VOLUME XLV

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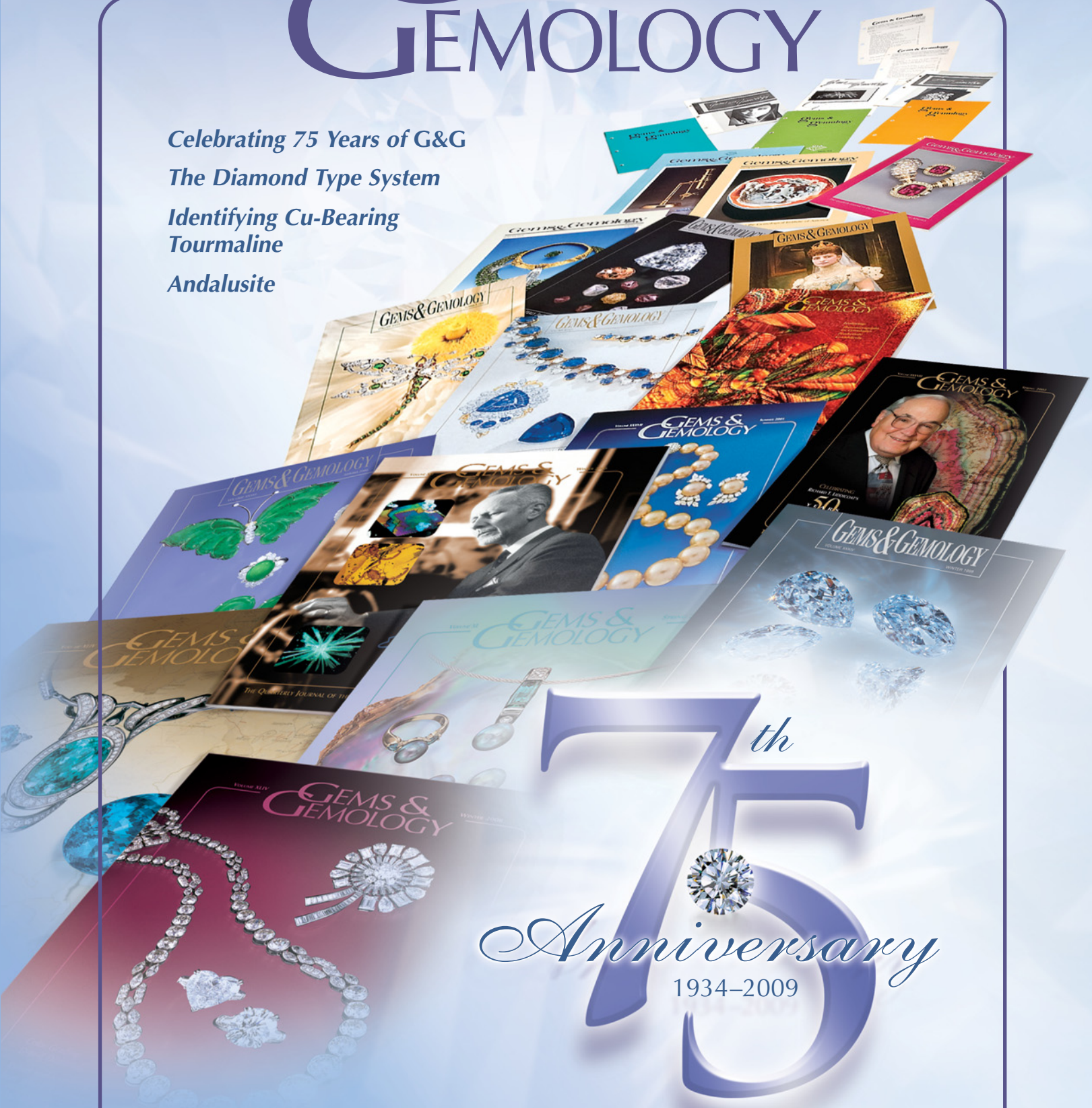
Andalusite



