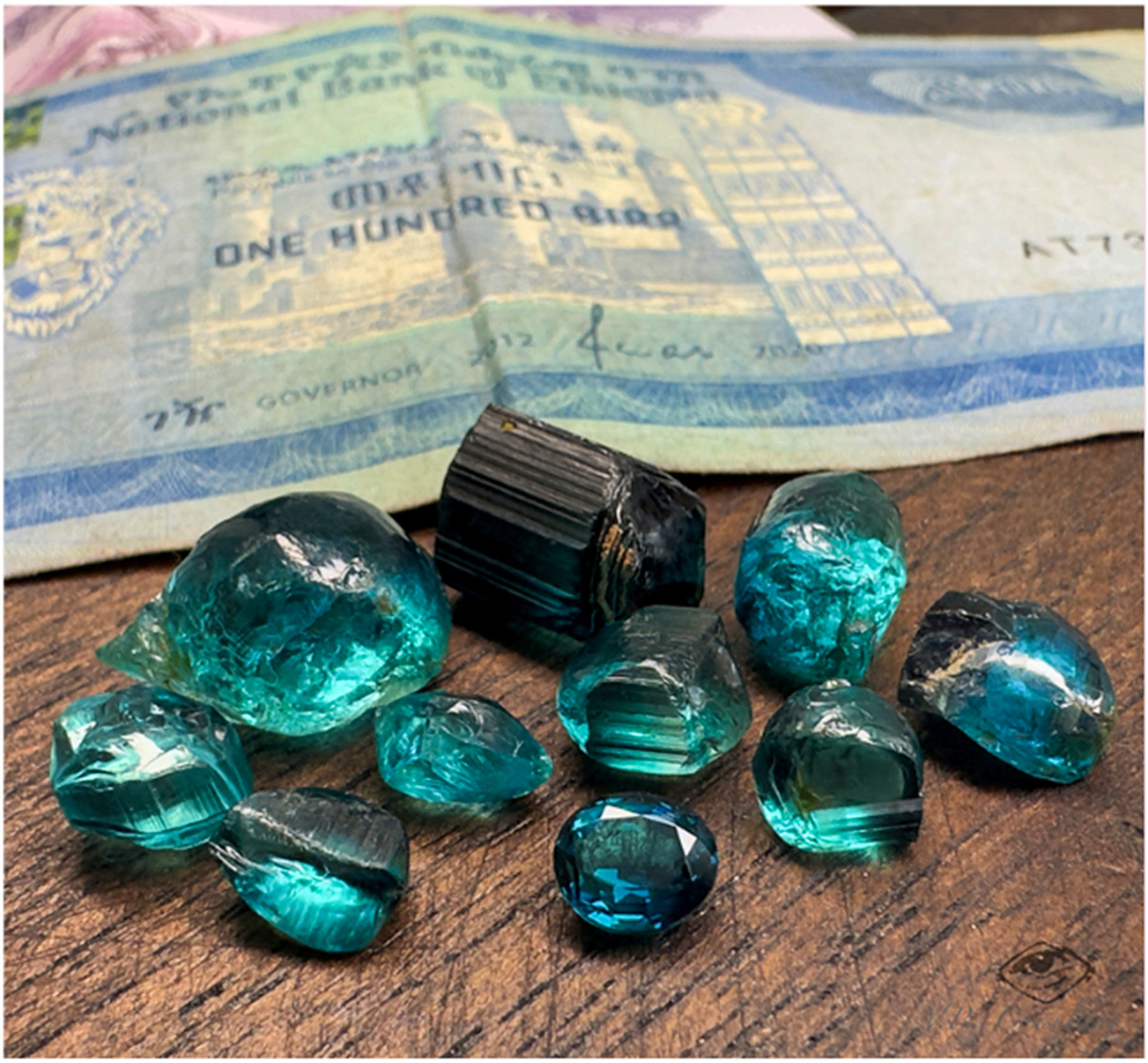
First examinations on paraiba and other copper-bearing tourmalines from Abuloo, Ethiopia

From June 24 to June 26, 2026, a preliminary study was conducted on twenty-one rough tourmalines freshly arrived in Bangkok from the new discovery reported a few weeks earlier near Abuloo village, in the Oromia Region of Ethiopia. The study was carried out by VP Consulting WLL, in collaboration with C. Dunaigre Gem Lab (Bangkok) and the Laboratoire Français de Gemmologie (LFG). Among these twenty-one pieces, ten were very fine-quality, high-value gems. One stone was immediately faceted by the owner to check the transparency of the material, see photo below.

