

From Nigeria

New Pale Gem-Quality Emerald or Green Beryl?

Treatise by Dr H. A. Hänni, Swiss Gemmological Institute SSEF, Zürich

A discussion of green beryl vs. emerald started because of the recently found blue-green stones from Nigeria. I want to summarise the points that may lead to a decision regarding which name is to be applied.

Emerald is a green variety of beryl in which the colour comes from chromium (and vanadium). This is a historically used formula, accepted by CIBJO. Generally the name is applied without regard to the quantity of green, so long as it is perceived as green (light green emerald, medium strong green etc.). There is no master stone cutting the green line between emerald and light green emerald. Parallel to the development with ruby/pink ruby (formerly pink sapphire) I do not feel that emeralds (or rubies) need possess a certain saturation of green (or red) to earn the name. It is not a concept of nature to cut between light and darker green emerald (or rubies).

Green beryl is a variety of beryl whose colour is due to iron. It is a mixed colour of

yellow (golden beryl with trivalent iron) and blue (aquamarine with bivalent iron). A green beryl possesses both causes of colour and thus shows the mixed variety yellow + blue = green. With an excess of blue we get green-blue, with an excess of yellow we have greenish yellow.

Blue emeralds were reported towards 1974 from Zambia. They were instantly accepted as emeralds, although they have a considerable content of bivalent iron (blue). They are understandable as mixtures of emerald with aquamarine: they possess both colour reasons, thus show mixed colour.

The balance between green (chromium) and blue (bivalent iron) seems to be on the green side, nevertheless a bluish tinge is visible in those stones.

The investigation on the **new material from Nigeria** proves it to be of similar composition, although green and blue is more evenly balanced and the colourless component is stronger, leading to lighter saturations. The colour can be un-

derstood best in a colour triangle where emerald green (Cr, V), aquamarine blue (bivalent iron) and colourless beryl represent the corners. Light green or light blue is on the edge between the green or blue corner and the colourless pole. Mixed colours are situated within the triangle, depending on the relative amounts. Medium light blue-green emeralds may be placed in the centre of the triangle (as e.g. for bluegreen emeralds from Nigeria). The presence of iron and a little chromium (and vanadium) in the bluegreen crystals from Nigeria has been proved by EDS XFA analytical technique. Thus the chromium necessary for the name emerald is detected. It is true that there is not as much as normally in a Zambian emerald, but it still is able to cause the green shade beside the blue. Thus aquamarine is not masking emerald.

A proposal has been made to measure the chromium content and decide on a lower limit for emerald. This is first

not convenient because the analytical instrument required (electron microprobe) is large and expensive. Secondly it does not take into account the size and cut of the stone, which are both important for the path length that light travels in a stone, thus the strength of absorption which means intensity of colour. And thirdly a lower limit value for chromium in emeralds does not exclude the possibility that the chromium green is covered by a different colour when the presence of another chromophore element is dominant. I think that the nomenclature rules, scientific considerations and practical possibilities allow and recommend the name **bluegreen emerald** for the above described gemstones where green (due to chromium) is a visible part of the bluegreen mixed colour. With the colour description "bluegreen" we signal that the emerald under consideration is in one respect different from what one might expect from a "normal" emerald. ■

Coloured Gemstone Report