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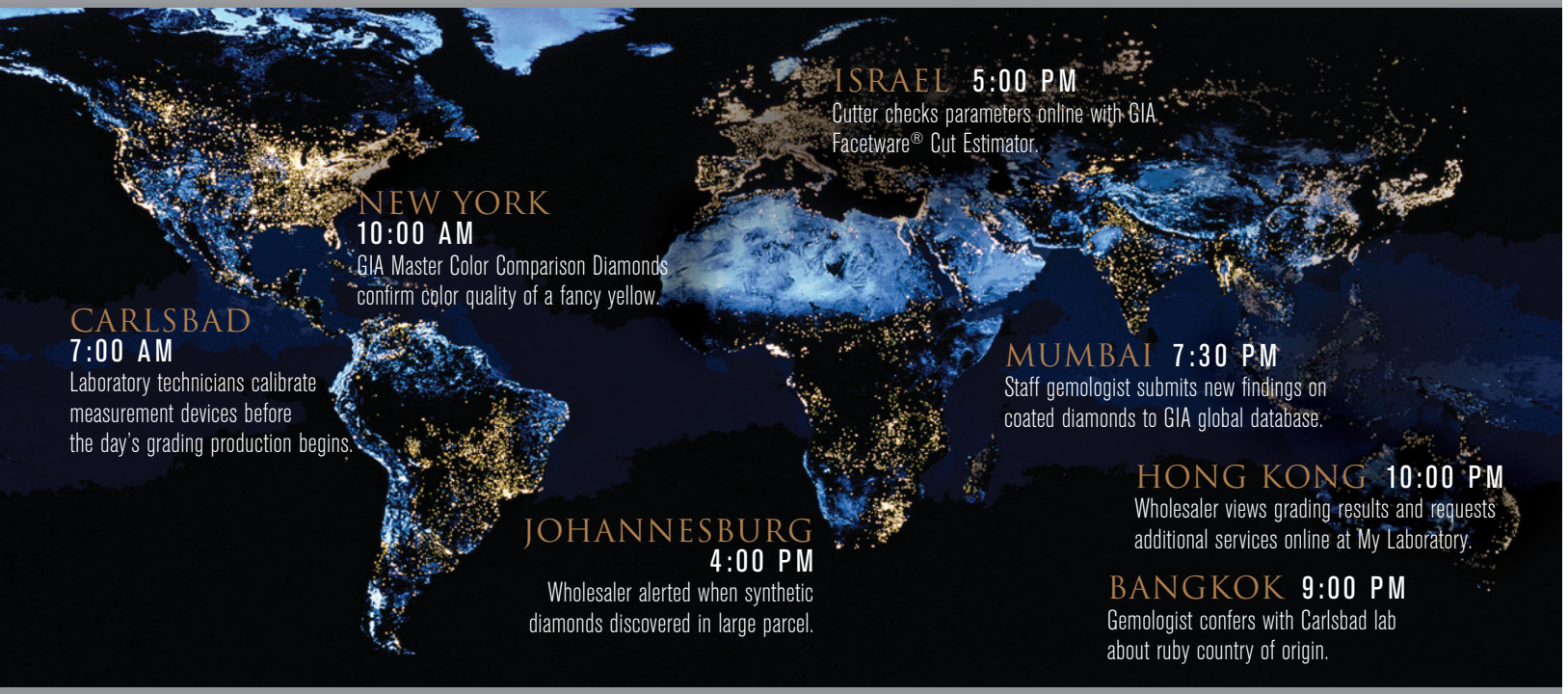

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INCONSISTENCIES IN "THE FRENCH BLUE AND THE HOPE"

In their article presenting a new model of the French Blue (Spring *G&G*, pp. 4–19), Farges et al. used a newly discovered lead cast to confirm the possibility of the Hope diamond being cut from the French Blue. During their research, they created a three-dimensional model of the cast based on the shadow projections obtained by an Octonus Helium Rough 1:4 scanner operated by Matrix Diamond Technology. The dimensions of the model are $30.37 \times 25.50 \times 12.87$ mm, which match those of the lead cast within 20 microns accuracy. (This model is available at www.octonus.com/oct/projects/frenchblue.phtml.)

From my analysis of the 3D model, I disagree with some of the statements made in the article. First, it is clear that its maximum diameter is actually 30.44 mm: The inclination of the maximum diameter to the direction of the length measurement is 4.4°, as illustrated in figure 1. If Brisson (1787) measured this true maximum diameter, and the edges of the lead cast have indeed been rounded and worn down over two centuries, then Brisson's data match the lead model in this dimension much better than the authors believed because of their assumption that Brisson measured a smaller, "non-tilted" diameter.