Chemical and spectroscopic analyses, using EDXRF and UV-Vis spectroscopy, were conducted to investigate the origin of their striking blue-to-green colours. Most of these elbaite tourmalines do indeed contain significant concentrations of copper, which contribute to their coloration. Unlike the classic copper-bearing tourmalines from Brazil, however, many also contain moderate to high concentrations of iron, which also contributes strongly to colour. Finally, variable amounts of manganese were detected.



These preliminary results are interesting for several reasons.

The most significant findings of this preliminary study is the remarkable chemical variability in copper, iron and manganese concentrations, which differ substantially from one specimen to another. This suggests that the Abuloo deposit produces a chemically diverse population of tourmalines rather than a uniform material. In addition, all analysed samples contain relatively elevated concentrations of gallium, zinc, lead, and bismuth. These trace elements may become useful indicators for distinguishing Abuloo tourmalines from copper-bearing material originating elsewhere.

This chemical and spectroscopic diversity has important implications for gem classification. Gemstones in which copper is the dominant chromophore would likely qualify as paraíba tourmalines, following the terminology of the LMHC Information Sheet 6 (see annex). In that sense, these preliminary results support the idea that a new deposit of paraíba tourmaline has indeed been discovered in Ethiopia. Specimens containing high concentrations of iron derive much of their colour from iron rather than copper and therefore would not normally be considered paraíba tourmalines, but rather indicolites, comparable to those from Namibia or Afghanistan, often referred to as "lagoon" tourmaline in the trade. Other samples occupy an intermediate compositional range where classification may remain open to interpretation.

