

## BOOK REVIEW

PHOTOATLAS OF INCLUSIONS IN GEMSTONES, Vol. 3, by Eduard J. Gübelin and John I. Koivula (2008). Opinio-Verlag, Basel, Switzerland, 672 p. \$300.00 plus shipping (and tax, if applicable). ISBN 978-3-03999-047-4.

The *Photoatlas* is fundamentally a compendium of photomicrographs of inclusions in gemstones organized and described in a fashion to enhance the gemologist's skills at identifying and interpreting such inclusions. The second volume proceeds from an earlier volume that was published in 1986, and fundamentally updates the older volume to 2005. This volume, the third, focuses on the so-called "precious stones"—diamond, ruby, emerald, and sapphire, but with significant additions relating to "treated" gems and synthetics (both of the actual species as well as simulants). Eduard Gübelin, a dean of the gemological community (deceased in 2005), and John Koivula, a renowned gemologist and inclusion expert at the Gemological Institute of America (GIA), have been the experts in this field, so the book is a testament and proof of their experience and expertise with respect to inclusions in gemstones and gemology, more generally. Moreover, as the authors appreciate the beauty as much as the information revealed by inclusions, the *Photoatlas* can be viewed as a paean to gem inclusions as art. The images are superb and printed in high quality on heavy paper with attention to color correction (typically a problem for colored stones and inclusions). The authors also justifiably point out that inclusions and their identification can be critical, perhaps the only non-destructive and ready means to determine the origin (natural, natural-but-treated, or synthetic) and source of a gem (i.e., deposit, such as Mogok vs. Mongshu for Burmese ruby). Thus, while flawlessness of a stone may be praised, it provides fewer indications of its source or possible treatment.

The *Photoatlas* is arranged with a foreword by Edward Boehm, Gübelin's grandson and a well-known gemologist himself, and acknowledgments, a short introductory section that lays out concepts and terms, and then dives into sections on diamond, ruby, sapphire, emerald, and rare and unusual gems. Except for diamond, which is not formed by crustal processes, each section for the "precious gems" is divided into subsections for the most significant sources, such as Mogok, Mongshu (both Myanmar), Kashmir, and Kenya, ordered by the category of geological origin and synthetics. The beginning of each section has an overview that includes differentiation among origin types and an extensive list of references primarily from the gem literature. Finally, there is a short summation section, a shorter glossary, and an index.

The intended market for the *Photoatlas* is gemologists, most obviously those involved with routine examination of gems with microscopes but perhaps without some expensive instrumenta-

tion, such as confocal Raman microspectrometry. Certainly, it is also a reference book in the training of gemologists. Whether the average gemologist in the gem trade or mineralogists who are interested in gems will consider this book something for their libraries depends on the balance between cost, utility, and desire for such a beautiful compilation of images.

The fundamental strengths of the *Photoatlas* are its depth and comprehensive coverage of inclusions in gemstones combined with the quality and care of the authors in providing superbly captured images, clear text, and well-organized content. In addition to the introduction of each section, the photo captions explain what is observable, highlighting the inclusion species, and contain abbreviations that indicate the microscopic and illumination techniques, such as DF for dark field and PL for polarized light, plus a magnification scale referring to the 35 mm frame of the photographic film used (not digital photography in this book). There is no longer a labeling of origin type because the groupings are arranged by that distinction, which is an improvement from the second volume.

As noted above, the book organizes images by the geological classification of the source deposit, such as marble-hosted ruby deposits as compared with metamorphic or xenocrystic in igneous rocks. The authors acknowledge that it may be difficult to distinguish among marble-hosted ruby sources such as Mogok (and its associated deposits in the Mogok belt) from Luc Yen, Vietnam, however the diagnostic features, for example "silk" in Mogok rubies, are pointed out.

Because the audience is geological, most of the citations and language is largely limited to gemology. As a mineralogist, I understand the focus but find it limited particularly with the increase of research in geosciences and material sciences on gem materials. Another absence that I find puzzling is substantiation of inclusion identity by something other than visual observation. The images of colorless inclusions in strongly colored stones such as rubies or emeralds are frequently enigmatic, so how was it distinguished, whether by optical or other techniques such as Raman spectroscopy. Although this is not a textbook and volume 2 has more of the detail on technique, I find the lack of criteria puzzling.

Perhaps the most useful aspect of this volume for the practicing gemologist today are the sections on treatments and synthetics. The practice of gem treatment has expanded dramatically over the years, and discernment by simple methods is a critical issue in the gem industry. Although disclosure of a gem's pedigree is the legal standard, the gemologist must make an assessment whether the claims made about a stone's untreated or natural character are true or false. This volume of the *Photoatlas* provides valuable images to help with these assessments.

Using the *Photoatlas* may be difficult for on the spot observations unless the reader has first done a thorough examination of the relevant sections. This results from its layout, limited index, and lack of textbook style, which makes it hard to find the image or two that would resolve a question. Instead the layout demands a full perusal to gain a full picture of the inclusion suites from which a decision can be made for a problem at hand. Whether this proves useful in practice, I cannot judge from my non-gemologist academic perspective.

Finally, as I posited in 2008, I wonder whether the market for this *Photoatlas* might be better ready for a DVD with a built-in database system that permits organizing images along many paths of interest (perhaps the concern for the fidelity of chromes vs. digital images plays a role in this decision). In addition

to the organization provided in the serial layout of the book, examining images by gem, inclusion characteristic, localities, or whatever could be of great value on a computer adjacent to a microscope.

*Reviewers note:* I reviewed Volume 2 in 2008, and as there are great similarities among the volumes, I have retained much of what I wrote in the previous review.

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