Next, the authors estimate the French Blue's dimensions as $29.99 \times 23.96 \times 12.11$ mm on the basis of Brisson's mistakes in measuring the Regent diamond. However, the authors did not specify their correction factor and method. Taking into account that the correction factors for the Regent are in the 1.028–1.035 range, while the correction factors for the French Blue height and width used by the authors were 1.034–1.035, a height of 12.11 requires a correction factor of 1.055. Using the 1.034–1.035 correction factor, the height would be 12.35 mm.

Finally, to correct the weight of the French Blue based on the lead cast, the authors used historical data after Bion (1791) and Brisson (1787). The weight was used as a main criterion to determine the model's accuracy. The authors used results after Morel and converted 268⅛ grains (Bion) and 260 grains (Brisson) to 69.00 ± 0.05 modern carats, as their weight estimate; this estimate was used later to adjust the dimensions of the lead cast to match the diamond's presumed weight. To obtain the weight represented by the reduced lead cast, the authors used the weight of the lead cast (which is not given in the article), the cast's density (which was determined by chemical analysis of the metal surface), and the density of the French Blue according to Brisson. This resulted in 68.3 ± 0.2 ct. The discrepancy in the estimates was explained by different factors of the lead cast's production and storage. As a result, the conclusion was made that the lead cast models the French Blue well.

However, there are several problems with this approach.

First, 268⅛ grains (Bion) equal 71.22 modern carats, while 260 grains (Brisson) correspond to 69.05 modern carats. The authors do not explain why different ratios were used for recalculation of grains into carats for the Bion and Brisson data.

Second, the 3D model developed on the basis of the lead cast obtained by an Octonus Helium Rough 1:4 scanner operated by Matrix Diamond Technology resulted in 71.4 ± 0.2 modern carats; this was not mentioned by the authors at all.

Third, the discrepancy between the dimensions of the lead cast and Brisson's data is as much as 0.6 mm, and the authors' data had a final error range of up to 1.5 mm.

Last, the chemical composition of the lead cast's surface could differ significantly from its internal chemical composition. If the authors chose not to rely on the weight calculated on the basis of the 3D model, they should have measured the lead cast volume by, for example, hydrostatic weighing. This would have provided a more reliable weight estimate to reduce the diamond density.

The issues above compel one of two conclusions: Either the French Blue weighed more than 71 ct or, if the authors consider 69 ct to be the true weight, then the 3D model based on the lead cast should be reduced to a size corresponding to 69 ct before the comparison with the models of the French Blue and Hope Diamond. However, this decrease in model parameters would make the conclusion that the Hope Diamond could have been recut from the French Blue doubtful (figure 2).

In order to increase the accuracy and reliability of the analysis, I suggest it is necessary to use the 3D models of these objects directly, not by comparison with 2D projections (which have an accuracy of only 43 pixels/mm). For a 3D model comparison, there are programs like AutoCad, Solidworks, or software for rough diamond allocation, such as PacorClient developed by OctoNus, whose products were used by the authors in the course of their research.

Sergey Sivovolenko
OctoNus Finland OY
Tampere, Finland

Reply

We welcome Dr. Sivovolenko's comments. We do wish to point out that, for space reasons, the published version of the paper was shorter than the version that was originally submitted, so it was not possible to include all relevant details.

First, we do not feel it is appropriate in such a paper to argue that one type of software is better than another. Second, a difference of 2.5 ct (out of 69 ct, following Brisson, 1787), depending on the software used, corresponds to an error of 0.3 mm in the dimensions of the cast, which is surely within the error range resulting from wear or shrinkage given its manufacture sometime before 1812. Third, we have no doubt that Brisson's 1787 measurements are accurate to the 0.03 ct level and $^{2}/_{10}$ of a millimeter based on comparison of his reports of the Regent and Hortensia diamonds with modern measurements.

Our goal was not to conduct an analytical study of the lead cast per se but to help reconstruct a mythic diamond. The lead cast is the best model known to date of the French Blue, as it has unique features (such as asymmetries) that are also present in the 1889 drawing. There is no record of any other diamond of that size with that peculiar cut, so there is no doubt that this cast is a replica of the French Blue and the only remaining artifact of the largest blue diamond ever cut.