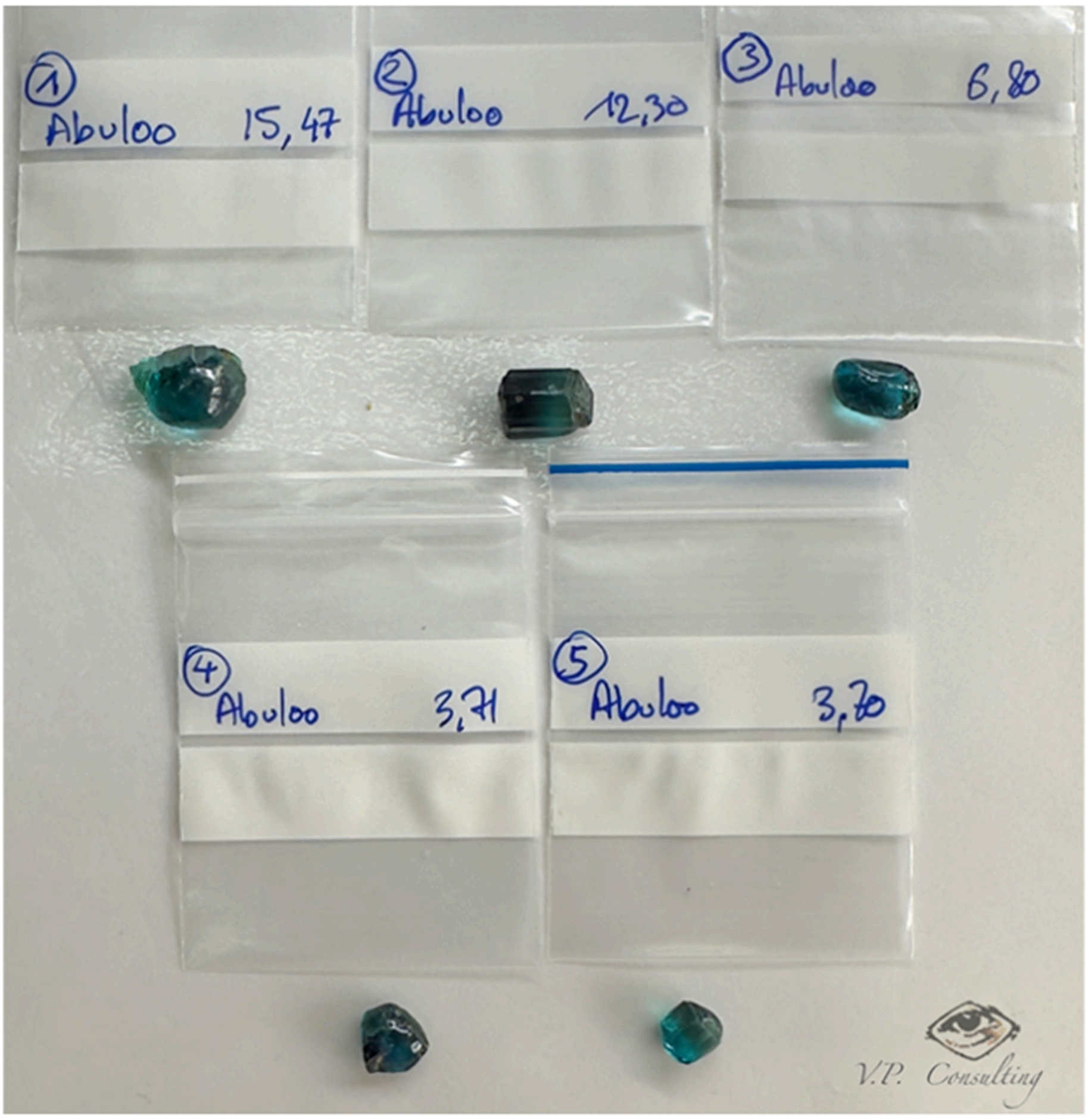
The preliminary data obtained on those samples do not seem to corroborate the hypothesis of the SSEF in their recent press release that the material from this deposit shows similarities with paraiba tourmalines from the Brazilian deposit. In fact, the chemistry of most of the samples studied seems more consistent with Fe-Cu type tourmalines reportedly from Nigeria, as described by Krzemnicki et al. (2022) (see annex), and with some of the stones presented in other articles, such as https://www.mdpi.com/2075-163X/14/1/44 (see annex).

Same parcel of tourmalines reportedly from Abuloo area in Ethiopia as on the previous page, under the same natural light but with a different background. One of the stones was faceted to check the transparency of the material. The faceted stone is a bit over 1 carat and has high levels of copper and rather low iron. Photo by Vincent Pardieu.

These observations demonstrate that visual appearance alone is not sufficient for classification. Reliable identification between paraíba tourmaline and indicolite requires quantitative chemical analyses, together with UV-Vis-NIR spectroscopy (as explained in LMHC sheet 6), to determine the relative contributions of copper and iron to colour.

The wide variation in manganese concentrations observed among the analysed samples also suggests that their response to heat treatment may vary. Samples with relatively low manganese contents may show little or no improvement following conventional heating, whereas those containing higher manganese concentrations could prove more responsive and undergo more significant colour modification.

Because the chemistry varies considerably from one specimen to another, no single heat-treatment behaviour should be expected for all Abuloo tourmalines. Controlled experimental studies on a representative range of samples is required to establish the relationship between chemical composition and treatment response.



Details on the five largest pieces analyzed in Bangkok on June 26th 2026 for this preliminary study. Only three of these stones were found to be clearly colored by copper and thus can qualify as Paraiba according to the terminology proposed by LMHC information sheet number 6. Photo by Vincent Pardieu.

Conclusion:

The discovery of copper-bearing elbaite tourmalines at Abuloo represents an important addition to the growing number of known copper-bearing tourmaline deposits worldwide.

The first analytical results indicate that the Abuloo deposit appears to produce a chemically heterogeneous population of copper-bearing tourmalines. Consequently, not every stone recovered from this deposit should automatically be described as Paraíba tourmaline. Some specimens clearly meet this designation, as copper is the dominant chromophore. Others fall within a more transitional compositional range, where classification may remain open to debate, while iron-rich stones derive much of their colour from iron and are therefore better described as indicolites. Visual separation is extremely challenging, and UV-Vis-NIR spectroscopy remains the key instrument for separating these different varieties, following LMHC Information Sheet No. 6.

This chemical diversity is also likely to influence the response of individual stones to heat treatment, with manganese-poor specimens expected to show less improvement than those containing higher manganese concentrations.

Further mineralogical, spectroscopic, and geochemical investigations, involving site visits and a substantially larger, statistically representative sample set, are required to establish reliable geographic origin criteria, improve our understanding of the compositional variability of the deposit, and assess its significance among the world's copper-bearing tourmaline occurrences.

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Group photo of the twenty one tourmalines reportedly from Abuloo in Ethiopia studied in Bangkok on June 26th 2026 for this preliminary study. Photo by Vincent Pardieu.

LMHC Information Sheet # 6

Paraiba Tourmaline

- **Definition**
- **Report wording**

Members of the Laboratory Manual Harmonisation Committee (LMHC) have standardised the nomenclature that they use to describe a paraiba tourmaline.

Definition

A paraiba tourmaline is a blue (electric blue, neon blue, violet blue), bluish green to greenish blue, green or yellowish green tourmaline, of medium-light to high saturation and tone (relative to this variety of tourmaline), mainly due to the presence of copper (Cu) and manganese (Mn) of whatever geographical origin. The name of the tourmaline variety 'paraiba' is derived from the Brazilian locality Paraíba where this gemstone was first mined.

- Tourmalines with only traces of copper and low colour saturation and / or outside of the defined colour range (above) are not called Paraiba tourmaline[6].
- Iron-rich copper bearing tourmaline showing in the o-ray polarised spectrum (obtained by UV-Vis-NIR spectrometer) an absorption band at 700 nm higher than the 900 nm absorption band (related to Cu) is not called Paraiba tourmaline.[6]

Report wording

Any paraiba tourmaline shall be described as,

Identification:	
(Group:)[1]	**(tourmaline)[1]**
Species:	**(natural)[1] (mineral species) tourmaline[2]**
Variety:	**(colour)[3]** (**paraiba)[1] (tourmaline)[4]**
Origin:	**(not determined), (undetermined), (Brazil), (Nigeria), (Mozambique), (other)[5]**
Further information	**Paraiba is a gem variety of tourmaline containing copper (Cu) and manganese (Mn). (The variety name is derived from the Brazilian locality Paraíba where this gemstone was first mined, however today it may come from a number of localities.)[1]** or, if paraiba is not used in the variety description **This copper (Cu) and manganese (Mn)[7] bearing tourmaline may also be called "paraiba tourmaline" in the trade. (The name is derived from the Brazilian locality Paraíba where this gemstone was first mined, however today it may come from a number of localities.)[1]**

Note: Paraiba tourmaline is commonly heated. However, in some cases this treatment is currently not determinable, see also information sheet#8.

[1] Wording and text in parenthesis is optional.
[2] The name 'tourmaline' shall be used in either the species or variety section (or both) of the report if the group is not mentioned.
[3] Optionally insert the colour of the stone being examined particularly if not described elsewhere on the report.
[4] If 'paraiba' is not used in the 'Variety' section, the word 'tourmaline' shall be used.
[5] If an origin determination is not included on a report the following wording shall be added in the comments section: 'Geographic origin has not been determined's
[6] The presence of copper may be mentioned in the comment section.
[7] If no or only very low traces of manganese are present, then manganese is not mentioned in the comment section.