Our research is now focusing on a second lead cast of another well-known (and lost) diamond and that of a mythic sapphire (also recut) that were found in the same set of donations.

François Farges
MNHN, Paris
Scott Sucher
Tijeras, New Mexico

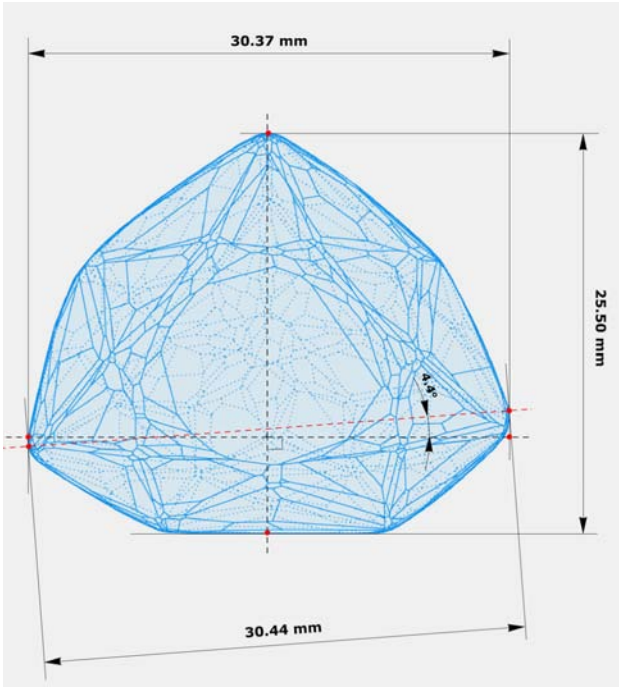
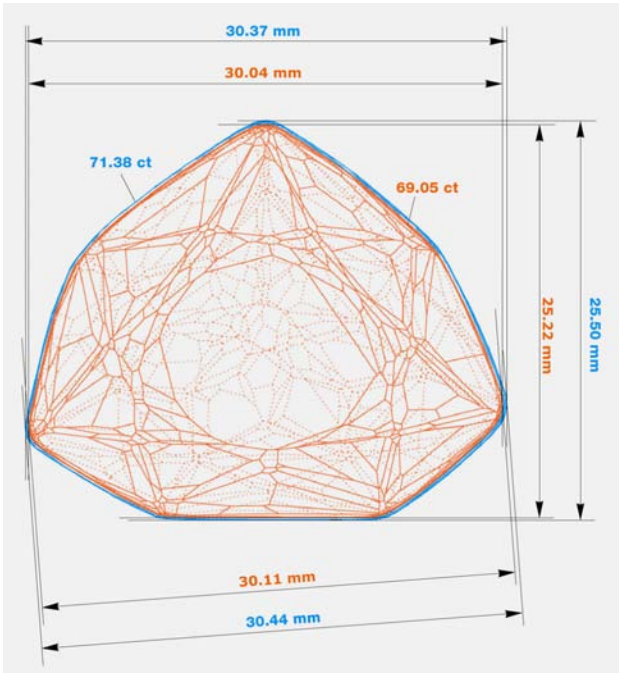


Figure 1. The maximum diameter of the French Blue model is actually 30.44 mm, if the measurement is taken in a direction slightly inclined from a line directly across the table.

Figure 2. Based on the Helium 3D model, the weight of the French Blue would be at least 71.38 ct. Reducing the weight to 69.05 ct, as given in Farges et al., would require reducing the dimensions as shown.



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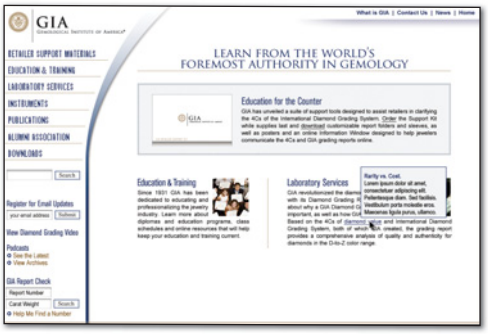

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